Columbia River Commercial Advisor Group Meeting

February 12, 2020
10:00a-11:30a
Rainier City Hall
106 B Street
Rainier, OR 97048

Prepared by: Columbia River Joint Staff

Columbia River Commercial Advisor Group Meeting
Rainier, OR
10:00 – 11:30 am February 12, 2020

Agenda	
• **Welcome and Introductions** o Advisor Group members and Agency staff	(5 minutes)
• **Harvest Reform update** o Joint-State Columbia River Fishery Policy Review Committee (PRC) o Director Delegation o WA Commission update	(15 minutes)
• **Spring season** o 2019 results o 2020 fishery • Catch balance • Willamette spring Chinook allocation • Post-update fishery discussion	(15 minutes)
• **Shad fishery discussion**	(20 minutes)
• **Alternative gear** o Pound Net - TAC mortality update o Future fisheries • Intent to use impacts • Harvest potential	(20 minutes)
• **2019 Sport fishery handle/mark rate**	(5 minutes)
• **Additional Topics** o California troll spring Chinook fishery o Summer Chinook o Other/General discussion	(10 minutes)
• **Future Meetings** o North of Falcon #1, March 17, WDFW-Ridgefield, 10 am o North of Falcon #2, April 1, WDFW-Ridgefield, 10 am	

Spring season

1. 2019 Catch Balance and ESA impacts:

2019 Non-Treaty Fisheries - Comparison of Post-Season Allowed and Actual ESA-impacts and Catch (kept plus release mortalities) of Adult Upriver Spring Chinook.						
	POST Season					
	(73.1 K run size, 1.5% ESA impact limit)					
2019 Non-Treaty Fishery	ESA Impact	Actual	% of Allowed	Catch Balance	Actual	% of Allowed
Mainstem	0.000%	0.000%	--	0	0	--
Select Areas	0.300%	0.278%	93%	219	203	93%
Commercial total (20% of total)	**0.300%**	**0.278%**	**93%**	**219**	**203**	**93%**
Downstream of Bonneville Dam (LCR)	0.900%	0.246%	27%	3,899	1,478	38%
Bonneville Dam to OR/WA border	0.120%	0.050%	41%	520	288	55%
Upper Col/Snake	0.180%	0.180%	100%	479	342	71%
Sport total (80% of total)	**1.20%**	**0.475%**	40%	**4,898**	**2,108**	**43%**
Non-Treaty Total	**1.50%**	**0.75%**	**50%**	**5,117**	**2,311**	**45%**

2. 2020 fishery:

- The 2020 allocations between OR and WA are not confirmed yet through the Director delegation conversations. The table below assumes sharing as occurred in 2017-2019 (80% recreational/20% commercial) but are subject to change.

2020 Spring Chinook Preseason Management Guidelines			
	2019 postseason	**2020 preseason**	**Difference**
Upriver CHS abundance (adults)	73,101	81,700	+8,599
ESA impact rate	1.50%	1.50%	0
Willamette CHS abundance (adults)	27,292	40,800	+13,508

Commission Guidance (ESA impact allocation)	**2019**	**2020**	**Difference**

Sport allocation*	80%	80%	0
Commercial allocation	20%	20%	0
***U.S. v OR* Catch Balance**	**2019 preseason**	**2020 preseason**	
30% Buffered Run	69,510	57,190	-12,320
ESA Impact rate	1.50%	1.50%	0
Catch Balance Available Pre-update	**4,866**	**4,003**	**-863**
Sport Fisheries (LCR, Z6, Snake)	4,548	3,747	-801
Lower Columbia (below Bonneville)	3,689	2,947	-742
Bonneville to OR/WA border	492	393	-99
Snake River (WA waters)	357	407	+50
Commercial Mainstem	TBD	TBD	
Commercial Select Area	≤318	≤245	-73

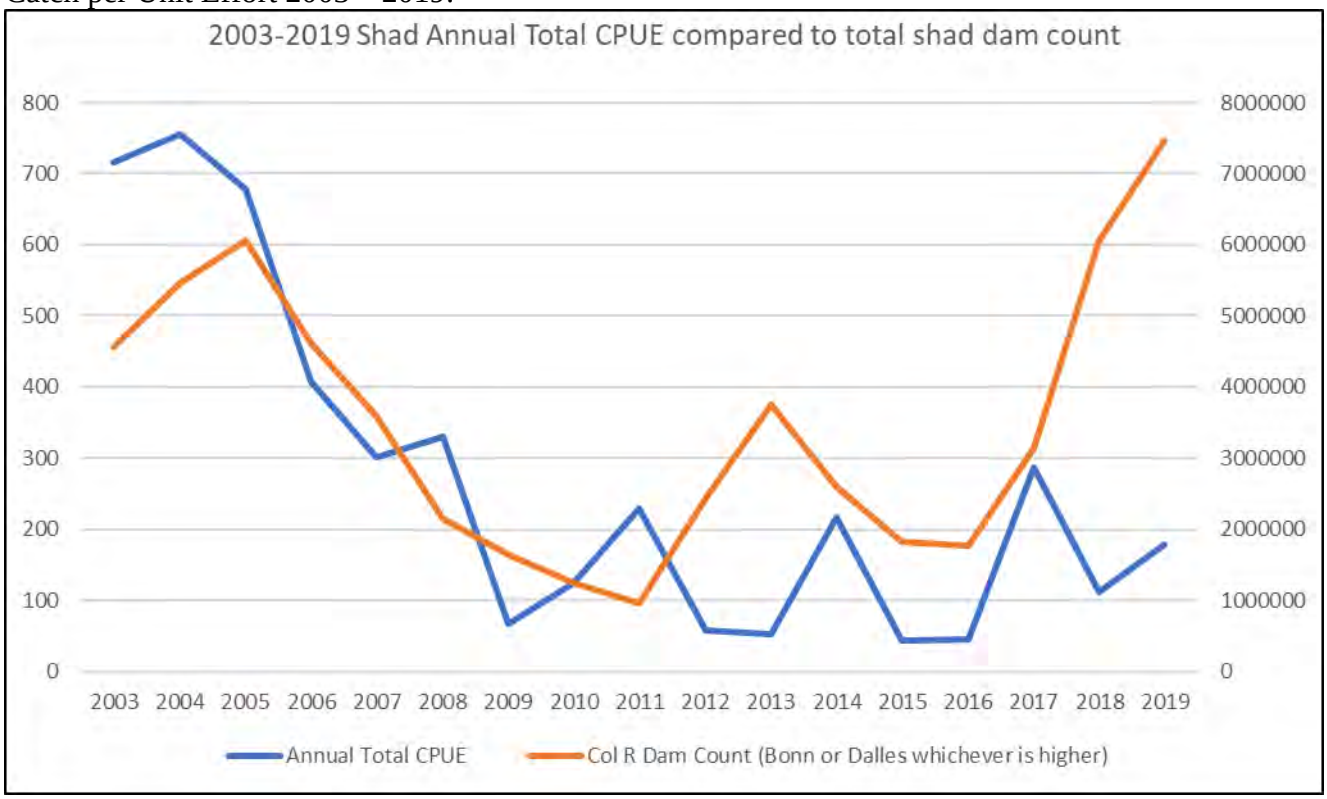
- Weekly mainstem test fishing is expected to begin March 16 (8 days total, March 16-May 4).
  - Provides stock composition, catch rates and bycatch information, and continues long-term data set; test fishing is helpful in setting potential future commercial fisheries.
  - Hatchery fish are sold at fair market value to offset test fishing operational costs.
  - All information can be found at: https://wdfw.wa.gov/fishing/commercial/columbia-river-test.
- Willamette spring Chinook commercial allocation: <330 hatchery fish per FMEP, most expected to be used in the Select Areas.
- Post-update fishery discussion:
  - 2020 allocation/gear allowed
    - Currently awaiting guidance for allocation and gear.
    - ~20% commercial allocation is used within Select Area fisheries.
  - Lower Columbia spring Chinook are a management concern this year.
    - Closed below the Lewis River due to forecasted returns being below escapement goal (FMEP) for both the Cowlitz and Lewis River hatcheries.
    - Directed harvest of these stocks in the mainstem or tributaries will further reduce returns to the lower river hatcheries.
    - See supplemental tributary handout regarding expected returns and broodstock needs.
    - Recent conversations with NMFS staff confirmed that fisheries must be managed to address the issue of LCR Chinook hatchery escapement through management actions intended to maximize returns of these stocks.

Shad

Monitoring**:** The staffs of WDFW and ODFW monitored this fishery in the past (most recently in 1999-2001, 2005, and 2009) and the salmonid handle is estimated based on the results of the monitoring, although it is not routinely monitored currently.

