Columbia River Commercial Advisor Group Meeting

January 11, 2022
10:00a-12:00p
Virtual

Prepared by: Columbia River Joint Staff

Columbia River Commercial Advisor Group Meeting

Join on your computer or mobile app Click here to join the meeting
Or call in (audio only) +1 564-999-2000,,93223524# Phone Conference ID: 932 235 24#

10:00a – 12:00p January 11, 2022

Agenda	
• **Welcome and Introductions** o Ground rules o Introduction o Staff roles o Agenda review	(15 minutes)
• **Update on white sturgeon** o 2021 population status and trends (lower river) o 2022 fishery discussion (lower river)	(35 minutes)
• **Update on Eulachon smelt** o Population trend o 2022 outlook	(25 minutes)
• **Summary of 2021 Salmon Fisheries**	(15 minutes)
• **Ocean Conditions & Forecasts** o Ocean conditions o 2022 forecast (spring/summer Chinook and sockeye)	(15 minutes)
• **Future Meetings** o Compact Hearing (smelt), January 25, 10a o CRCAG February 8, virtual, (placeholder) o Compact Hearing (select areas), February 15 (tentative) o Joint State Hearing (recreational spring Chinook), February 23 (tentative) o North of Falcon #1, March 15 (tentative) o North of Falcon #2, April 1 (tentative)	(15 minutes)

Ground rules

- For virtual meetings
  - *6 to mute/unmute
  - Chat will not be monitored or used except for technical assistance
- Focus on the task at hand – *stick to the agenda*
- One person at a time to speak – *speak your name to be added to the speaking list*
  - Non-advisers will observe meeting and stay on mute – *comments may be permitted at the end of the meeting if time permits*
- Be respectful of others
  - Mute phone or line
  - Be tough on issues and questions, not on people or organizations
  - No personal attacks, insults or threats
  - Listen

    - Speak and act professional – *no offensive, disrespectful, or derogatory language, including profanity*
    - Allow for a balance of speaking time – *limit length and number of times to speak on each topic*
- Be a conduit – *share information*

Columbia River Commercial Advisory Group (2021–2023)

First	Last	City	State
Les	**Clark**	Chinook	WA
Jim	**Coleman**	St. Helens	OR
Darren	**Crookshanks**	Longview	WA
Bryce	**Devine**	Longview	WA
Steve	**Fick**	Astoria	OR
Tim	**Heuker**	Cascade Locks	OR
Bill	**Hunsinger**	Astoria	OR
Otis	**Hunsinger**	Astoria	OR
Greg	**Johnson**	Vancouver	WA
Brian	**Love**	Brush Prairie	WA
Kent	**Martin**	Skamokawa	WA
Aaron	**Miller**	Naselle	WA
Robert	**Sudar**	Longview	WA
Brian	**Tarabochia**	Astoria	OR
Derek	**Wall**	Astoria	OR
Jim	**Wells**	Astoria	OR
Ken	**Wirkkala**	Ilwaco	WA

Joint State Staff roles

ODFW – Columbia River Management

Tucker Jones (971-673-6067), Clackamas

- Ocean Salmon and Columbia River Program (OSCRP) Manager
  - Supervises OSCRP Program
- Policy level representation in various inter-jurisdictional forums
- OR representative for Compact/Joint State hearings

John North (971-673-6029), Clackamas

- Columbia River Fisheries Manager
  - Design, recommend, and implement fisheries in Columbia/lower Willamette rivers
- Supervise ODFW Columbia River Management program/staff
- Lead technical staff for Compact/Joint State hearings
- *U.S. v OR* Technical Advisory Committee (TAC) representative

Jeff Whisler (971-673-6024), Clackamas

- Columbia River Asst. Fisheries Manager
  - Assist with design/implementation fisheries in Columbia/lower Willamette rivers
- Primary technical analyst
- Technical staff for Compact/Joint State hearings
- TAC representative

Kevleen Melcher (971-673-6030), Clackamas

- Columbia and Willamette River Project Leader
- Responsible for coordinating sampling of fisheries in lower Columbia/Willamette rivers
- Primary contact for Willamette Falls fishway/counts

Cameron Duff (971-673-6057), Clackamas

- Select Area /Estuary Fisheries Project Leader
- Primary contact for Select Area commercial fisheries
  - Responsible for implementing and evaluating Select Area fisheries
- Responsible for coordinating sampling of Estuary fisheries in lower Columbia River

WDFW – Columbia River Management Unit

Charlene Hurst – Columbia River Management Unit Lead (360-605-5247), Ridgefield

- Columbia River Policy lead, supervise Ryan, Laura, Mark, Eric, Charlie
- Decision maker for Compact/Joint State hearings
- *U.S. v OR* policy representative

Ryan Lothrop – Columbia River Fisheries Manager (360-701-3602), Olympia

- Columbia River fishery lead, supervise Tim, Quinten, and Beth
- Fishery coordinator with eastside regions, ODFW and tribes
- TAC representative and lead technical staff (WA) for Compact/Joint State hearings

Tim Sippel – Columbia River Fishery Management Biologist (360-628-6953), Ridgefield

- Technical support for CRMU fisheries
- TAC representative

Quinten Daugherty – Columbia River Fishery Management Biologist (360-844-0205), Ridgefield

- Technical analyst, and design, recommend, and implement fisheries in Columbia
- Technical staff for Compact/Joint State hearings

Beth Deacy – Columbia River Fishery Sampling Coordinator (360-600-7069), Ridgefield

- Coordinates activities around fishery sampling and test fisheries

Laura Heironimus – Sturgeon, Smelt, Lamprey lead (360-719-0677), Ridgefield

- Supervises sturgeon, smelt, and lamprey research/monitoring programs
- Lead on white sturgeon and eulachon conservation and management
- Technical staff for Compact/Joint State hearings

Mark Sorel – Columbia River Fishery Analyst, Ridgefield

- Provides analytical/statistical support
- TAC representative

Lower Columbia River White Sturgeon

Stock Assessment and Fishery Management

2022 Update

Summary Prepared by

Joint Columbia River Management Staff

Washington Department of Fish and Wildlife
Oregon Department of Fish and Wildlife

Table 1. Dashboard of key status indicators for lower Columbia River white sturgeon, 2021. Colored circles indicate status relative to Conservation Plan metrics and/or recent trend.

Metric	N	Interpretation	Brief Summary
Abundance Trends 38" – 54" FL	122,395		Abundance estimate continues recent declining trend; Significantly above conservation status level.
Adult (>66" FL)	2021: 6,769 3-yr avg.: 11,064		2021 3-yr adult abundance avg is above desired status level (threshold = 9,250 adults); point estimate is above conservation status level (3,900).
Population Structure	~56% juvenile		Low relative abundance of juvenile and sub-legal sized fish indicates population productivity issues; Below conservation status level (threshold = 60%).
Recruitment Index (CPN)	LCR: 0.02 WR: 0.17		Low recruitment numbers in both CR and WR indicate continued productivity issues with this population segment.
Fisheries	Total: 36,704 angler trips		Participation still down from pre-closure levels, but interest in retention fishing opportunity remains.

Abundance and CPUE Trends

Table 2. Estimated and projected abundance of 38–54 inch FL (96–137 cm) white sturgeon in the LCR from 2008–2021 based on mark-recapture surveys. Historic method is the number of fish present at the start of July (2008–2009) or May (2010–2012), while the setline method is the number of fish present at the start of the year. Preliminary estimates are italicized.

Year	Historic method estimate	Setline method			Harvest guideline
		Estimate (95% C.I.)		Projection [1]	
2008	101,200	--		--	40,000
2009	95,000	--		--	40,000
2010	65,300	100,300		--	24,000
2011	72,800	80,600		77,000	17,000
2012	83,400	72,700		65,000	10,400
2013	--	113,900		74,300	10,105
2014	--	131,000	(75,500 – 186,480)	131,700	--
2015	--	143,900	(85,700 – 202,100)	138,200	--
2016	--	224,000	(118,300 – 329,600)	147,100	--
2017	--	199,800	(69,900 – 329,700)	237,900	6,235
2018	--	162,200	(93,400 – 230,950)	198,300	6,160
2019	--	168,200	(100,100-236,300)	164,100	6,160
2020 [2]	--	199,500	(40,100-358,800)	148,800	5,720
2021	--	122,395	(63,322-181,468)	206,100	6,160
2022				*114,356*	TBD

[1] *Projected abundance is based on the previous year's setline estimate. Projections do not include harvest.*

[2] *Due to sampling issue related to COVID-19 pandemic, the sample size was lower than standards and therefore the estimate of 199,500 during 2020 has considerable uncertainty.*

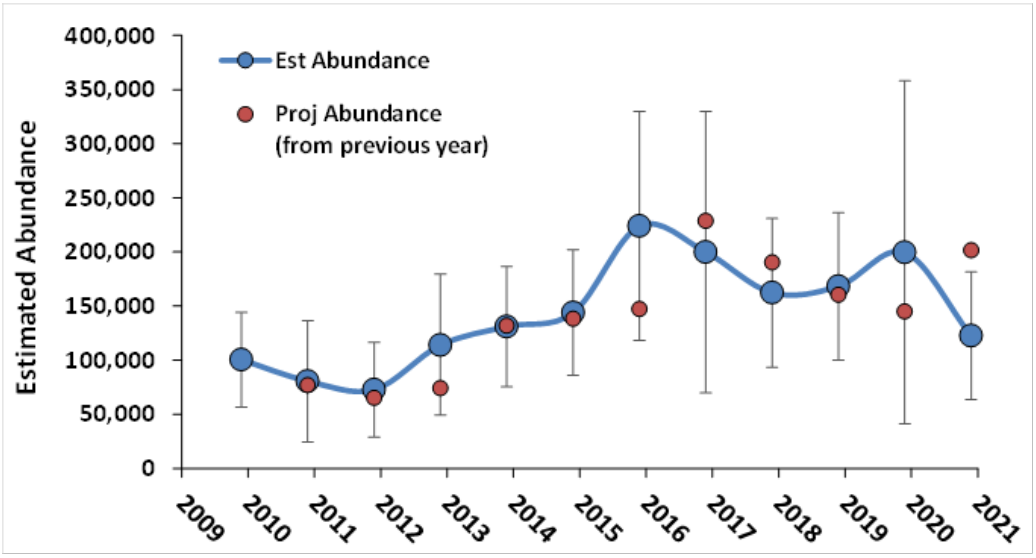


Figure 1. Estimated and projected abundance for 96–137 cm FL White Sturgeon from the LCR, 2010 – 2021. Error bars represent 95% CI's for the estimated abundance.