Current Regulations (since 1996): Shad Area 2S open under permanent rules from 3:00pm – 10:00pm daily, Monday through Friday (except on the observed Memorial Day holiday), from May 10 through June 20 annually. The gear used is a single-wall, unslackened, floater gillnet, with mesh size of 5 3/8-inch to 6 1/4-inch, and a 10-lb breaking strength. The net cannot exceed 40 meshes in depth and a maximum length of 150 fathoms in length. (WAC 220-358-050, OAR 635-042-0110, OAR 635-042-0115)

Catch per Unit Effort 2003 – 2019:

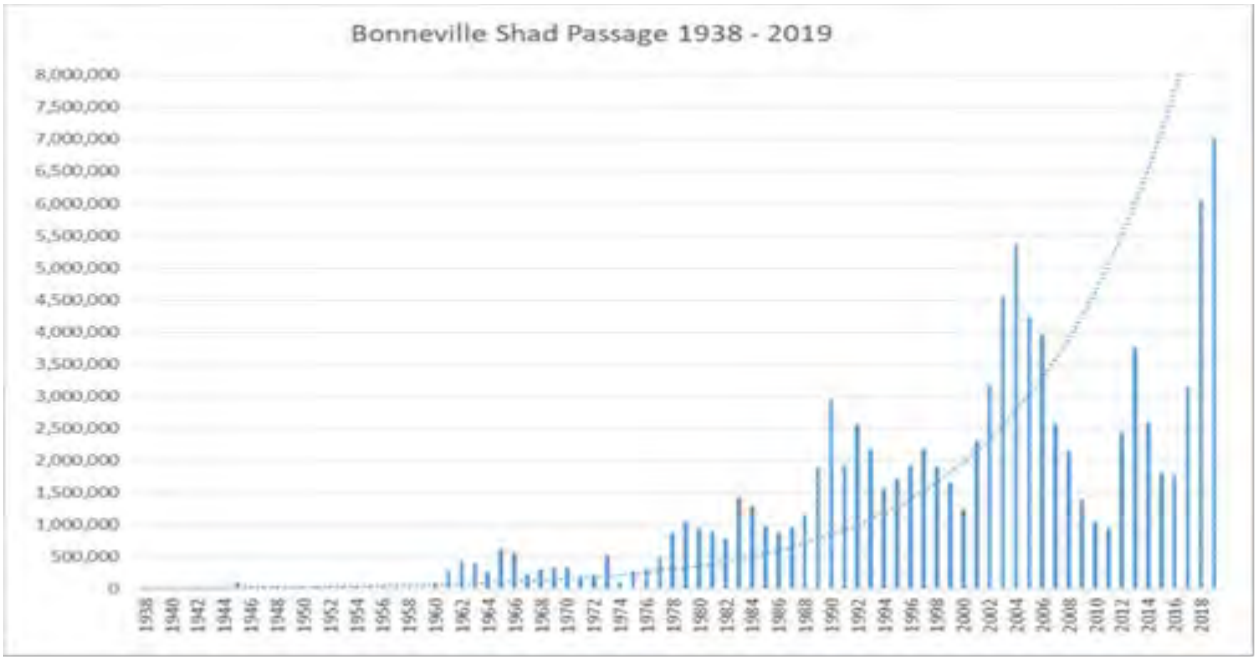


Regulation Change Request: WDFW has received two requests from commercial fishers/buyers to adjust shad regulations.

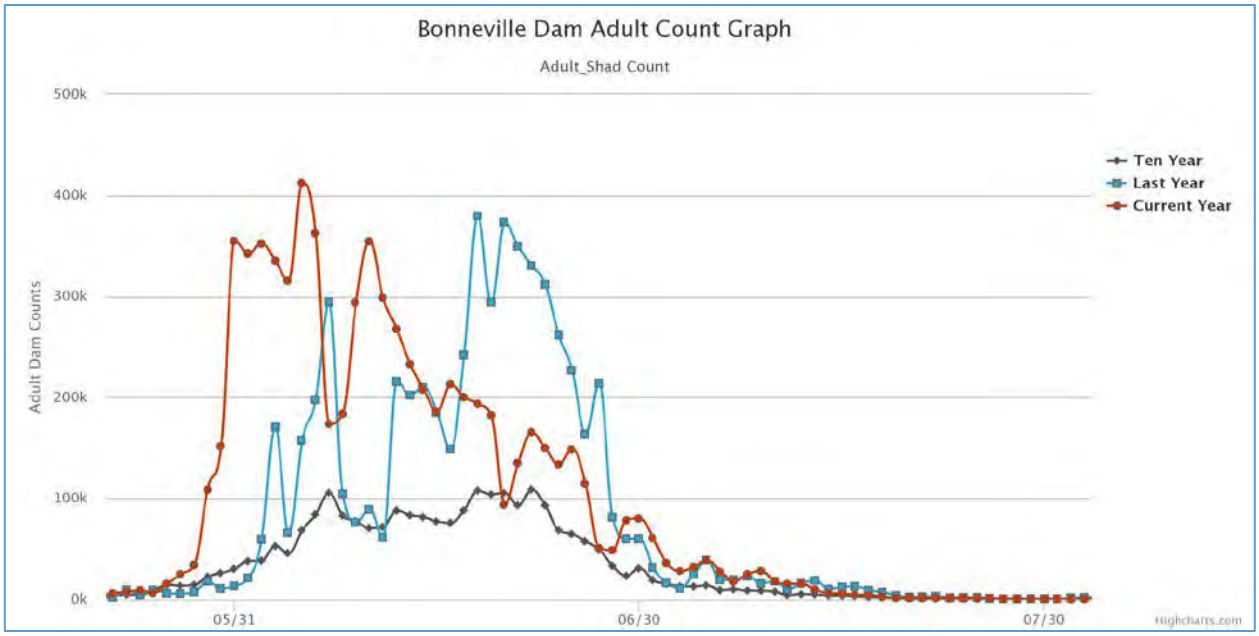
1. Open two 5 hour windows that overlap sunrise and sunset.
2. Expand fishing area to be larger than just 2S.
3. Allow fishing in Catch Areas 1A-1C (Zones 1-3) starting May 10th.
4. Increase net length from 150 fathoms to 250 fathoms.
5. Increase net depth.

These actions may increase interest in the fishery and harvest but would also likely result in additional impact on non-target stocks.

Do the existing shad fishery regulations work for the commercial industry? Are there additional thoughts on how to increase shad catches while not increasing impact to non-target stocks?



Timing of returns:



Alternative Gear

1. Pound Net/TAC mortality update:
    - TAC recently reviewed available information regarding post-release mortality rates associated with pound net caught fish in the fall season. TAC will present their recommendation to the *U.S. v. OR* Policy Committee soon. After that, TAC will notify NMFS of the proposed rates but NMFS must approve them prior to their application during NOF/PFMC fisheries modeling.
2. Future alternative gear fisheries (intent to harvest and harvest potential):
    - WDFW created the Alternative Gear Advisory Group, a required step in Washington prior to implementation of gear types which are not currently legal (seine and pound net traps) and to seek industry recommendations on potential future fishery structure. WA policy does not currently speak to a specific allocation for alternative gear. 2020 guidance on allocation/gear may provide clarity for WDFW.
    - OR rule: "Use up to 2% of commercial ESA impacts of the most constraining stock for use in lower river commercial fisheries using alternative gears. The Department shall approve alternative gears for use."
        - To clarify, 2% of 30% equates to ≤6.7% of the commercial allocation is available for alternative gears under current Oregon rules.
    - Fall season forecasts and available impacts will drive the discussion on implementing fisheries.

Sport fishery handle/mark rate

Fall season recreational trips and catch below Bonneville Dam by CHF retention status, 2019

			CHF Retention		Adult Chinook		Adult Coho		Release Morts		Total CHF	CHF Morts/	Sum	Sum	Sum Rel	Kept/m	Morts/
Fishery	Month	Date	Status	Trips	Kept	Rel	Kept	Rel	CHF	COH	Morts	Angler Trip	Kept	Rel	Morts	ort	kept
B10*	Aug	8/1-20	Open	38498	11209	4240	2432	2708	890	569	12099	0.31	13640	6948	1459	9.3	0.1
	Aug-Oct	8/21-10/31	Closed	38479	65	11036	19843	21645	2317	4546	2382	0.06	19909	32681	6863	2.9	0.3
	Total			76977	11274	15276	22275	24353	3207	5115	14481	0.19	33549	39629	8322	4.0	0.2
LCR	Aug	8/1-27	Open	35222	4616	157	85	53	33	11	4649	0.13	4701	210	44	106.6	0.0
	Aug	8/27-31	Closed <WR	332	0	41	0	21	9	4	9	0.03	0	62	13	0.0	
	Sep	9/1-5	Open >WR	10840	2536	80	95	103	17	22	2553	0.24	2631	183	38	68.5	0.0
	Sep	9/6-30	Closed	10416	13	5895	554	801	1238	168	1251	0.12	567	6696	1406	0.4	2.5
	Oct	10/1-31	Closed	1865	0	564	312	97	118	20	118	0.06	312	661	139	2.2	0.4
	Total			58675	7165	6737	1046	1075	1415	225	8580	0.15	8211	7812	1641	5.0	0.2
	Total		Open	84560	18361	4477	2612	2864	940	602	19301	0	20972	7341	1542	13.6	0.1
	Total		Closed	51092	78	17536	20709	22564	3682	4738	3760	0	20788	40100	8421	2.5	0.4

** B10 data itemized by CHF retention status is approximated pending final daily catch estimates*

2019 Lower Columbia 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	Sthd Rel'd	Sockeye Kept	Sockeye Rel'd	Adult Coho Kept	Adult Coho Rel'd	Jack Coho Kept	Jack Coho Rel.	Adult Chin. CPUE	Sockeye CPUE
Feb	Buoy 10 to I-5	ChS, StW		2,374	4	1	0	0	0	0	Closed	0	Closed	0	Closed	0	0.002106	0
March	WR-BO	ChS, StW	31	10,626	317	76	0	3	0	18	Closed	0	Closed	0	Closed	0	0.036985	0
April 1-10, 13-14, 20-21, 27-28	WR-BO	ChS, StW	16	19,691	1,356	240	0	12	4	4	Closed	0	Closed	0	Closed	0	0.081052	0
May 16-31	TP-Bonn.	StS, ChS jacks	0	3,500	0	61	16	0	166	24	Closed	0	Closed	0	Closed	0	0.017429	0
June 1-15	TP-Bonn.	StS, ChS jacks	0	3,218	0	102	16	6	424	126	Closed	91	Closed	0	Closed	0	0.031697	0.028
ChS Totals	**(February 1-June 15) 1/**		**47**	**39,409**	**1,677**	**480**	**32**	**21**	**594**	**172**	**0**	**91**	**0**	**0**	**0**	**0**	**0.054734**	0.002
June 16-21	Astoria Br-Bo	StS	0	5,271	0	281	0	14	834	239	Closed	80	Closed	0	Closed	0	0.053311	0.015
July 1-31	Astoria Br-Bo	StS	0	14,485	0	211	0	50	1,394	1,862	Closed	79	Closed	0	Closed	0	0.014567	0.005
ChR Totals	**(June 16-July 31) 2/**		**0**	**19,756**	**0**	**492**	**0**	**64**	**2,228**	**2,101**	**0**	**159**	**0**	**0**	**0**	**0**	**0.024904**	0.008
Spring/Summer Totals				**59,165**	**1,677**	**972**	**32**	**85**	**2,822**	**2,273**	**0**	**250**	**0**	**0**	**0**	**0**	**0.044773**	0.004
Aug	TP-BO	ChF, Co	31	35,554	4,616	198	392	86	Closed	335	Closed	0	85	74	17	10	0.1354	0.000
Sep	TP-BO	ChF, Co	5	21,236	2,549	5,975	195	151	Closed	31	Closed	0	649	904	78	46	0.401394	0.000
Oct	TP-BO	Co	0	1,865	0	564	0	11	Closed	0	Closed	0	312	97	13	10	0	0.000
ChF Totals	**(August 1-October 31) 3/**		**36**	**58,655**	**7,165**	**6,737**	**587**	**248**	**0**	**366**	**0**	**0**	**1,046**	**1,075**	**108**	**66**	**0.237013**	0.000
LCR Spring Summer and Fall			**83**	**117,820**	**8,842**	**7,709**	**619**	**333**	**2,822**	**2,639**	**0**	**250**	**1,046**	**1,075**	**108**	**66**	**0.140477**	**0.002**
OR Buoy 10	B10-TP	ChF, Co, StS	20	54,497	8,636	12,655	0	0	0	56	0	0	16,736	18,393	0	0	0.390682	0.000
WN Buoy 10	B10-TP	ChF, Co, StS	20	22,480	2,638	2,621	0	0	0	0	0	0	6,039	5,960	0	0	0.233941	
Buoy 10 Total	**(August 1- October 31) 4/**		**20**	**76,977**	**11,274**	**15,276**	**0**	**0**	**0**	**56**	**0**	**0**	**22,775**	**24,353**	**0**	**0**	**0.344908**	**0.000**
B10 and Mainstem Fall Totals				**135,632**	**18,439**	**22,013**	**587**	**248**	**0**	**422**	**0**	**0**	**23,821**	**25,428**	**108**	**66**	**0.298248**	**0.000**
LCR and B10 Grand Totals				**194,797**	**20,116**	**22,985**	**619**	**333**	**2,822**	**2,695**	**0**	**250**	**23,821**	**25,428**	**108**	**66**	**0.221261**	**0.001**

1/ Spring Chinook was open February 1-28 between Buoy 10 and the I-5 Bridge; March 1-April 10, April 13-14, 20-21, and 27-28 from the Warrior Rock line upstream to Beacon Rock plus the Oregon and Washington banks between Beacon and Bonneville Dam.

2/ Retention of summer Chinook and sockeye was peohibited in 2019. The daily steelhead limit was one hatchery fish in July 2019.

3/ Fall Chinook was open August 1-20 between Tongue Point and Puget Island, August 1-27 between Puget Island and Warrior Rock and August 1- September 5 between Warrior Rock and Bonneville Dam with a one adult salmonid bag limit. Coho was open August 1-September 25 and October 18-31 between Tongue Point and Bonneville Dam, and summer steelhead was closed for retention during August 1-October 31. Two hatchery coho bag limit in areas closed for Chinook retention.

4/ Buoy 10 was open August 1-August 20 for Chinook and coho with one Chinook in the daily limit and August 21-December 31 for coho with a two fish limit. Steelhead retention was closed during August 1-October 31.

2019 Zone 6 (Bonneville-McNary Dam) Spring and Summer Fisheries Summary.

Area	Time Period	Species Allowed	Salmonid Anglers	Adult Chin. Kept	Adult Chin. Ref'd	Jack Chin. Kept	Total Sthd Kept	Total Sthd Ref'd	Adult Coho Kept	Adult Coho Rel.	Jack Coho Kept	Sockeye Kept	Sockeye Ref'd
Bonneville		ChS, Sth	426	40	4	18	4	0	0	0	0	0	0
The Dalles			1,319	147	63	43	0	0	0	0	0	0	0
John Day			713	87	14	10	0	0	0	0	0	0	0
ChS Totals	**(April 1 - June 15) 1/**		**2,458**	**274**	**81**	**71**	**4**	**0**	**0**	**0**	**0**	**0**	**0**
Bonneville		StS	744	0	35	0	40	20	0	0	0	0	3
The Dalles			93	0	0	0	0	0	0	0	0	0	0
John Day			0	0	3	0	0	0	0	0	0	0	0
ChR Totals	**(June 16-July 31) 2/**		**837**	**0**	**38**	**0**	**40**	**20**	**0**	**0**	**0**	**0**	**3**
Spring/Summer Totals			**3,295**	**274**	**119**	**71**	**44**	**20**	**0**	**0**	**0**	**0**	**3**

Additional Topics

1. California troll spring Chinook fishery
    - Factors to why a difference in fishery success:
        - California drought subsided, hatchery production online, ocean variables/warm blob, mixed stock fishery up north/additional constraints

2. Summer Chinook

- Guidance regarding allocation of ESA impacts for 2020 commercial and recreational fisheries, has not yet been finalized.
- Similar to 2019, the low forecast of 38,300 adult summer Chinook to the Columbia River mouth may not provide for any harvestable summer Chinook downstream of Priest Rapids Dam, given potential ocean harvest and obligations to upriver fisheries.
- The first run update is typically not available until around July 1.
- Discussions regarding 2020 summer Chinook will continue at the North of Falcon meetings. Ocean fishery regulations are set through the Pacific Fishery Management Council process.