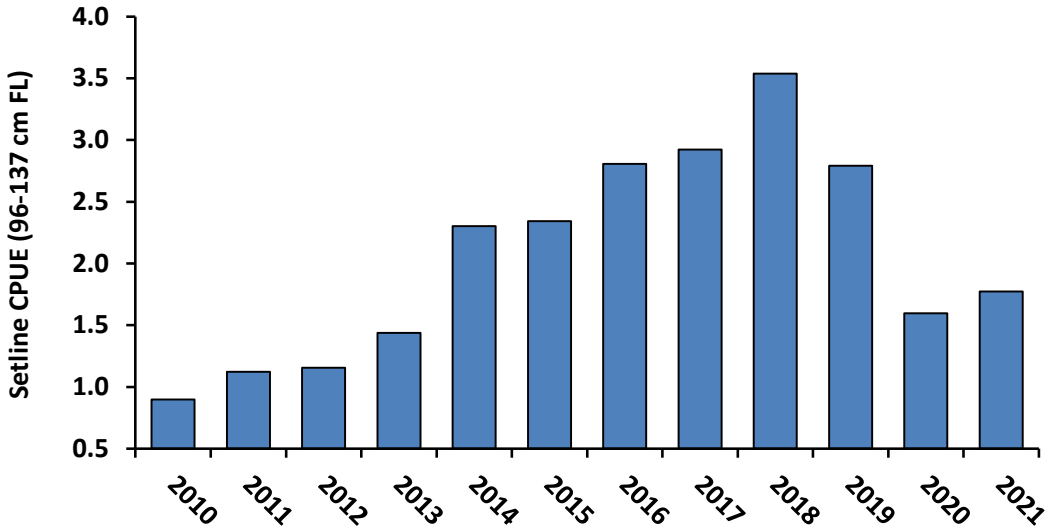


Figure 2. CPUE of 96 – 137 cm FL White Sturgeon caught with setlines in the LCR, 2010 – 2021.

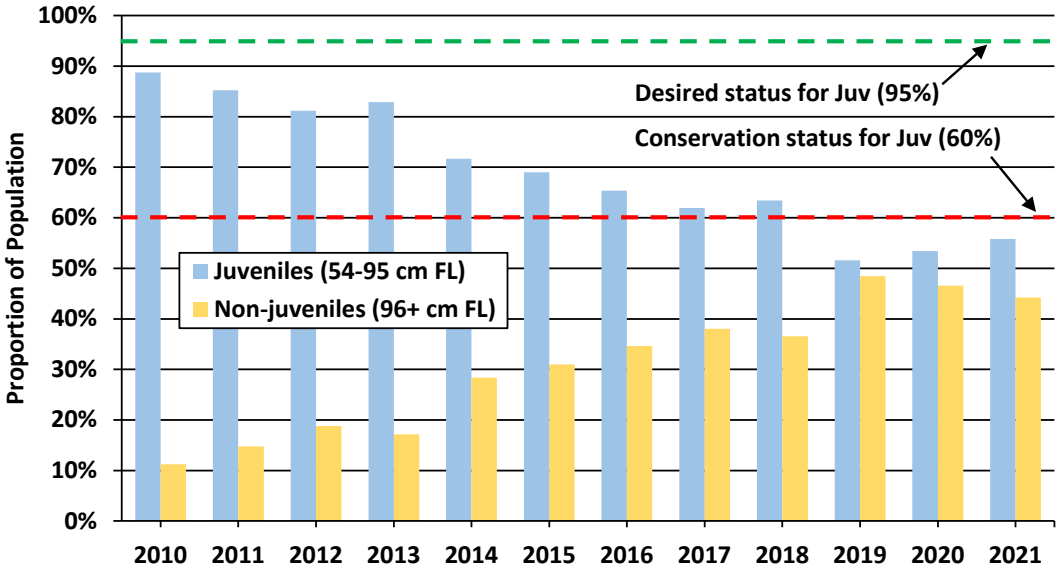


Figure 3. Lower Columbia River White Sturgeon population composition, 2010 – 2021.

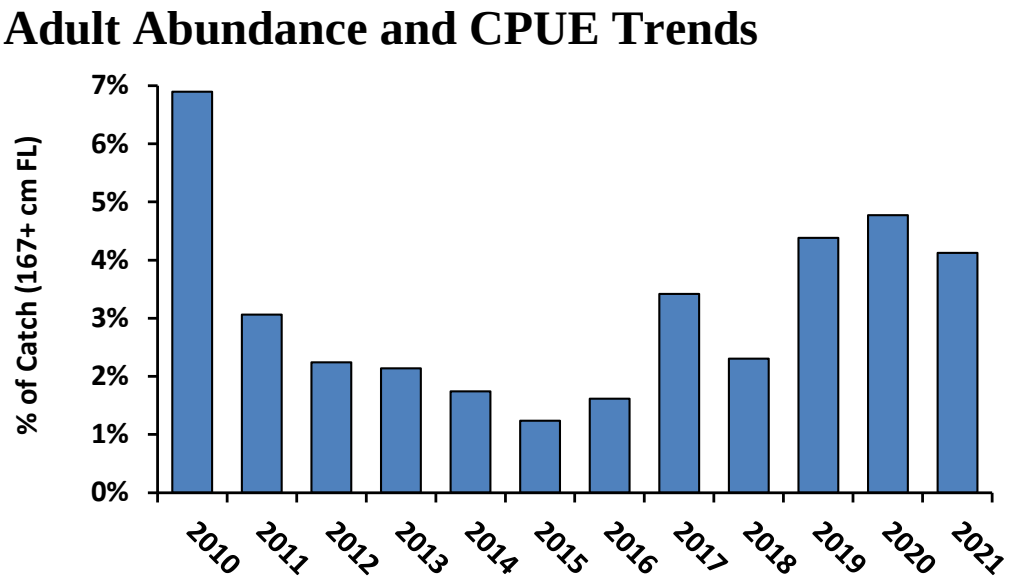


Figure 4. Percent of LCR setline catch comprised of White Sturgeon ≥ 167 cm FL, 2010 – 2021.

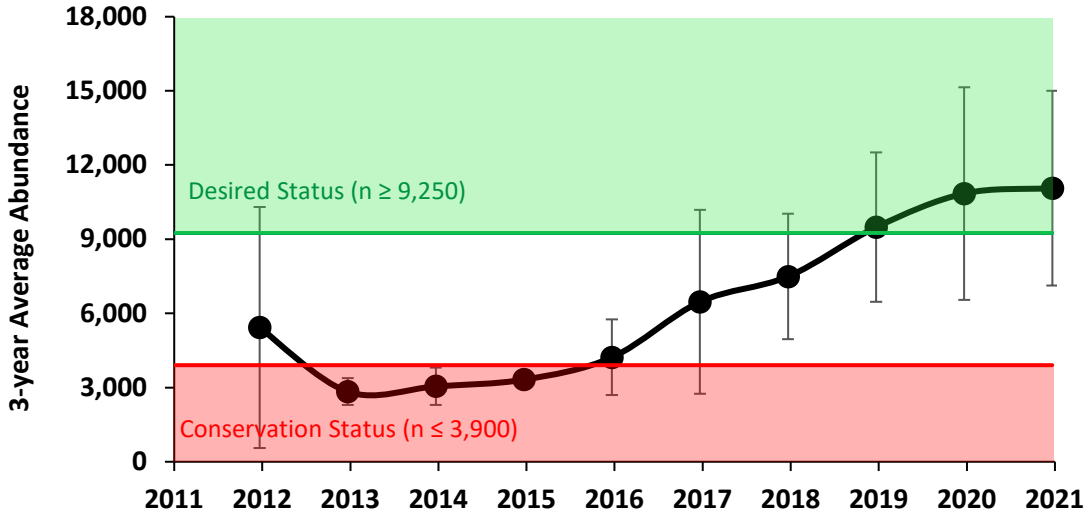


Figure 5. Three-year running average estimated abundance for White Sturgeon ≥ 167 cm FL from the LCR, 2012 – 2021. Less than three years of data were available prior to 2012, therefore no averages were calculated. Error bars represent one standard deviation.