2020 in-river upper Columbia summer Chinook scenarios

			allowable NT harvest		<BON			
Ocean PFMC-area NT harvest	CR mouth runsize forecast	Abundance to calculate allowable harvest	Ocean + in-river	In-river	commercial	recreational	recreational BON-PRD	>PRD
2,000	38,300	40,300	5,650	3,650	73	248	44	3,285
3,000	38,300	41,300	6,150	3,150	63	214	38	2,835
4,000	38,300	42,300	6,650	2,650	53	180	32	2,385
5,000	38,300	43,300	7,150	2,150	43	146	26	1,935
6,000	38,300	44,300	7,650	1,650	33	112	20	1,485
7,000	38,300	45,300	8,150	1,150	23	78	14	1,035
8,000	38,300	46,300	8,650	650	13	44	8	585
9,000	38,300	47,300	9,150	150	3	10	2	135
9,300	38,300	47,600	9,300	0				

*In-river allocations assume recreational/commercial sharing as occurred in 2017-19 (80% recreational and 20% commercial)

3. Spring/summer forecasts and fall outlook were provided before and are below for reference.

Columbia River Adult Salmon Returns: Actual and Forecasted				
		2019	**2019**	**2020**
		Forecast	**Return**	**Forecast**
Spring Chinook	**Upriver Total ***	**99,300**	**73,101**	**81,700**
	Upper Columbia	11,200	14,651	13,600
	Upper Columbia natural-origin	*2,100*	*1,668*	*2,300*
	Snake River Spring/Summer **	48,100	43,077	56,400
	Snake River natural-origin **	*8,200*	*7,480*	*9,600*
	Lower River Total	**58,200**	**36,707**	**54,100**
	Total Spring Chinook	**157,500**	**109,808**	**135,800**
	Area-specific detail			
	Willamette River	40,200	27,292	40,800
	Sandy River	5,500	3,260	5,200
	Select Areas***	8,200	2,548	4,300
	Cowlitz River	1,300	1,563	1,400
	Kalama River	1,400	997	1,000
	Lewis River	1,600	1,047	1,400
	Wind River***	2,800	1,598	2,000
	Drano Lake/Little White Salmon River***	5,600	3,571	4,600
	Hood River***	2,300	1,207	2,300
	Klickitat River***	1,100	404	1,800
	Deschutes River***	1,455	863	--
	John Day River***	--	2,170	2,800
	Umatilla River***	2,400	522	900
	Yakima River***	3,000	1,756	2,800
Summer Chinook	**Upper Columbia**	**36,340**	**34,619**	**38,300**
Sockeye	**Total Sockeye**	**94,400**	**63,222**	**246,300**
	Wenatchee	18,300	7,900	39,400
	Okanogan	74,500	54,300	201,800
	Yakima	1,300	600	2,500
	Deschutes	100	200	300
	Snake River	200	342	2,300
Winter Steelhead	**Wild**	**14,400**	**9,440**	**10,100**

* 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.

** 2019 return is based on standard TAC run reconstruction methodology.

*** Return to tributary mouth.

2/3/2020

COLUMBIA RIVER FALL CHINOOK
2019 PRELIMINARY RETURNS AND
OUTLOOK FOR 2020

2019 Preliminary Returns

- Adult fall Chinook return was predicted to be 349,600 fish.
- Preliminary return is slightly above the forecast.
- Bright jack return appears to be improved over 2018. Tule jack return appears to be slightly improved over 2018.

2020 Outlook

- Bright stocks should be similar to the 2019 preliminary return.
- Tule stocks should be similar to the 2019 preliminary return.
- Ocean conditions between 2015 and 2019 were among the worst observed during the last 21 years and are likely continuing to have a strong influence on the fall Chinook return in 2020.

Columbia River Coho

- 2019 preliminary return is about 30% of the preseason forecast of 611,300.
- Coho jack return to the Columbia River is less than 50% of the recent three-year average.

Tule Stocks

LRH – Lower River Hatchery stock
BPH – Bonneville Pool Hatchery stock

Bright Stocks

URB – Upriver Bright stock
PUB – Pool Upriver Bright stock
LRB – Lower River Bright stock
LRW – Lower River Wild stock
SAB – Select Area Bright stock

December 13, 2019
Washington Department of Fish and Wildlife
Oregon Department of Fish and Wildlife

Ground Rules

1. Focus on the task at hand – *Stick to the agenda*
2. One person at a time to speak – *Stand name tag upright, or raise hand*
3. Allow for a balance of speaking time – *respect time limits*
4. Be respectful of others
   - Be tough on issues and questions, not on people and organizations
   - No personal attacks
   - Listen
5. Keep side conversations to a minimum
6. Mute phone
7. Be a conduit – *share information*

Cowlitz, Kalama, and Lewis River
Spring Chinook Fact Sheet
February 2020

2020 Spring Chinook Forecasts to Columbia River Mouth

- Cowlitz River= 1,440 adult spring Chinook.
- Kalama River= 1,030 adult spring Chinook.
- Lewis River= 1,370 adult spring Chinook.
- Spring Chinook forecasts are based on average brood year relationships, where:
    - age-3 fish (jacks) predict age-4 fish
    - age-4 fish predict age-5 fish
- Brood year relationships are currently used for nearly all forecasts in the Columbia River basin.
- 2020 forecasts for other spring Chinook stocks in the Columbia River basin are generally below average.

Hatchery Releases

- Spring Chinook hatchery releases from Cowlitz, Kalama and Lewis hatchery facilities for 2010-2019 are shown in Table 1.
- Returning jacks and adults (age 3-6) in 2020 are from releases in 2016-2019.
- Cowlitz release goals increased in 2013-2014 alongside a transition to a change in release size strategies.
- Cowlitz and Kalama releases in 2014-2019 have been near or above goal.
- Cowlitz 2019 releases included an additional 118,000 subyearlings in June as a result of surplus production.

Table 1. Spring Chinook hatchery releases from Cowlitz, Kalama and Lewis facilities in 2010-2019. Adult and jack spring Chinook (age 3-6) returning in 2020 are from juvenile releases in 2016-2019 (highlighted below).

	COWLITZ			KALAMA			LEWIS		
Release Year	Goal	Plant	% of goal	Goal	Plant	% of goal	Goal	Plant	% of goal
2010	1,262,539	1,280,347	101%	500,000	352,924	71%	1,050,000	1,110,755	106%
2011	1,260,226	1,076,945	85%	500,000	501,556	100%	1,050,000	1,057,833	101%
2012	942,369	881,337	94%	500,000	559,575	112%	1,350,000	1,410,270	104%
2013	1,464,849	1,601,472	109%	500,000	521,462	104%	1,250,000	1,286,170	103%
2014	1,797,115	2,051,598	114%	500,000	515,038	103%	1,675,000	1,516,940	91%
2015	1,793,529	1,958,471	109%	500,000	549,558	110%	1,925,000	1,814,469	94%
2016	1,793,529	1,874,482	105%	500,000	481,624	96%	1,250,000	717,742	57%
2017	1,741,899	1,852,960	106%	500,000	533,954	107%	1,250,000	402,224	32%
2018	1,741,899	1,844,162	106%	500,000	509,425	102%	1,250,000	710,708	57%
2019	1,741,899	2,011,018	115%	500,000	509,909	102%	1,350,000	2,294,425	170%

- Lewis releases in 2014-2019 have been below goal due to a combination of reduced in-hatchery survival and subsequent low adult returns for use as hatchery broodstock.

- A change in release size and timing strategies has been made at Lewis Hatchery to address the challenges with in-hatchery survival that have occurred in recent years; a program has been implemented to evaluate this change including subyearling releases in summer and fall. Goal and release numbers in Table 1 include all strategies.
- Lewis Hatchery releases in 2019 included an additional 900,000 subyearlings released in June as part of Southern Resident Killer Whale forage supplementation.

Hatchery Escapement Goals

- Hatchery escapement needs for Cowlitz, Kalama and Lewis rivers are shown in Table 2.
- The on-station escapement need at the hatchery in Table 2 is the average number of adults needed to meet broodstock needs for the in-basin hatchery release goals and/or reintroduction programs.
    - On-station hatchery escapement needs for the Cowlitz and Lewis are defined in the Columbia River Biological Opinion (BIOP) issued by NOAA Fisheries. Available at: https://www.fisheries.noaa.gov/webdam/download/95517198.
- Based on preseason forecasts for 2020, the Cowlitz and Lewis River hatcheries are not expected to meet their escapement goals. Projections indicate the Cowlitz and Lewis River hatcheries will be roughly 10% and 16% short of broodstock goals, respectively. There are not enough spring Chinook predicted to return to either tributary to support a directed fishery.

Table 2. Cowlitz, Kalama, and Lewis River spring Chinook run-size forecasts for 2020 and hatchery escapement needs. Actual annual hatchery escapement needs may vary slightly to account for changes in fecundity, sex ratios, pre-spawn loss, etc.

2020 Expectations			
	Cowlitz	Kalama	Lewis
Forecasted return to Tributary Mouth	1,393	1,002	1,333
Avg. % wild return 2014-2018	1.6%	3.7%	1.6%
Natural-origin fish return	22	37	22
Hatchery fish return	1,371	965	1,311
Escapement need at Hatchery			
On-station (from BiOp)	1,337	400*	1,380
Upstream**	if available	NA	if available
SRKW prey enhancement	if available	if available	if available
Deep River Net Pen off-channel program		200	
Total Escapement Need	1,337	600	1,380
Escapement Need at River Mouth***	1,526	693	1,563
Harvestable surplus	(136)	236	(222)
*Kalama broodstock goal is greater than BiOp goal			
**Fish are trucked and released above dams for population recovery			
***Includes fish spawning downriver from hatchery			

- ESA obligations (Biological Opinion) guide hatchery escapement goals so that conservation objectives can be met to continue efforts to re-introduce fish into the upper basins in the Cowlitz and Lewis rivers.
- The Kalama River is projected to have sufficient fish available in excess of broodstock needs to provide for sport fisheries.
- The Cowlitz River hatchery escapement goal of 1,340 adults was not met in 2019; a total of 1,170 adults returned to the hatchery. However, the egg-take goal of 2.2 million was achieved due to better than expected brood survival.
- The Kalama hatchery escapement goal of 600 adults was met in 2019; this includes 400 adults for the on-station program and 200 adults for the Deep River net pen program. A total of 704 hatchery and wild adult spring Chinook returned to Kalama Falls Hatchery.
- The Lewis River hatchery escapement goal of 1,380 fish was not met in 2019; a total of 803 adults returned to the hatchery. The egg-take is expected to be about 87% of the program goal due to higher fecundity and better than expected brood survival.

<u>Ocean Conditions</u>

- Ocean conditions have been identified as a leading contributor to adult salmon returns along the Pacific coast of the U.S. and Canada.
- The development of poor ocean conditions beginning in 2014, commonly called "The Blob", have impacted salmon and steelhead survival in the marine environment across a large geographic area in the north Pacific.
- Figure 1 shows the relationship between ocean conditions as measured by the Pacific Decadal Oscillation (PDO) and adult salmonid returns to the Columbia River basin. The relationship between cooler ocean conditions (negative PDO) and higher returns to the Columbia River is evident.
    - In this figure, the PDO values two years prior to the adult return are shown adjusted to the adult return year, highlighting that warm ocean conditions experienced by juveniles entering the ocean in 2014 and 2015 affected subsequent adult returns in 2016 and 2017.
- Table 3 presents NOAA's Northwest Fisheries Science Center "stoplight" chart for ocean indicators identified to correlate with salmon survival.
    - Ecosystem indicators deteriorated in 2014, with the 2015-2019 overall rankings in the "bad" category.
    - 2016 was the 2nd worst score on record, which impacted 2018 spring chinook returns and likely impacted 2019 returns as well.
    - Adult Spring Chinook returns are primarily composed of 4 and 5-year-old fish that encountered ocean conditions during 2017 through 2019. While ocean conditions during these years weren't the worst in the current period of record, they tend to rank fairly low.

SUMMARY – Ocean conditions from 2014 through 2019 have generally been poor for salmonids, with four of the last five years falling in the bottom third of ranked years. This has likely had a negative influence on marine survival for many Columbia River salmonid stocks. Additionally, there are numerous other factors that affect post-release survival for hatchery fish. Some of the more prominent factors may include predation by seals/sea lions, birds,

and/or other fish, as well as streamflow and temperature conditions which can cause disease after the fish are released. Effects of these other factors are not well quantified for Cowlitz, Kalama and Lewis hatchery programs, but all contribute to overall survival.

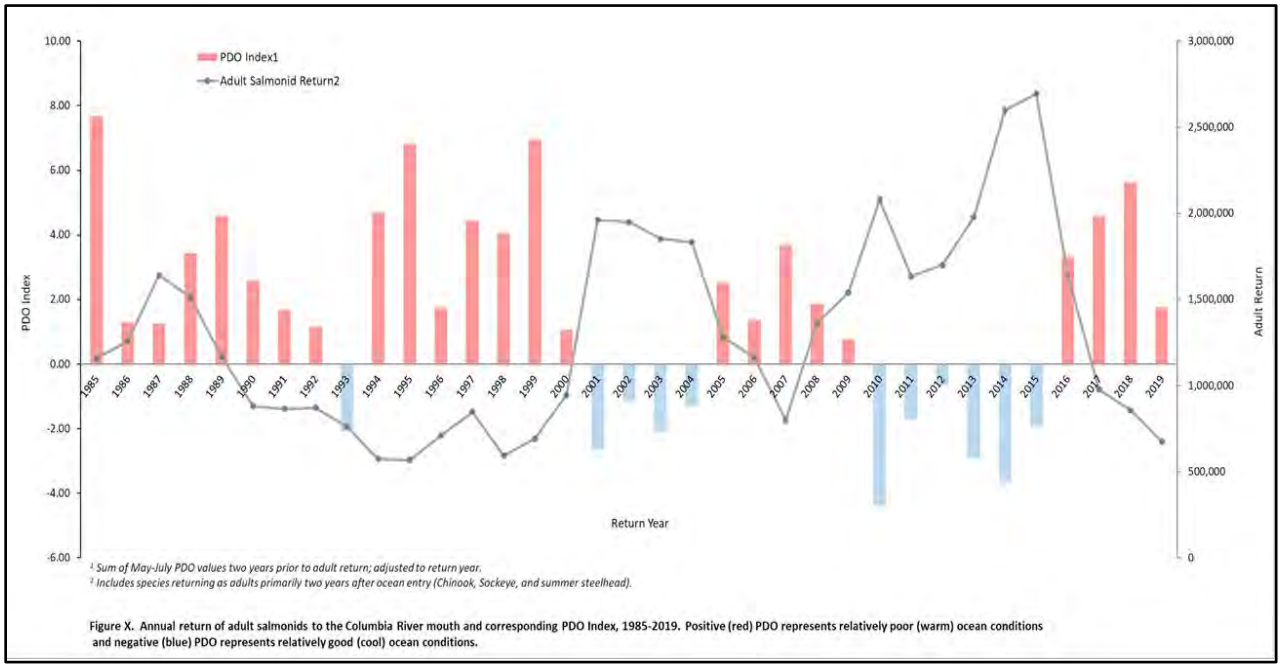


Figure 1. Total annual return of adult salmonids to the Columbia River mouth and corresponding PDO index, 1985-2018. Positive (red) PDO represents relatively poor (warm) ocean conditions and negative (blue) PDO represents relatively good (cool) ocean conditions.

<u>Spring Chinook Adult Returns for Cowlitz, Kalama and Lewis</u>

- Spring Chinook adult returns (2000-2019) for the Cowlitz, Kalama and Lewis rivers are shown in Figure 3.
- Cowlitz and Kalama River spring Chinook returns closely reflect changes in the PDO cycle and ocean indicators.
- Lewis River returns have shown a lack of response to favorable ocean conditions over the last decade. This is likely due to hatchery rearing challenges (i.e. river temperatures, disease issues, and release timing).
- Improved returns in 2017 and 2018 (despite poor ocean conditions) may be a positive sign that recent hatchery rearing changes are resulting in increased survival.