Length Frequency Trend

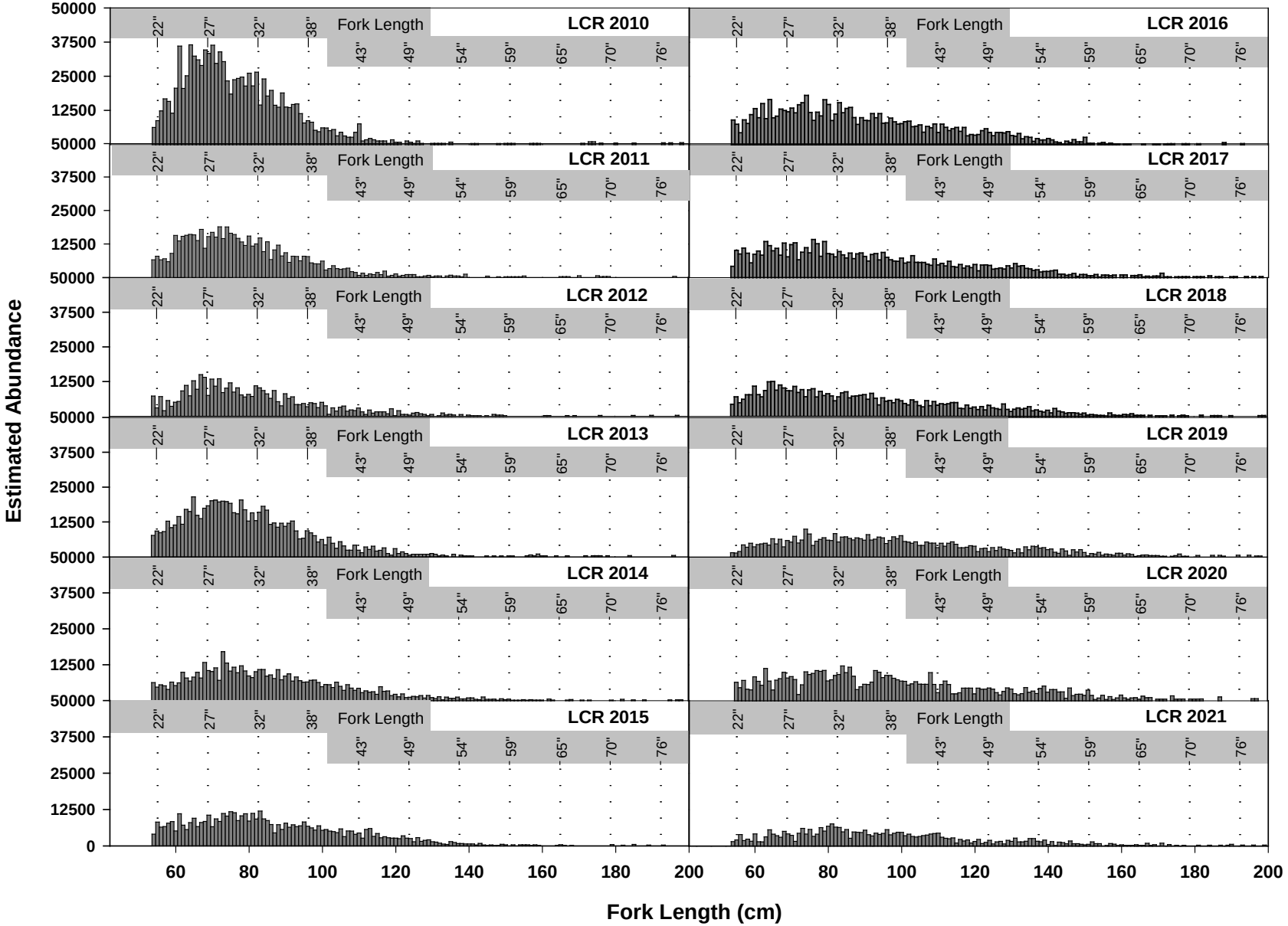


Figure 6. Estimated abundance by 1-cm length increments of White Sturgeon ≥ 54 cm FL from the LCR, 2010 – 2021.

Legal-size Abundance Forecasts

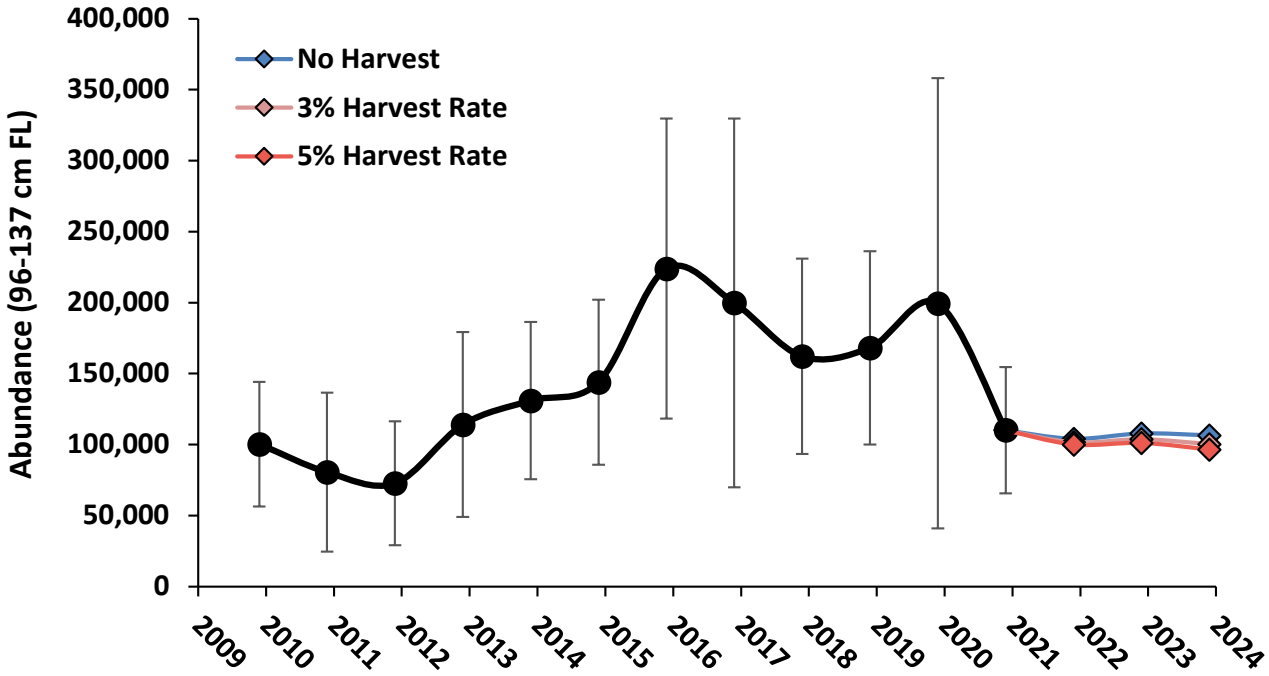


Figure 8. Projected abundance of White Sturgeon 96 - 137 cm FL in the LCR under different annual harvest rates.

Sub-yearling (Age-0) Production

Table 4. Annual recruitment index (E_p) and catch-per-net (CPN) for age-0 White Sturgeon from the Willamette River (Will R) and the lower Columbia River (LCR), 2004 – 2021.

Year	Will R E_p	Will R CPN	LCR E_p	LCR CPN
2004			0.44	1.29
2005			0.49	1.74
2006			0.52	1.88
2007[1]			--	--
2008			0.45	1.23
2009			0.78	5.66
2010	0.24	0.43	0.18	0.19
2011	0.06	0.06	0.34	0.58
2012	0.22	0.25	0.35	0.77
2013[2]	--	--	0.12	0.21
2014	0.38	1.38	0.31	0.56
2015	0.26	0.58	0.05	0.06
2016	0.50	0.75	0.14	0.20
2017	0.50	1.75	0.58	1.64
2018	0.83	3.96	0.27	0.43
2019	0.58	1.13	0.19	0.30
2020[1]	--	--	--	--
2021	0.17	0.17	0.02	0.02

[1] No age-0 sampling in either the lower Columbia or Willamette rivers.
[2] No age-0 sampling in the Willamette River.

2022 Fisheries:

- Commission:
  - OR and WA will present updated stock status information and share staff recommendations for the 2022 fisheries to respective commissions in February.
    - Oregon: Feburary 18, 2022
    - Washington: February 18-19, 2022
  - Advisor feedback is important to developing staff recommendations and receiving commission support.
- Considerations for fisheries:
  - Guideline reduced by approximately 1/3 compared to 2021 in both recreational and commercial fisheries.
  - Reduced opportunity to accommodate smaller guidelines is expected.

Appendix
Predation and Harvest Data

Appendix Table 1. Annual recruitment index (E_p) and catch-per-net (CPN) for age-0 White Sturgeon from the Willamette River (Will R) and the lower Columbia River (LCR), 2004 – 2021.