Table 3. NOAA Fisheries – Northwest Fisheries Science Center Ecosystem Indicator "Stoplight" chart https://www.nwfsc.noaa.gov/research/divisions/fe/estuarine/oeip/figures2019/Table_SF-03.JPG

Ecosystem Indicators	*1998*	*1999*	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*	*2012*	*2013*	*2014*	*2015*	*2016*	*2017*	*2018*	*2019*
PDO (Sum Dec-March)	19	6	3	13	7	21	12	17	14	9	5	1	16	4	2	8	10	22	20	18	11	15
PDO (Sum May-Sept)	10	4	6	5	11	17	16	18	12	14	2	9	7	3	1	8	20	22	21	15	13	19
ONI (Average Jan-June)	21	1	1	7	14	16	15	17	9	12	3	11	18	4	6	8	10	19	22	13	5	20
SST NDBC buoys (°C; May-Sept)	17	6	8	4	5	11	22	12	2	14	1	10	3	7	9	16	20	19	18	13	15	21
Upper 20 m T (°C; Nov-Mar)	21	11	8	10	6	15	16	13	12	5	1	9	18	4	3	7	2	22	20	19	14	17
Upper 20 m T (°C; May-Sept)	16	11	13	4	1	3	22	19	8	10	2	5	17	7	6	18	20	9	14	12	15	21
Deep temperature (°C; May-Sept)	22	6	8	4	1	10	12	16	11	5	2	7	14	9	3	15	21	19	13	18	20	17
Deep salinity (May-Sept)	21	3	11	4	5	18	19	12	7	1	2	16	20	15	14	13	22	17	9	8	6	10
Copepod richness anom. (no. species; May-Sept)	20	2	1	7	6	15	14	19	16	10	8	9	18	4	5	3	11	21	22	17	13	12
N. copepod biomass anom. (mg C m^{-3}; May-Sept)	20	15	11	12	4	17	14	21	16	13	7	10	9	1	3	5	6	18	22	19	8	2
S. copepod biomass anom. (mg C m^{-3}; May-Sept)	22	2	5	4	3	15	16	21	14	10	1	7	17	9	8	6	11	19	20	18	13	12
Biological transition (day of year)	19	11	6	7	8	15	12	20	14	3	1	2	17	4	9	5	10	21	21	18	13	15
Nearshore Ichthyoplankton Log(mgC 1,000 m^{-3}; Jan-Mar)	17	4	11	6	1	21	22	16	8	18	3	13	2	7	5	10	19	14	15	12	9	20
Nearshore & offshore Ichthyoplankton community index (PCO axis 1 scores; Jan-Mar)	11	6	5	9	8	13	16	20	1	14	3	12	15	4	2	7	10	18	21	22	17	19
Chinook salmon juvenile catches (no. km^{-1}; June)	20	4	5	17	8	12	18	21	13	11	1	6	7	16	2	3	10	14	19	22	15	9
Coho salmon juvenile catches (no. km^{-1}; June)	20	8	14	6	7	3	17	21	18	4	5	10	11	16	19	1	13	9	15	22	2	12
Mean of ranks	18.5	6.3	7.3	7.4	5.9	13.9	16.4	17.7	10.9	9.6	2.9	8.6	13.1	7.1	6.1	8.3	13.4	17.7	18.3	16.6	11.8	15.1
Rank of the mean rank	22	4	6	7	2	15	17	19	11	10	1	9	13	5	3	8	14	19	21	18	12	16
Ecosystem Indicators not included in the mean of ranks or statistical analyses																						
Physical Spring Trans. UI based (day of year)	3	7	21	18	4	13	16	22	13	1	6	2	8	11	19	9	20	10	5	17	11	13
Physical Spring Trans. Hydrographic (day of year)	21	3	13	8	5	12	15	22	6	9	1	9	19	3	11	2	17	7	18	20	15	14
Upwelling Anomaly (April-May)	11	3	18	7	10	15	14	22	11	5	8	9	16	18	15	13	20	1	2	21	6	4
Length of Upwelling Season UI based (days)	6	2	20	13	1	15	11	22	5	3	9	3	17	19	17	16	21	12	8	14	7	10
Copepod Community Index (MDS axis 1 scores; May-Sept)	21	3	5	8	2	16	14	20	17	10	1	7	13	9	6	4	11	19	22	18	12	15

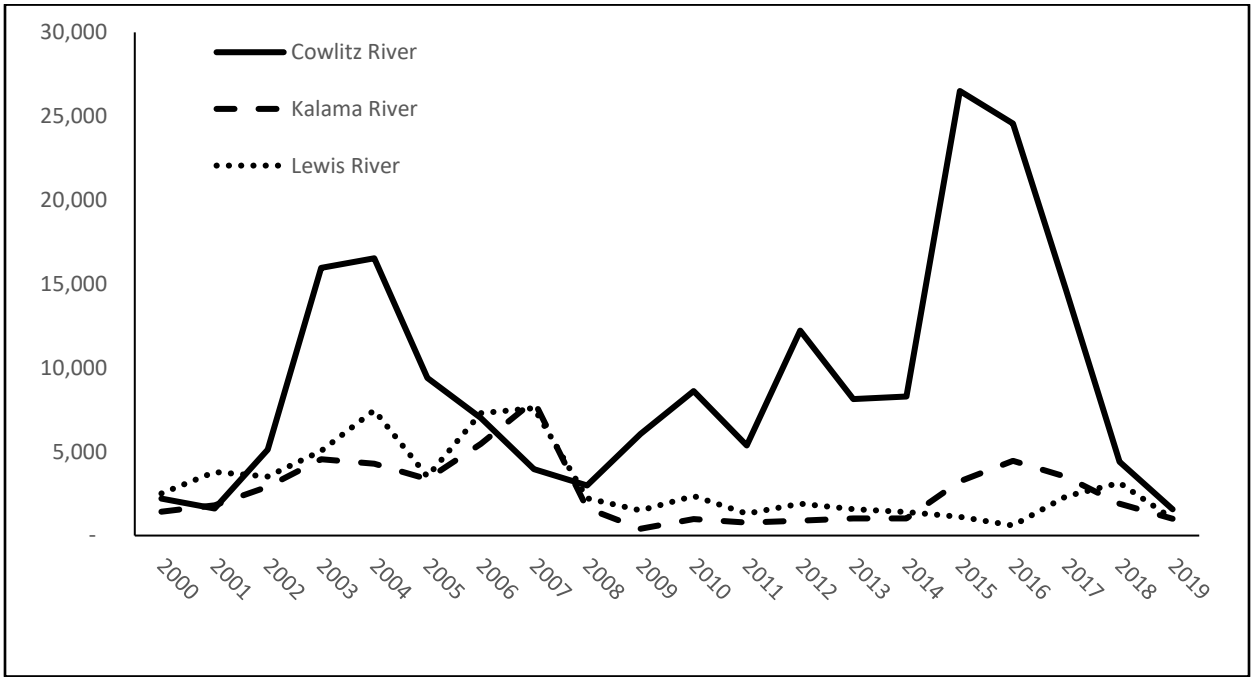


Figure 3. Adult Spring Chinook Returns to the Cowlitz, Lewis , and Kalama Rivers.

Analysis of Variables Potentially Affecting Run Timing of Upriver Spring Chinook

Main points:

- Since 1990, average water temperature in the Columbia River (as measured at the Bonneville Dam scroll case) during March 1 – April 30 has been declining, and may be associated with earlier timing of snowmelt and peak runoff from changes in climate within the Columbia River Basin (Figure 1). This decrease in average temperature coincides with an increasingly later 50% passage date for upriver spring Chinook at Bonneville Dam during the same timeframe (Figure 2).
- A simple linear regression of average March-April water temperature and 50% passage timing (day # of the year) showed a moderately strong negative relationship between river temperatures and passage timing between 1990 and 2019 ($R^2 = 0.41$; Figure 3).
- As river flow (represented by outflow discharge at Bonneville Dam) and water temperature are often (but not always) inversely associated during the spring, average March-April river flow and passage timing were positively related during 1990-2019; however, the relationship was not as strong as it was for temperature ($R^2 = 0.26$).
- A multiple regression of average March-April river temperature and flow vs. 50% passage timing resulted in an R^2 of 0.49, indicating that almost half of the variation in run timing in the last 30 years can be explained by these two environmental variables.
- Predation by pinnipeds below Bonneville Dam has increased since the early 2000s. Both levels of pinniped predation (% of the spring salmonid run lost to pinnipeds) and 50% passage day number have increased at a similar rate since 2002; however, because of high variability in salmonid predation levels between 2002 and 2018 (possibly due to changes in sea lion species composition and diet), the relationship between predation alone and passage timing is relatively weak ($R^2 = 0.08$).
- A simple linear regression of upriver spring Chinook run size vs. 50% passage day during 2000-2019 resulted in an R^2 of 0.52, with passage timing becoming progressively earlier as run size increased. This makes intuitive sense in that larger run sizes tend to have more protracted run timing and this may push up the date of 50% passage. However, a similar regression for a longer time series (1980-2019) showed no relationship between the variables, suggesting that the higher R^2 for the 2000-2019 period may be the result of effects from more recent conditions, or may be confounded by other variables.
- Nevertheless, when all four variables (river temperature, flow, pinniped predation, and run size) were incorporated into a multiple regression vs. 50% passage timing for 2002-2018 (years when data for all variables are available), the resulting R^2 was 0.65, suggesting that almost 2/3 of the variation in run timing in recent years can be explained by these four variables.
- Harvest rates of upriver spring Chinook in the Lower Columbia River recreational fishery showed a slightly decreasing trend between 2001 (when mark-selective fisheries were established) and 2019. Harvest rates in the fishery did not correspond with changes in passage timing during the same timeframe (Figure 4), and a simple linear regression indicated no relationship between these variables ($R^2 = 0.0002$).
- It is likely that changes in river conditions have been affecting the run timing of upriver spring Chinook for many years. In more recent years, it is possible that other factors such as pinniped predation and smaller run sizes, may also contribute to later run timing.