	Spring Sampling Period [2]			Fall-Winter Sampling Period [3]
Year	Total hours observed	Observed sturgeon catch	Adjusted sturgeon catch estimate	Adjusted sturgeon catch estimate (95% CI)
2005	1,109	1	--	
2006	3,650	265	413	
2007	4,433	360	664	
2008	5,131	606	1,139	
2009	3,455	758	1,710	
2010	3,609	1,100	2,172	
2011	3,315	1,353	3,003	
2012	3,404	1,342	2,498	
2013	3,247	314	635	
2014	2,947	79	146	
2015	2,995	24	44	
2016	1,974	30	90	
2017	1,142	6	24	238 (183-281)
2018	1,410	46	148	359 (301-416)
2019	836	22	187	762 (583-915)
2020 [4]	331	9	57	--

[1]*Data from U.S. Army Corps of Engineers observation program (http://pweb.crohms.org/tmt/documents/FPOM/2010/Task%20Groups/Task%20Group%20Pinnipeds/)*

[2]*Spring sampling period: January-July.*

[3]*Fall-Winter sampling period: August-December*

[4]*Data for spring 2020 limited to April 4 through May 20 due to the COVID-19 pandemic. Data for fall 2020 and spring 2021 not currently available.*

Appendix Table 2. Annual recreational white sturgeon catch and harvest guidelines in the lower Columbia River, 1994-2021.

	Below Wauna [1]		Above Wauna		Combined	
Year	Catch	Guideline [2]	Catch	Guideline [3]	Catch	Guideline
1994	15,578	N/A	17,893	N/A	33,471	
1995	29,714	N/A	15,423	N/A	45,137	
1996	27,694	N/A	15,068	N/A	42,762	
1997	24,511	N/A	13,646	N/A	38,157	53,840
1998	30,303	N/A	11,293	N/A	41,596	53,840
1999	29,238	N/A	10,561	N/A	39,799	40,000
2000	24,267	N/A	16,238	N/A	40,505	40,000
2001	21,619	N/A	19,597	N/A	41,216	39,500
2002	26,234	N/A	12,045	N/A	38,279	38,300
2003	18,367	19,200	13,565	12,800	31,932	32,000
2004	15,050	16,000	10,519	12,800	25,569	28,800
2005	17,911	17,783	11,891	11,560	29,802	29,343
2006	15,726	16,000	8,545	12,800	24,271	28,800
2007	19,131	16,274	10,675	13,852	29,806	30,126
2008	13,614	13,143	7,959	12,387	21,573	25,530
2009	13,109	15,529	4,599	11,430	17,708	26,959
2010	6,491	9,600	4,831	4,835	11,322	14,435
2011	6,117	6,800	2,908	3,410	9,025	10,210
2012	4,466	4,160	1,859	2,080	6,325	6,240
2013	4,559	4,042	1,942	2,021	6,501	6,063
2014 [4]	0	0	0	0	0	0
2015 [4]	0	0	0	0	0	0
2016 [4]	0	0	0	0	0	0
2017	3,235	3,000	430	1,245	3,665	4,245
2018 [5]	2,412	2,960	1,050	1,230	3,462	4,190
2019 [5]	2,838	2,960	735	1,230	3,573	4,190
2020 [5,6]	0	2,750	857	1,140	857	3,890
2021 [5,7]	2,549	2,960	885	1,230	3,434	4,190

[1] Recreational catch estimates for 1993-2002 are above and below the western tip of Puget Island (RM 38).

[2] The switch to a 45-inch min. (TL) size limit in 2004 required a 17% reduction in the base guideline.

[3] Actual in-season guidelines were different than represented here. Beginning in 2010, the guideline for the area above Wauna does not include the Willamette guideline.

[4] No sturgeon retention allowed during 2014-2016.

[5] The Cowlitz River was opened with the Above Wauna fishery in 2018–2021.

[6] No estuary sturgeon retention allowed during 2020.

[7] Preliminary.

Appendix Table 2. Annual recreational white sturgeon catch and harvest guidelines in the lower Willamette River, 2004-2021.

Year	Catch [1]	Baseline [2]	Catch in Excess of Baseline [3]	Guideline [3]	% of Guideline
2004	4,099	1,225	2,874	Na	
2005	2,327	1,225	1,102	Na	
2006	3,348	1,225	2,123	Na	
2007	6,555	1,225	5,330	Na	
2008	9,148	1,225	7,923	Na	
2009	7,346	1,225	6,121	Na	
2010	3,529	735	2,794	2,865	98%
2011	2,690	520	2,170	2,030	107%
2012	1,535	520	1,015	1,248	81%
2013	1,410	520	890	1,213	73%
2014 [4]	0	0	0	0	NA
2015 [4]	0	0	0	0	NA
2016 [4]	0	0	0	0	NA
2017 [5]	0	0	0	745	0%
2018 [5]	0	0	0	740	0%
2019 [5]	0	0	0	740	0%
2020	167	0	0	690	24%
2021	87	0	0	740	12%

[1] Harvest estimates revised November 2011 based on updated punch card and existing creel information.

[2] Baseline harvest levels for the lower Willamette River were based on average harvest during 1986-1996 (1,225 fish). The lower Willamette River baseline decreased to 735 fish in 2010 and 520 fish in 2011 consistent with declining legal abundance estimates. The baseline was eliminated in 2017.

[3] During 2003-2009, harvest in excess of the baseline was applied to the above Wauna recreational harvest guideline. Beginning in 2010, a separate harvest guideline was established for the lower Willamette River.

[4] No sturgeon retention allowed during 2014-2016.

[5] No retention fisheries occurred in 2017-2019.

Appendix Table 3. Annual commercial white sturgeon landings and harvest guidelines in the lower Columbia River, 2000-2021.

	Mainstem							Select Area				
Year	Winter Sturgeon [1]	Winter Salmon	Summer	Early August	Late August	Late Fall	Total	Winter/ Spring/ Summer	Fall	Total	Grand Total	Guideline
2000	2,260			2,490	300	5,130	10,180	540	160	700	10,880	10,000
2001	3,060			4,720	1,020	0	8,800	490	20	510	9,310	9,100
2002	2,720			1,340	380	4,200	8,640	650	330	980	9,620	9,800
2003	1,490	27		2,170	410	3,430	7,527	250	170	420	7,947	8,000
2004	1,696	174	9	1,550	917	3,219	7,565	184	117	301	7,866	8,000
2005	473	70	1,369	1,129	965	3,793	7,799	279	74	353	8,152	8,200
2006	288	1,651	544	1,548	363	3,492	7,886	317	109	426	8,312	8,000
2007	1,424	47	414	2,646	91	2,734	7,356	257	148	405	7,761	7,850
2008	869	17	523	2,706	103	3,170	7,388	337	134	471	7,859	7,927
2009	1,697	21	624	2,213	756	2,001	7,312	311	114	425	7,737	8,000
2010	518	28	289	1,578	297	1,348	4,058	211	116	327	4,385	4,800
2011	50	125	504	967	353	1,187	3,186	201	0	201	3,387	3,400
2012	40	14	281	585	409	368	1,697	225	0	225	1,922	2,080
2013	15	274	326	0	719	324	1,658	254	100	354	2,012	2,021
2014 [2]	0	0	0	0	0	0	0	0	0	0	0	0
2015 [2]	0	0	0	0	0	0	0	0	0	0	0	0
2016 [2]	0	0	0	0	0	0	0	0	0	0	0	0
2017	0	0	0	0	485	239	724	266	237	503	1,227	1,245
2018	0	0	0	0	413	0	413	296	117	413	826	1,230
2019	0	0	0	0	509	0	509	487	212	699	1,208	1,230
2020	0	0	0	74	332	161	567	547	0	547	1,114	1,140
2021	0	0	0	27	270	98	395	428	371	799	1,194	1,230

[1] Prior to 2003, values reflect all winter fisheries.

[2] No sturgeon retention allowed during 2014-2016.

Columbia River Eulachon Smelt

Stock Status

- In the last decade, the adult run abundance has ranged from a low of 370,000 pounds in 2018 to 16,632,100 pounds in 2014 (Figure 1).
- In 2021, a complete field season was conducted with sampling occurring over 18 weeks from January through mid-May. Sampling occurred twice per week for 5 weeks during peak larval outflow. The adult abundance for 2021 is estimated at 8,990,000 pounds, which is double the 2019 estimate and the highest adult abundance since 2015.
- There has been an increasing trend in the Eulachon run size since 2018. Although an adult abundance estimate for 2020 is not available, observations and limited sampling conducted suggest 2020 was congruent with that trend.

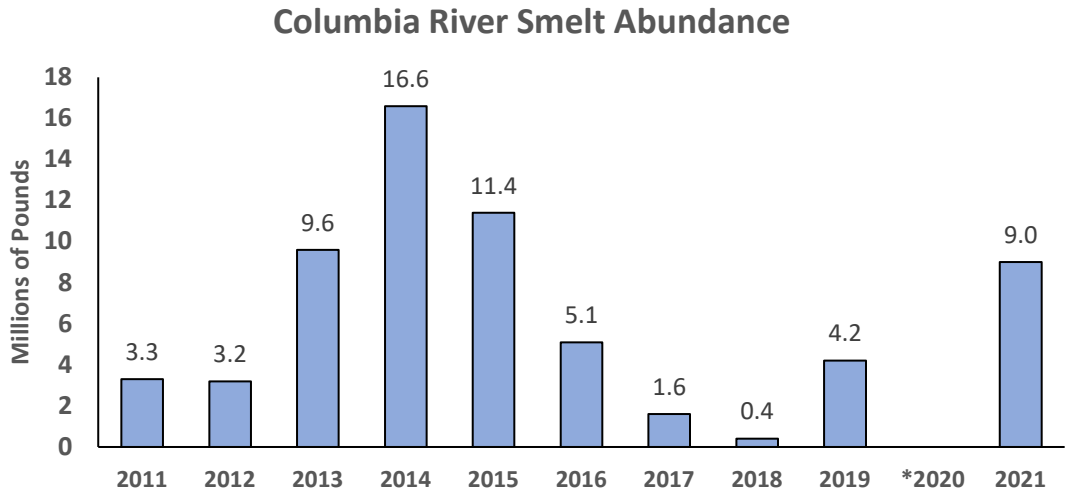


Figure 1. Columbia River Eulachon abundance by year. The 2020 run size estimate is unavailable due to an incomplete sampling season.