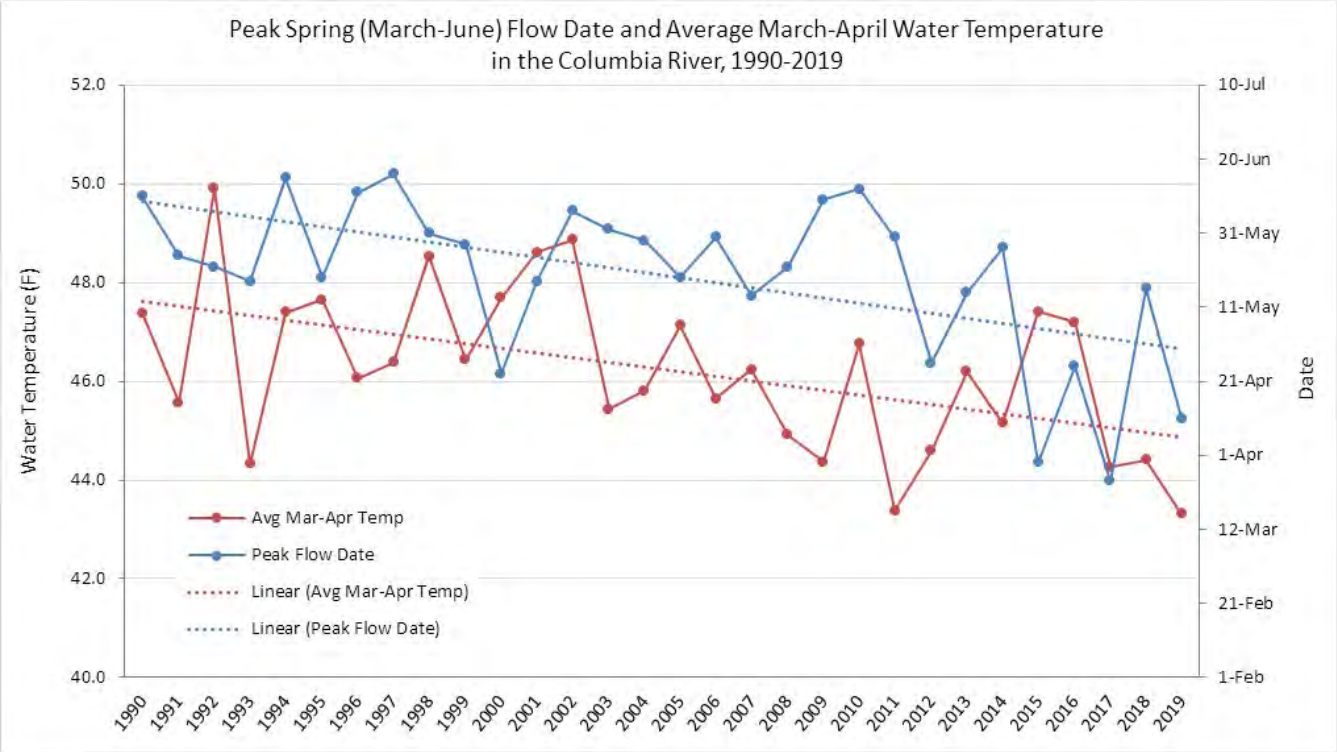


Figure 1.

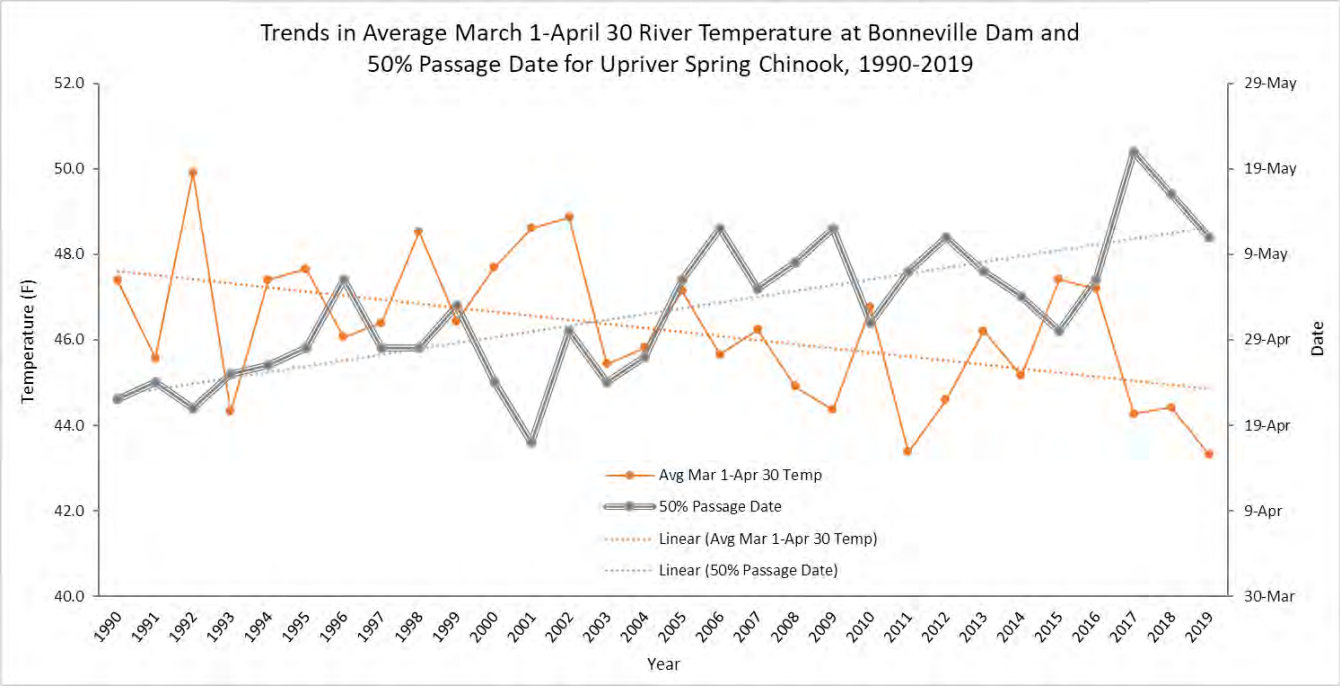


Figure 2.

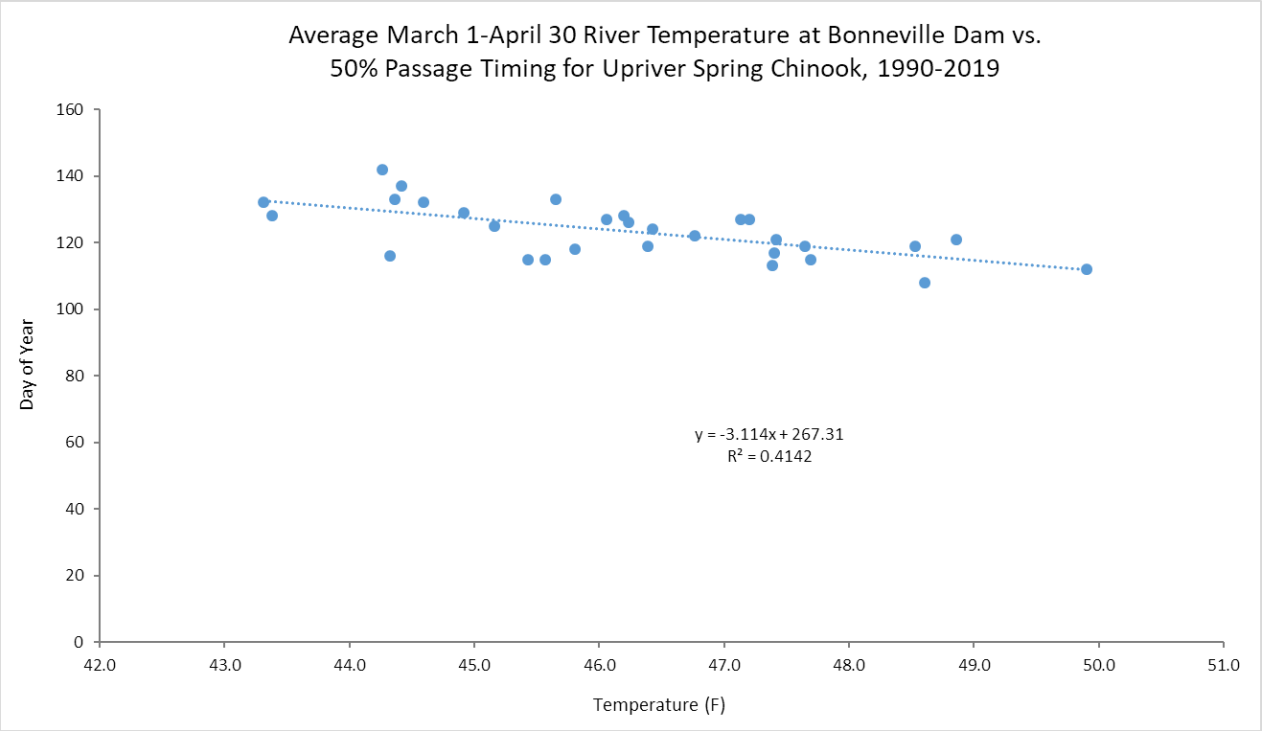


Figure 3.

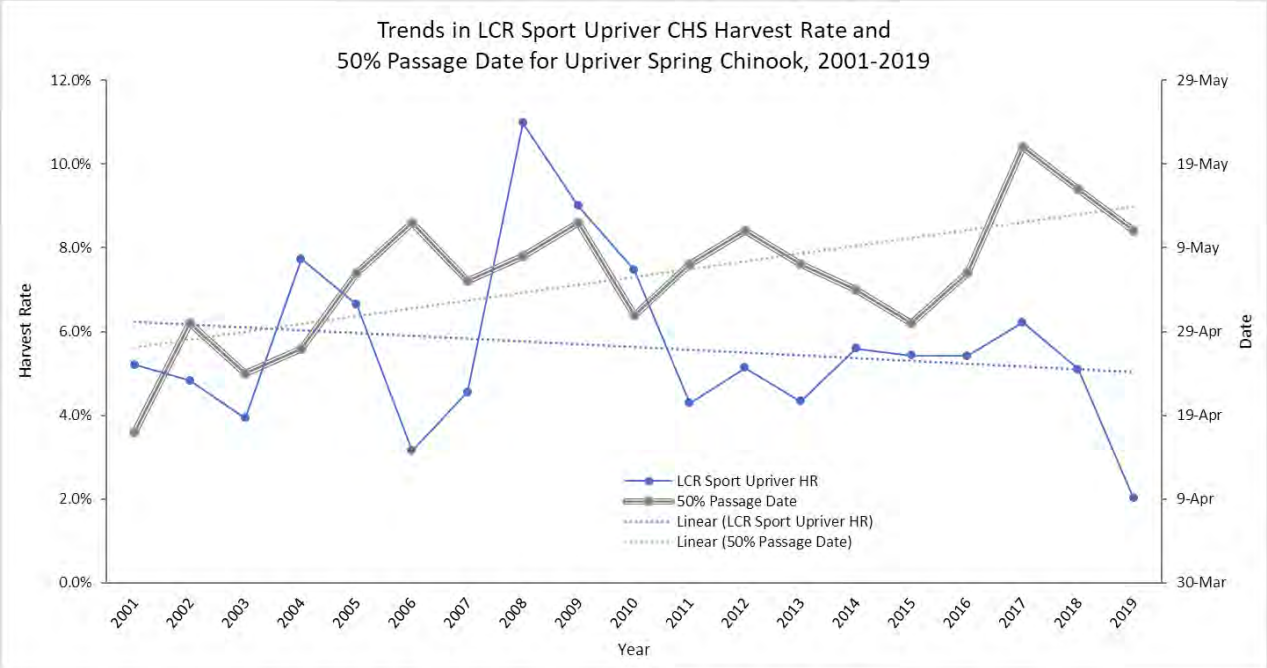


Figure 4.

Upper Columbia Summer Chinook Spawning Escapement Estimates.

Table 1. Wild summer/fall Chinook spawning escapements in the Upper Columbia River tributaries for the 2002-2018 return years with escapement goals. Red indicates problem years (escapement target not acheived).

																				5-year		10-year	
	Wild Escapement Target	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	Average	Geomean	Average	Geomean
Wenatchee		11,892	10,025	9,220	6,862	16,060	3,173	4,794	7,113	5,879	8,155	7,327	7,449	9,607	4,070	5,321	6,534	2,744	1,132	3,960	3,378	5,822	5,062
Entiat	13,500 [1]	349	531	296	278	345	142	238	203	319	570	1,063	843	594	269	613	349	161	114	301	254	489	399
Chelan		146	84	237	215	269	62	258	25	481	563	262	606	583	719	396	378	454	764	542	518	521	498
Subtotal	13,500	12,387	10,640	9,753	7,355	16,674	3,377	5,290	7,341	6,679	9,288	8,651	8,898	10,784	5,058	6,330	7,261	3,359	2,010	4,803	4,357	6,832	6,177
Methow	1,500	2,732	2,240	1,642	1,690	1,667	614	1,227	1,020	1,271	1,459	1,680	1,720	1,463	3,162	1,457	1,028	684	846	1,435	1,223	1,477	1,359
Okanogan	2,000	4,296	1,436	5,444	6,400	6,623	2,739	2,930	4,149	3,155	4,453	4,688	5,818	10,583	10,706	9,014	5,451	3,305	1,870	6,069	5,040	5,904	5,152
Total	17,000	19,414	14,316	16,839	15,445	24,964	6,729	9,446	12,510	11,104	15,200	15,019	16,436	22,829	18,926	16,801	13,740	7,348	4,726	12,308	10,620	14,213	12,688

1 Goal is an aggregate allocation to include the Wenatchee and Entiat basins, with lower Chelan River

Provisional Data

Table 2. Total Summer Chinook spawning escapement (wild and hatchery) in Upper Columbia tributaries for the 2002-2018 run years. Proportion of hatchery fish on spawning grounds is expressed as pHOS. Red indicates problem years (pHOS ≥ 0.33).

																				5-year		10-year	
	Wild Escapement Target	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	Average	Geomean	Average	Geomean
Wenatchee		15,723	11,800	10,479	8,703	17,792	4,590	6,496	8,327	7,468	9,850	8,539	10,209	10,443	4,330	5,902	7,425	3,473	1,742	4,574	4,092	6,938	6,146
pHOS		0.24	0.15	0.12	0.21	0.10	0.31	0.26	0.15	0.21	0.17	0.14	0.27	0.08	0.06	0.10	0.12	0.21	0.35	0.17	0.14	0.17	0.15
Entiat	13,500	499	672	361	381	456	225	309	254	415	627	1,275	995	701	363	766	591	486	228	487	449	645	579
pHOS		0.30	0.21	0.18	0.27	0.24	0.37	0.23	0.20	0.23	0.09	0.17	0.15	0.15	0.26	0.20	0.41	0.67	0.50	0.41	0.37	0.28	0.24
Chelan		582	419	416	524	420	189	497	625	1,118	1,280	1,308	1,684	1,100	1,438	900	859	966	1,018	1,036	1,018	1,167	1,143
pHOS		0.75	0.80	0.43	0.59	0.36	0.67	0.48	0.96	0.57	0.56	0.80	0.64	0.47	0.50	0.56	0.56	0.53	0.75	0.58	0.57	0.59	0.59
Methow	1,500	4,630	3,930	2,189	2,561	2,733	1,364	1,947	1,758	2,492	2,917	2,947	3,583	1,625	3,952	2,241	1,408	1,367	2,820	2,358	2,170	2,535	2,387
pHOS		0.41	0.43	0.25	0.34	0.39	0.55	0.37	0.42	0.49	0.50	0.43	0.52	0.10	0.20	0.35	0.27	0.50	0.70	0.40	0.37	0.41	0.36
Okanogan	2,000	13,857	3,420	6,721	8,889	8,601	4,417	6,975	7,544	5,952	9,681	8,225	8,194	12,164	13,726	10,605	6,568	4,860	3,596	7,871	6,992	8,357	7,758
pHOS		0.69	0.58	0.19	0.28	0.23	0.38	0.58	0.45	0.47	0.54	0.43	0.29	0.13	0.22	0.15	0.17	0.32	0.48	0.27	0.24	0.32	0.29
Total		34,792	19,569	19,805	20,677	30,002	10,785	16,224	18,508	17,445	24,355	22,294	24,665	26,033	23,809	20,414	16,851	11,152	9,404	16,326	14,721	19,642	18,011

1 Goal is an aggregate allocation to include the Wenatchee and Entiat basins, with lower Chelan River

Provisional Data from Redd Counts and Carcass Recoveries.

McLain modeled this estimate, Casey Baldwin will provided precision estimate soon.