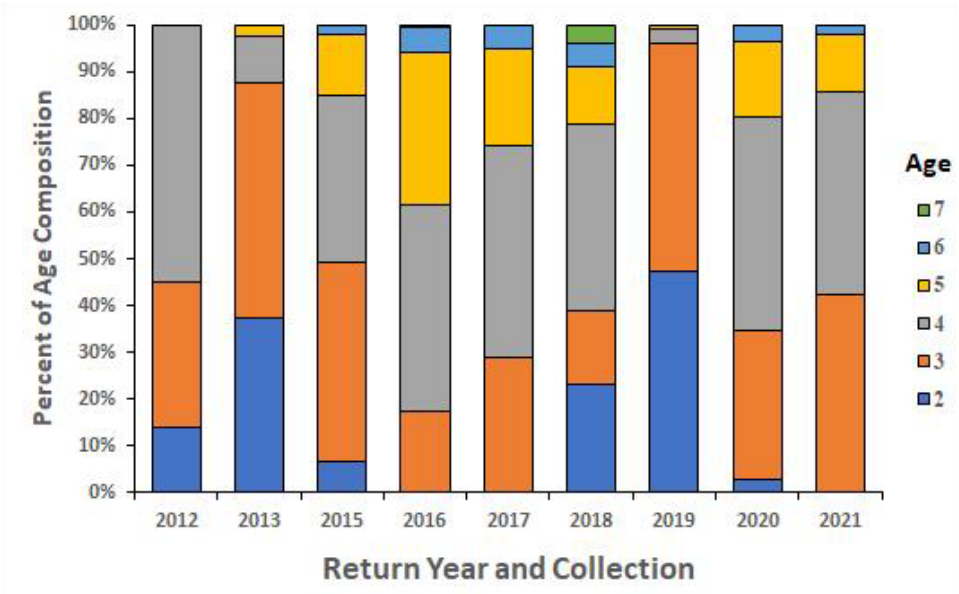


Figure 2. Columbia River Eulachon adult spawning run age composition by year.

Positive abundance indicators for 2022:

- A moderate return of the brood year 2017 and 2018 Eulachon adults returned in 2020 and 2021 which may indicate a similar moderate return of these cohorts in 2022 (Figure 2).
- Improved environmental conditions during outmigration for the 2017 (Age-5), 2018 (Age-4) and 2019 (Age-3) cohorts likely improved survival to the ocean, such as:
    - January through March, river temperatures were cool to warm and the flow quick, which may have led to normal or late yolk sac absorption.
    - March through June, estuary water particle residence time was shorter than average, which might lead to an early to normal ocean arrival time.
    - April through June, the volume of the Columbia River plume was large, which may have improved conditions for larvae entering the ocean environment.
- Ocean Indices such as PDO, SOI, and ONI show neutral to favorable conditions during 2017 and 2018. Values in 2019 shifted to neutral or unfavorable, then improved again during 2020 and 2021 to the lowest values since 2012. The recent 3-year running average is the lowest observed since 2012-2014, suggesting ocean conditions supporting the 2022 run are the best since 2015.
- Marine food sources have been improving since 2018—the copepod composition off Newport, Oregon has mostly been comprised of nutritionally richer northern species of copepod.

Negative abundance indices for 2022:

- Warm water temperatures during the 2018 larval outflow period could have negatively impacted early survival of this cohort, however, a positive flow anomaly indicates transport time to the estuary was quick, possibly reducing the negative impact.
- Building El Nino conditions in 2019.
- About 58% of the continental shelf area north of the Newport Line experienced hypoxic conditions during June 2018, which may impact the strength of Age-4 returns for 2022. Hypoxic conditions have been occurring more regularly during portions of the summer in recent years.
- The upwelling in 2017 was extremely weak and combined with the continued warm water conditions the Eulachon food base remained dominated by the nutrient poor warm-water species. This should be a minor impact, only effecting Eulachon returning as Age-5.

Table 1. Summary of factors to forecast the Columbia River Eulachon adult return in 2022.

Factors determining the return of Eulachon to the Columbia River in 2022				
		Cohort Survival Factors		
Brood Year	Age at Spawn	Freshwater Phase	Ocean Phase	Forecasted Contribution
2017	5	+	0	+
2018	4	+	+	+
2019	3	+	+	+
2020	2	0	+	0

2021-22 Observations

- Sightings of Eulachon have been reported in the Columbia and Cowlitz rivers since late-November 2021.
    - One observer reported low numbers of smelt as far up as Castle Rock in mid-December.
- Marine mammals have been reported feeding on smelt near the mouth of the Cowlitz River.

Purpose of the commercial fisheries:

- The biological data collected during the commercial fishery allow us to investigate the structure of the annual Eulachon run into the Columbia River including run distribution, run strength, weight distribution, age composition, sex ratio, stage of maturity, and fecundity.
- Fishery assessment provides data to evaluate the utility of adult abundance calculations and provides context to historical landings data. For example, there appears to be a correlation between the pounds per landing data provided by the mainstem commercial fishery and the data from the larval density survey (Figure 3).

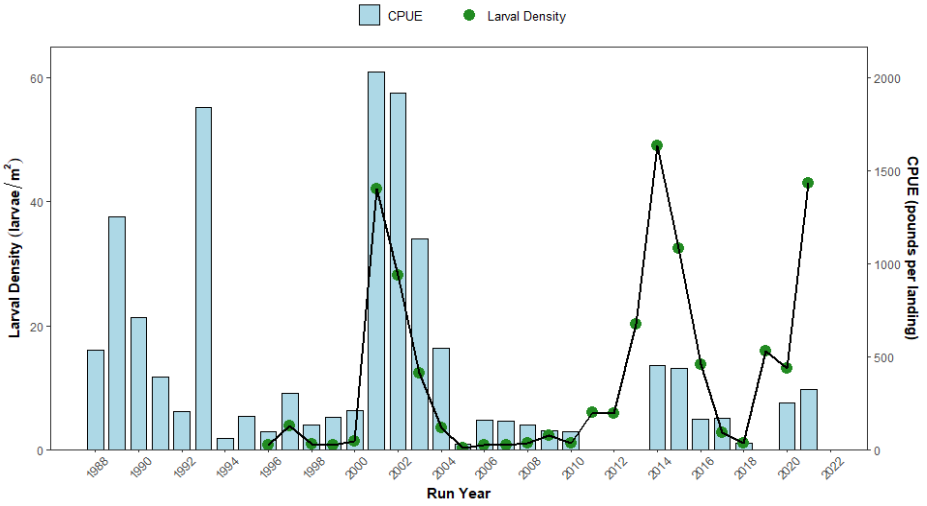


Figure 3. Comparison of adult Eulachon catch per unit effort (CPUE) in terms of total pounds per landing in the mainstem Columbia River commercial gillnet fishery and mean larval densities captured at mainstem Columbia index sites using plankton tow nets, 1988–2020. Commercial fisheries CPUE data is not available for 2011–2013 or 2019 due to no fisheries occurring in those years.

Table 2. Columbia River Eulachon run size and harvest estimates, 2011–2021.

Year	Weeks sampled	Run size (adult abundance plus harvest in pounds) [1]	Harvest (pounds)				
			Commercial				
			Mainstem	Tributary	Sport	Tribal	Combined
2011	19	3,300,000	0 [2]	0 [2]	0 [2]	N/A	0
2012	25	3,200,000	0 [2]	0 [2]	0 [2]	N/A	0
2013	29	9,600,000	0 [2]	0 [2]	0 [2]	7,470	7,470
2014	22	16,600,000	18,560	0 [2]	203,880	6,970	229,410
2015	33	11,400,000	16,550	0 [2]	290,770	10,400	317,720
2016	25	5,100,000	4,820	0 [2]	141,050	8,560	154,430
2017	18	1,600,000	5,019	0 [2]	541	1,900	7,531
2018	13	400,000	110	0 [2]	0 [2]	0	110
2019	16	4,205,000	0 [2]	0 [2]	0 [2]	23,660	23,660
2020	10	N/A [3]	10,255	0 [2]	35,040	23,900	69,195
2021	17	9,000,000	10,997	0 [2]	91,250	55,940	158,187

[1] *Rounded to the nearest 100,000 pounds.*

[2] *Closed to fishing.*

[3] *The 2020 estimate is incomplete due to truncated sampling during March.*

2022 Fisheries:

- 2022 Run Forecast:
    - Overall, the 2022 run is expected to be larger than the 2021 run, since positive environmental conditions were experienced by recent cohorts and a moderate return of the 2017 and 2018 cohort were present in the 2021 run.
- Commercial Harvest:
    - Staff are considering a 2022 research-level fishery season structure as follows:
        - A reduced Level One Commercial fishery
        - Season: 2-3 days per week, late January-early March
        - Area: Zones 1-3
        - Gear: Gill net only
        - *Commercial fishing season subject to decision at the Compact Hearing scheduled for January 25th, 2022 at 10 a.m.
- Recreational Fisheries:
    - Dependent on landings data from commercial fishery.
    - Similar to previous years, we expect to use a trigger of 200 pounds/landing in the commercial fishery and observations of smelt within the Cowlitz River prior to opening. Observations of smelt within the Sandy River provide important information prior to considering opening.
    - Based on current forecasted run sizes, staff are preparing to consider 1-3 recreational smelt dipping days between the Cowlitz and Sandy rivers.
- Tribal Fisheries: None proposed yet, but tribal sources indicate subsistence fishing regulations will be drafted.

Summary of 2021 Salmon Fisheries (all data considered preliminary)

Lower River Recreational Fisheries Summary

Time Period	Area	Species Allowed	Days for Chinook	Salmonid Anglers	Adult Chin. Kept	Adult Chin. Rel'd	Jack Chin. Kept	Jack Chin. Rel.	Sthd Kept 3/	Sthd Rel'd.	Sockeye Kept 4/	Sockeye Rel'd	Adult Coho Kept	Adult Coho Rel'd	Jack Coho Kept	Jack Coho Rel.	Adult Chin. CPUE
Feb	Buoy 10 to I-5	ChS, StW		2,698	6	0	0	0	12	7	0	0	Closed	0	Closed	0	0.002
March	LCR	ChS, StW	31	25,933	1,534	203	8	33	63	134	0	0	Closed	0	Closed	0	0.067
April	LCR	ChS, StW	4	15,303	1,403	126	31	5	23	5	0	0	Closed	0	Closed	0	0.000
May	LCR	StS, ChS jacks, ChS	4	9,003	652	309	167	44	53	12	0	0	Closed	0	Closed	0	0.107
June 1-15	TP to I-5	StS, ChS	15	14,282	1,790	790	341	115	143	66	0	67	Closed	0	Closed	0	0.181
ChS Totals 1/	**(February 1-June 15)**		**54**	**67,219**	**5,385**	**1,428**	**547**	**197**	**294**	**224**	**0**	**67**	**0**	**0**	**0**	**0**	**0.101**
June 16-30	Astoria Br-BO	ChR, Sok, StS	15	18,537	1,797	732	248	112	384	157	385	41	Closed	0	Closed	0	0.136
July 1-31	TP-BO	ChR, Sok, StS	5	10,331	337	266	69	57	664	793	149	31	Closed	0	Closed	0	0.058
ChR Totals 2/	**(June 16-July 31)**		**20**	**28,868**	**2,134**	**998**	**317**	**169**	**1,048**	**950**	**534**	**72**	**0**	**0**	**0**	**0**	**0.108**
Spring/Summer Totals				**96,087**	**7,519**	**2,426**	**864**	**366**	**1,342**	**1,174**	**534**	**139**	**0**	**0**	**0**	**0**	**0.103**
Aug	TP-BO	ChF, Co	31	33,284	6,184	287	383	175	11	419	0	0	1,023	382	12	22	0.194
Sep	TP-BO	ChF, Co	26	42,281	10,964	683	1,617	333	0	53	0	0	2,500	1,918	146	51	0.275
Oct	TP-BO	ChF, Co	31	11,703	1,752	76	280	67	0	6	0	0	2,001	610	122	45	0.156
ChF Totals 5/	**(August 1-October 31)**		**88**	**87,268**	**18,900**	**1,046**	**2,280**	**575**	**11**	**478**	**0**	**0**	**5,524**	**2,910**	**280**	**118**	**0.229**
LCR Spring Summer and Fall			**162**	**183,355**	**26,419**	**3,472**	**3,144**	**941**	**1,353**	**1,652**	**534**	**139**	**5,524**	**2,910**	**280**	**118**	**0.163**
OR Buoy 10	B10-TP	ChF, Co	26	79,768	17,902	8,609	0	0	0	105	0	0	28,060	20,713	0	0	0.332
WN Buoy 10	B10-TP	ChF, Co	26	22,681	2,847	1,251	0	0	0	0	0	0	7,568	6,211	0	0	0.181
Buoy 10 Total	**(August 1- October 31) 6/**			**102,449**	**20,749**	**9,860**	**0**	**0**	**Closed**	**105**	**0**	**0**	**35,628**	**26,924**	**0**	**0**	**0.299**
B10 and Mainstem Fall Totals				**189,717**	**39,649**	**10,906**	**2,280**	**575**	**Closed**	**583**	**0**	**0**	**41,152**	**29,834**	**280**	**118**	**0.266**
LCR and B10 Grand Totals				**285,804**	**47,168**	**13,332**	**3,144**	**941**	**1,342**	**1,757**	**534**	**139**	**41,152**	**29,834**	**280**	**118**	**0.212**

1/ Spring Chinook was open February 1-28 between Buoy 10 and the I-5 Bridge; March 1-April 4 from Buoy 10 to Beacon Rock, plus the banks between Beacon Rock and Bonneville Dam; and May 21-May 23, and May 29, and June 1-15 from Tongue Point to Bonneville Dam. Cowlitz Bubble in effect March 1-June 15 for days open to salmon fishing. Two fish daily bag limit for Chinook June 12-15.

2/ Retention of hatchery summer Chinook was allowed June 16-July 5, 2021 from the Astoria-Melger to Bonneville Dam with a two fish limit.

3/ Summer steelhead retention was allowed in conjuction with May-June spring Chinook fisheries and May 16-June 15 from Tongue Point to I-5; and June 16-July 31 from the Astoria-Megler Bridge to Bonneville. One steelhead bag limit effective May 21- July 31.

4/ Sockeye retention was open June 16-July 31 between the Astoria-Megler Bridge and Bonneville Dam. One sockeye in the daily limit.

5/ Fall Chinook was open during August 1-September 3 and October 1-31 from Tongue Point to Warrior Rock and August 1-September 6 and September 11-October 31 from Warrior Rock to Bonneville Dam. Only one Chinook in the daily bag limit.

6/ Buoy 10 was open during August 1-10 for hatchery Chinook and hatchery coho, August 11-August 26 and October 1-December 31 for Chinook and hatchery coho, and August 27-September 30 for hatchery coho. Three fish bag limit starting September 7, but not more than one Chinook when retention was allowed.

Zone 6 Recreational Fisheries Summary

Estimated effort and catch in Zone 6 (Bonneville Dam - McNary Dam) spring, summer, and fall salmon fisheries, 2021.

Area/Pool	Time Period	Species Allowed	Salmonid Anglers	Adult Chin. Kept	Adult Chin. Rel'd	Jack Chin. Kept	Total Sthd Kept	Total Sthd Rel'd	Adult Coho Kept	Adult Coho Rel.	Jack Coho Kept	Sockeye Kept	Sockeye Rel'd
Bonneville	Apr 17 - Jun 15	Chinook, steelhead	827	127	0	10	0	1	0	0	0	0	0
The Dalles			2,985	532	211	58	0	0	0	0	0	0	0
John Day			1,353	87	130	38	0	0	0	0	0	0	0
Spring Management Period Total 1/	**(Jan 1 - June 15)**		**5,165**	**746**	**341**	**106**	**0**	**1**	**0**	**0**	**0**	**0**	**0**
Bonneville	Jun 16 - Jul 31	Chinook, steelhead, sockeye	664	18	18	2	0	1	0	0	0	4	4
The Dalles			613	0	0	0	0	0	0	0	0	0	0
John Day			232	2	4	2	0	0	0	0	0	2	0
Summer Management Period Total 2/	**(June 16-July 31)**		**1,509**	**20**	**22**	**4**	**0**	**1**	**0**	**0**	**0**	**6**	**4**
Bonneville	Aug 1 - Nov 21	Chinook, steelhead, coho	12,626	3,308	373	636	0	9	4,231	147	490	0	0
The Dalles			5,479	1,781	122	362	0	29	527	27	22	0	0
John Day			1,677	192	14	72	0	20	187	26	11	0	0
Fall Management Period Total 3/	**(August 1-December 31)**		**19,782**	**5,281**	**509**	**1,070**	**0**	**58**	**4,945**	**200**	**523**	**0**	**0**
Grand Total			**26,456**	**6,047**	**872**	**1,180**	**0**	**60**	**4,945**	**200**	**523**	**6**	**4**

Upstream of McNary Dam Recreational Summary

Fishery	Kept Adults	Released Adults	Chinook Season
Spring Chinook: Snake R.	443	123	May 4,7,11,25,28, June 4,6
Spring Chinook: McNary – OR/WA border	16	7	March 16 – May 5,22,23,29,30 & June 5,6,12,13,14,15
Summer Chinook: HWY 395 – PRD	74	29	June 16 – August 15
Summer Chinook: Above PRD+tribs	4,933	2,084	July 1 – October 15
Fall Chinook: Hanford Reach	11,494	107	August 16 – October 31

Fall Recreational Fishery Summary

Fall Season Buoy 10	Chinook open 8/1-26, 10/1-10/31 2 fish/1 CHF 8/1-8/26; 2 Coho 8/27-9/6; 3 Coho 9/7-30; 3 Fish/1 ChF 10/1-10/31 Coho open 8/1-12/31 STH retention closed Aug-Oct ~102,449 trips (highest since 2015) ~20,749 Chinook kept (9,860 rel) ~35,628 Coho kept (26,924 rel) SRW/LRH HR slightly/much higher than preseason expectation
Fall Season LCR Sport TP/RP - BON	Chinook and Coho Open: Tongue Pnt. - Warrior R. 8/1-9/3, 10/1-31, Coho only 9/17-30 Warrior R.-BON: 8/1-9/6, 9/11-10/31 STH retention closed Aug-Oct 87,268 trips Aug-Oct 18,900 adult Chinook kept (11th highest) 1,046 rel 5,524 Coho kept (2nd highest) 2,910 rel 11 STH kept (478 rel H+W) SRW HR w/in and LRH higher than preseason expectation
Fall Season BON - McNary	Chinook and Coho open 8/1 – 12/31 1 ChF bag STH closed Aug-Oct BON Pool; Sep-Dec TDA/JD/McN pools 19,771 trips Aug-Nov 25; 5,306 adult Chinook kept (519 rel) 4,921 Coho kept (200 rel); 0 STH kept (49 rel H+W) SRW HR w/in preseason expectation
Fall Season McNary-Hwy 395	Same season as JD-McN 511 trips; 136 Chinook and 78 Coho kept
Fall Season Hanford Reach	Fall Chinook open 8/16-10/31; 6 fish/2 adults 33,271 trips; 11,494 adults and 957 jack Chinook kept; 234 Coho kept; 22% decrease in Chinook harvest from 2020 fishery

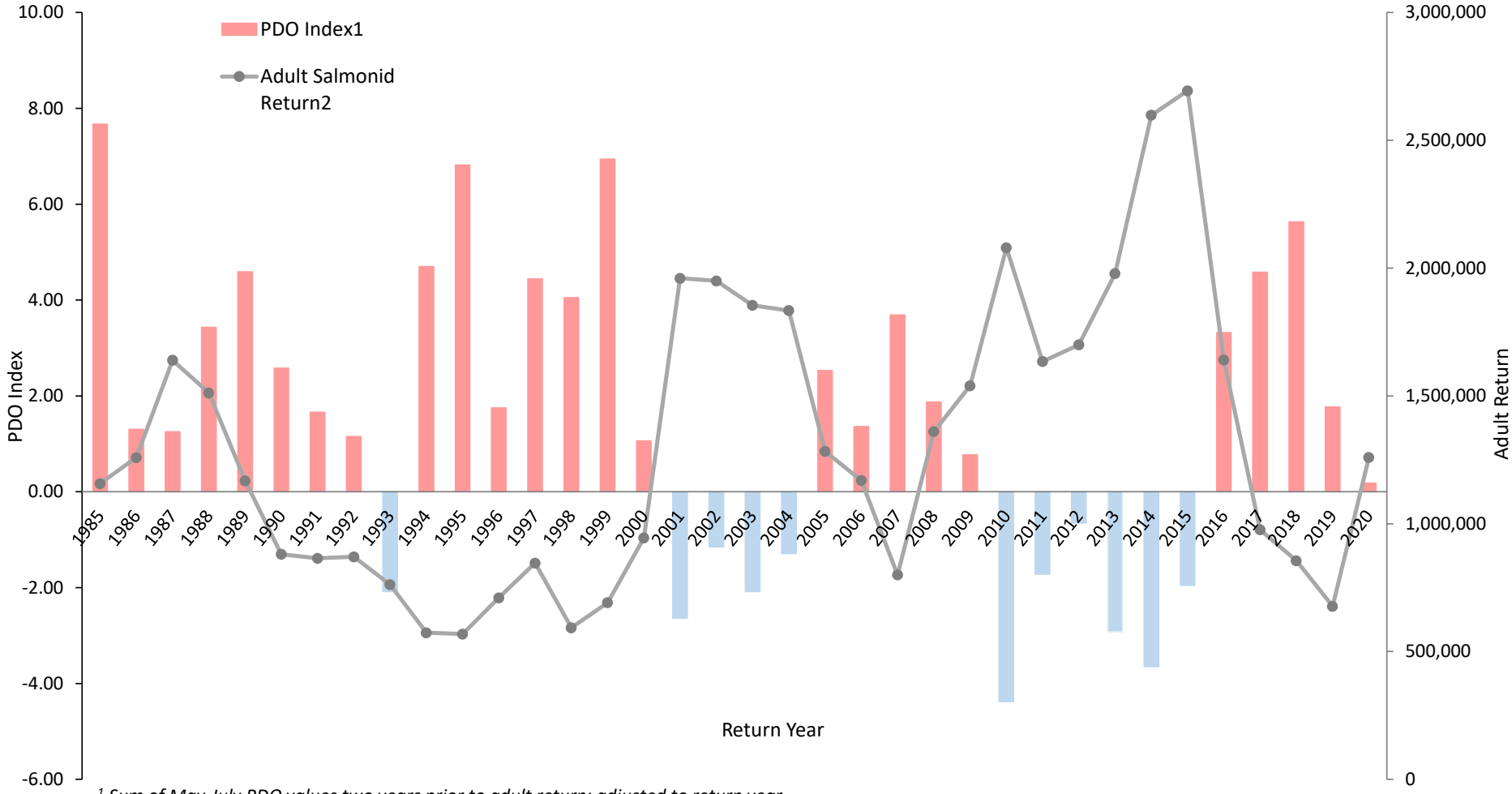
Lower Columbia River Commercial Landings Summary

Season	Fishing Period	Week	Hours	Zones	Mesh Size	WSTG Limit [1]	Del.	Chinook	Coho	Sockeye	Pink	Chum	White Sturgeon
								ChS Adults	*ChS Jacks*				
Spring	No season.	--	--	--	--	--	—	—	—	—	—	Prohibited	—
	Spring Season Totals (and average number of deliveries):						**0**	**0**	**0**	**0**	**0**		**0**
								Chinook	Coho				
Summer	No season.	--	--	--	--	--	—	—	—	—	—	Prohibited	—
	Summer Season Totals (and average number of deliveries):						**0**	**0**	**0**	**0**	**0**		**0**
August	Aug 9, 9 PM - Aug 10, 6 AM	*33*	9	4–5	9"–9 3/4"	4	20	129	0	0	0	Prohibited	21
	Aug 11, 9 PM - Aug 12, 6 AM	*33*	9	4–5	9"–9 3/4"	4	13	204	2	0	0	Prohibited	6
	Aug 16, 9 PM - Aug 17, 6 AM	*34*	9	4–5	9"–9 3/4"	4	36	240	0	0	0	Prohibited	37
	Aug 18, 9 PM - Aug 19, 6 AM	*34*	9	4–5	9"–9 3/4"	4	32	463	12	0	0	Prohibited	23
	Aug 23, 9 PM - Aug 24, 6 AM	*35*	9	4–5	9"–9 3/4"	4	75	4,952	469	0	0	Prohibited	50
	Aug 25, 9 PM - Aug 26, 6 AM	*35*	9	4–5	9"–9 3/4"	4	80	5,770	686	0	0	Prohibited	38
	Aug 30, 9 PM - Aug 31, 6 AM	*36*	9	4–5	9"–9 3/4"	4	81	5,492	920	0	0	Prohibited	65
	Sep 1, 9 PM - Sep 2, 6 AM	*36*	9	4–5	9"–9 3/4"	4	79	3,978	679	0	0	Prohibited	57
	August Season Totals (and average number of deliveries):						**52**	**21,228**	**2,768**	**0**	**0**		**297**
Late-Fall	Sep 19, 8 PM - Sep 20, 6 AM	*39*	10	4–5	8"–9 3/4"	6	54	1,965	801	0	1	Prohibited	41
	Sep 22, 8 PM - Sep 23, 6 AM	*39*	10	4–5	8"–9 3/4"	6	36	998	358	0	0	Prohibited	17
	Sep 26, 8 PM - Sep 27, 6 AM	*40*	10	4–5	8"–9 3/4"	6	19	662	206	0	0	Prohibited	13
	Sep 27, 4 AM - 10 PM	*40*	18	1–3	3-3/4" max tangle-net	6	42	211	2,123	0	0	Prohibited	2
	Sep 29, 4 AM - 10 PM	*40*	18	1–3	3-3/4" max tangle-net	6	24	109	846	0	0	Prohibited	2
	Sep 29, 8 PM - Sep 30, 6 AM	*40*	10	4–5	8"–9 3/4"	6	17	460	188	0	0	Prohibited	6
	Oct 1, 4 AM - 6 PM	*40*	14	1–3	3-3/4" max tangle-net	6	23	67	1,260	0	0	Prohibited	1
	Oct 3, 7 PM - Oct 4, 7 AM	*41*	12	4–5	8"–9 3/4"	6	12	407	152	0	0	Prohibited	8
	Oct 4, 4 AM - 10 PM	*41*	18	1–3	3-3/4" max tangle-net	6	26	68	1,035	0	0	Prohibited	1
	Oct 6, 4 AM - 10 PM	*41*	18	1–3	3-3/4" max tangle-net	6	26	46	576	0	0	Prohibited	0
	Oct 6, 7 PM - Oct 7, 7 AM	*41*	12	4–5	8"–9 3/4"	6	6	328	37	0	0	Prohibited	2
	Oct 8, 4 AM - 6 PM	*41*	14	1–3	3-3/4" max tangle-net	6	19	28	591	0	0	Prohibited	0
	Oct 10, 7 PM - Oct 11, 7 AM	*42*	12	4–5	8"–9 3/4"	6	5	298	23	0	0	Prohibited	1
	Oct 11, 4 AM - 10 PM	*42*	18	1–3	3-3/4" max tangle-net	6	28	31	577	0	0	Prohibited	1
	Oct 13, 4 AM - 10 PM	*42*	18	1–3	3-3/4" max tangle-net	6	27	32	472	0	0	Prohibited	1
	Oct 13, 7 PM - Oct 14, 7 AM	*42*	12	4–5	8"–9 3/4"	6	5	231	19	0	0	Prohibited	0
	Oct 15, 4 AM - 6 PM	*42*	14	1–3	3-3/4" max tangle-net	6	13	8	315	0	0	Prohibited	0
	Oct 18, 4 AM - 10 PM	*43*	18	1–3	3-3/4" max tangle-net	6	12	5	196	0	0	Prohibited	0
	Oct 19, 4 AM - 10 PM	*43*	18	1–3	3-3/4" max tangle-net	6	7	1	47	0	0	Prohibited	0
	Oct 20, 4 AM - 10 PM	*43*	18	1–3	3-3/4" max tangle-net	6	11	1	105	0	0	Prohibited	0
	Oct 21, 4 AM - 10 PM	*43*	18	1–3	3-3/4" max tangle-net	6	0	0	0	0	0	Prohibited	0
	Oct 22, 4 AM - 6 PM	*43*	14	1–3	3-3/4" max tangle-net	6	3	0	44	0	0	Prohibited	0
	Oct 25, 4 AM - 10 PM	*44*	18	1–3	3-3/4" max tangle-net	6	8	4	138	0	0	Prohibited	0
	Oct 26, 4 AM - 10 PM	*44*	18	1–3	3-3/4" max tangle-net	6	8	2	104	0	0	Prohibited	0
	Oct 27, 4 AM - 10 PM	*44*	18	1–3	3-3/4" max tangle-net	6	4	1	53	0	0	Prohibited	0
	Oct 28, 4 AM - 10 PM	*44*	18	1–3	3-3/4" max tangle-net	6	8	0	66	0	0	Prohibited	2
	Oct 29, 4 AM - 6 PM	*44*	14	1–3	3-3/4" max tangle-net	6	3	0	9	0	0	Prohibited	0
	Late-Fall Season Totals (and average number of deliveries):						**17**	**5,963**	**10,341**	**0**	**1**		**98**
							Ave.Del.	**Chinook**	**Coho**	**Sockeye**	**Pink**	Chum	White Sturgeon
						FALL TOTALS:	**24**	**27,191**	**13,109**	**0**	**1**	Prohibited	**395**

Ocean Conditions and Forecasts

	Year																								
Ecosystem Indicators	*1998*	*1999*	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*	*2012*	*2013*	*2014*	*2015*	*2016*	*2017*	*2018*	*2019*	*2020*	*2021*
PDO (Sum Dec-March)	21	7	3	15	8	23	14	19	16	11	5	1	18	4	2	9	12	24	22	20	13	17	10	6
PDO (Sum May-Sept)	12	5	7	6	13	19	18	20	14	16	2	11	8	4	1	9	22	24	23	17	15	21	10	3
ONI (Average Jan-June)	23	1	1	8	15	17	16	19	9	13	3	12	20	5	7	9	11	21	24	14	6	22	18	4
SST NDBC buoys (°C; May-Sept)	19	7	9	5	6	13	24	14	2	16	1	12	3	8	10	18	22	21	20	15	17	23	11	4
Upper 20 m T (°C; Nov-Mar)	23	13	10	12	7	17	18	15	14	6	1	11	20	5	4	9	3	24	22	21	16	19	2	8
Upper 20 m T (°C; May-Sept)	16	11	13	4	1	3	24	20	9	10	2	6	17	8	7	18	22	19	14	12	15	23	21	5
Deep temperature (°C; May-Sept)	23	7	9	5	1	11	13	17	12	6	2	8	15	10	4	16	22	21	14	19	20	18	24	3
Deep salinity (May-Sept)	23	4	12	5	6	19	20	13	8	2	3	17	21	15	16	14	24	18	10	9	7	11	22	1
Copepod richness anom. (no. species; May-Sept)	22	2	1	9	8	17	16	21	18	12	10	11	20	5	7	3	13	23	24	19	15	14	6	4
N. copepod biomass anom. (mg C m^{-3}; May-Sept)	22	17	13	14	6	19	16	23	18	15	9	12	11	3	5	7	8	20	24	21	10	4	2	1
S. copepod biomass anom. (mg C m^{-3}; May-Sept)	24	2	6	5	3	16	18	23	15	12	1	8	19	11	9	7	13	21	22	20	14	17	10	4
Biological transition (day of year)	21	13	8	3	11	17	14	22	16	4	1	2	19	5	12	6	6	23	23	20	15	17	8	10
Nearshore Ichthyoplankton Log(mg C 1,000 m^{-3}; Jan-Mar)	19	3	13	7	1	23	24	17	10	19	3	15	2	9	5	12	21	16	17	14	11	22	8	6
Nearshore & offshore Ichthyoplankton community index (PCO axis 1 scores; Jan-Mar)	11	6	5	8	10	13	18	22	2	15	3	12	16	4	1	7	9	20	23	24	19	21	17	14
Chinook salmon juvenile catches Log(no. km^{-1}; June)	21	3	7	19	6	10	17	23	14	12	1	8	5	15	2	4	9	16	20	24	18	13	22	11
Coho salmon juvenile catches Log(no. km^{-1}; June)	22	11	19	5	7	6	21	23	17	2	4	8	9	18	13	1	10	16	15	24	3	14	20	12
Mean of ranks	20.1	7.0	8.5	8.1	6.8	15.2	18.2	19.4	12.1	10.7	3.2	9.6	13.9	8.1	6.6	9.3	14.2	20.4	19.8	18.3	13.4	17.3	13.2	6.0
Rank of the mean rank	23	5	8	7	4	17	19	21	12	11	1	10	15	6	3	9	16	24	22	20	14	18	13	2
Ecosystem Indicators not included in the mean of ranks or statistical analyses																								
Physical Spring Trans. UI based (day of year)	4	8	23	20	5	15	18	24	15	1	7	3	10	13	21	11	22	12	6	19	13	15	9	2
Physical Spring Trans. Hydrographic (day of year)	23	4	14	9	6	13	16	24	7	10	1	10	20	4	12	2	18	8	19	21	16	15	21	2
Upwelling Anomaly (April-May)	12	4	20	8	11	17	15	24	12	6	9	10	18	20	18	14	22	1	3	23	7	5	15	2
Length of Upwelling Season UI based (days)	6	2	22	14	1	16	12	24	5	3	9	3	18	21	18	17	23	13	8	15	7	10	20	10
Copepod Community Index (MDS axis 1 scores; May-Sept)	23	2	6	9	4	18	16	22	19	11	1	8	15	10	7	5	13	21	24	20	14	17	12	3

* NOAA ocean condition scorecard for outmigrating salmon with ratings from 1 (best) to 24 (worst). The years shown correspond to the years the smolts entered the ocean.
** This table is easier to interpret if printed in color. Green represents more favorable indicators. Yellow is intermediate and Red indicates unfavorable.



[1] *Sum of May-July PDO values two years prior to adult return; adjusted to return year.*

[2] *Includes species returning as adults primarily two years after ocean entry (Chinook, Sockeye, and summer steelhead).*

Figure X. Annual return of adult salmonids to the Columbia River mouth and corresponding PDO Index, 1985-2020. Positive (red) PDO represents relatively poor (warm) ocean conditions and negative (blue) PDO represents relatively good (cool) ocean conditions.

Columbia River Adult Salmon Returns: Actual and Forecasted				
		2021 Forecast	**2021 Return**	**2022 Forecast**
Spring Chinook	**Upriver Total ***	**75,200**	**91,736**	**122,900**
	Upper Columbia	13,000	n/a	n/a
	Upper Columbia natural-origin	*2,200*	*n/a*	*n/a*
	Snake River Spring/Summer **	40,000	52,274	73,400
	Snake River natural-origin **	*11,100*	*9,480*	*13,200*
	Lower River Total	**68,000**	**60,939**	**74,100**
	Total Spring Chinook	**143,200**	**152,675**	**197,000**
	Area-specific detail			
	Willamette River	50,000	41,308	51,200
	Sandy River	5,300	5,676	5,600
	Select Areas***	6,300	5,754	8,800
	Cowlitz River	1,800	3,478	4,100
	Kalama River	2,200	1,883	2,000
	Lewis River	2,400	2,840	2,400
	Wind River***	1,200	3,227	4,200
	Drano Lake/Little White Salmon River***	3,900	3,299	3,800
	Hood River***	n/a	n/a	n/a
	Klickitat River***	1,500	1,821	1,800
	Deschutes River***	n/a	2,435	n/a
	John Day River***	n/a	1,529	n/a
	Umatilla River***	900	1,077	3,000
	Yakima River***	3,200	2,882	4,700
Summer Chinook	**Upper Columbia ***	**78,800**	**56,800**	**57,500**
Sockeye	**Total Sockeye**	**155,600**	**151,765**	**198,700**
	Wenatchee	27,300	41,219	19,200
	Okanogan	127,300	105,493	175,700
	Yakima	200	3,531	3,500
	Deschutes	100	n/a	100
	Snake River	700	890	200

* Upriver totals are developed by TAC for use in management of *U.S. v. OR* fisheries. Wild components are included in the stock total. Area-specific estimates for upriver tributaries detailed here are provided by other agencies/entities and may not sum to TAC's upriver abundance estimates.

** 2021 return is based on current TAC run reconstruction methodology.

*** Return to tributary mouth.

12/10/2021