



2021 Post-Season Review

Fraser Sockeye & Pink Salmon



Photos by Maxime Veilleux

Presented to: Fraser River and Approach Forum

By: Jamie Scroggie

Jan. 2022



Overview

- Pre-season
- In-season
- Post-season
- Next steps/timelines

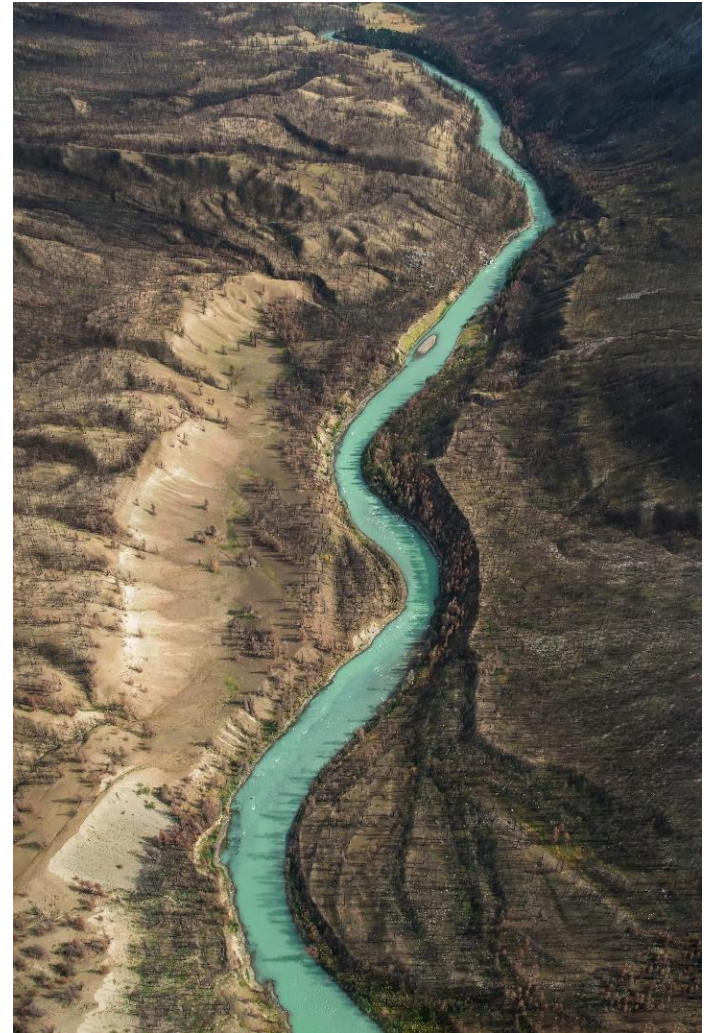


Photo by Shane Kalyn



Fisheries and Oceans
Canada

Pêches et Océans
Canada

2021 Pre-Season

Fraser Sockeye & Pink Salmon



Photo by Maxime Veilleux

2021 Fraser Sockeye & Pink Forecast Summary

Run timing group	Probability that return will be at/or below specified run size				
	10%	25%	50%	75%	90%
Early Stuart	8,000	12,000	18,000	30,000	47,000
Early Summer	33,430	58,760	107,500	206,900	375,300
Summer	231,890	474,300	1,045,700	2,225,000	4,502,000
Late	39,600	79,300	158,900	313,000	572,000
TOTAL SOCKEYE	312,920	624,360	1,330,100	2,774,900	5,496,300
TOTAL PINK	1,701,000	2,229,000	3,009,000	4,051,000	5,375,000

Fraser Sockeye Returns

Return Year	Forecast Probability Level						Actual Returns
	<10%	10%	25%	50%	75%	90%	
1998	NA	4,391,000	6,040,000	6,822,000	11,218,000	18,801,000	10,870,000
1999	NA	3,067,000	4,267,000	4,843,000	8,248,000	14,587,000	3,640,000
2000	NA	1,487,000	2,449,000	4,304,000	7,752,000	NA	5,200,000
2001	NA	3,869,000	6,797,000	12,864,000	24,660,000	NA	7,190,000
2002	NA	4,859,000	7,694,400	12,915,900	22,308,500	NA	15,130,000
2003	NA	1,908,000	2,742,000	3,141,000	5,502,000	9,744,000	4,890,000
2004	NA	1,858,000	2,615,000	2,980,000	5,139,000	9,107,000	4,180,000
2005	NA	5,149,000	8,734,000	16,160,000	30,085,000	53,191,000	7,020,000
2006	NA	5,683,000	9,530,000	17,357,000	31,902,000	56,546,000	12,980,000
2007	NA	2,242,500	3,602,000	6,247,000	11,257,000	19,706,000	1,510,000
2008	NA	1,258,000	1,854,000	2,899,000	4,480,000	7,057,000	1,740,000
2009	NA	3,556,000	6,039,000	10,578,000	19,451,000	37,617,000	1,590,000
2010	NA	5,360,000	8,351,000	13,989,000	23,541,000	40,924,000	28,250,000
2011	NA	1,700,000	2,693,000	4,627,000	9,074,000	15,086,000	5,110,000
2012	NA	743,000	1,203,000	2,119,000	3,763,000	6,634,000	2,050,000
2013	NA	1,554,000	2,655,000	4,765,000	8,595,000	15,608,000	4,130,000
2014	NA	7,237,000	12,788,000	22,854,000	41,121,000	72,014,000	20,000,000
2015	NA	2,364,000	3,824,000	6,778,000	12,635,000	23,580,000	2,120,000
2016	NA	814,000	1,296,000	2,271,000	4,227,000	8,181,000	853,000
2017	NA	1,315,000 ^R	2,338,000	4,432,000	8,873,000	17,633,000	1,641,000
2018	NA	5,265,000	8,423,000	13,981,000	22,937,000	36,893,000	10,675,000
2019	NA	1,832,000	2,979,000	5,056,000	9,133,000	15,313,000	564,000
2020	NA	275,000	486,000	924,000	1,834,000	3,573,000	288,000

- In the last decade, returns have been near or below the p50 forecast with exception of 2010 (2021).
- In recent years, returns have been well below forecast (near p10), exception of 2021.

← 2021 brood year

*2020 preliminary

2021 Fishery Planning Considerations

- Forecasts for 2021 were lower than average due to low brood year returns and expected poor survival.
 - Concern of not achieving average escapements and escapement targets.
 - No available TAC at any forecast levels for Early Stuarts and Late groups.
 - Early Stuart window closure extended one week to protect Early Summer.
 - Unlikely to be TAC until between p50 and p75 (Early Summer, Summer).
- Abundance-based escapement plan:
 - Feedback during pre-season consultations widely recommended a more conservative approach to Sockeye management.
 - Total allowable mortality (TAM) caps (50%).
 - 10% low abundance exploitation rate (LAER) limits for all run timing groups.
- Potential constraints: Sakinaw, Late Run, IFR Coho, IFR Steelhead, Chinook.
- Actual harvest opportunities depend on in-season information.
- Overall, a slow, cautious start to fisheries was recommended.



Fisheries and Oceans
Canada

Pêches et Océans
Canada

2021 In-Season Information

Fraser Sockeye & Pink Salmon

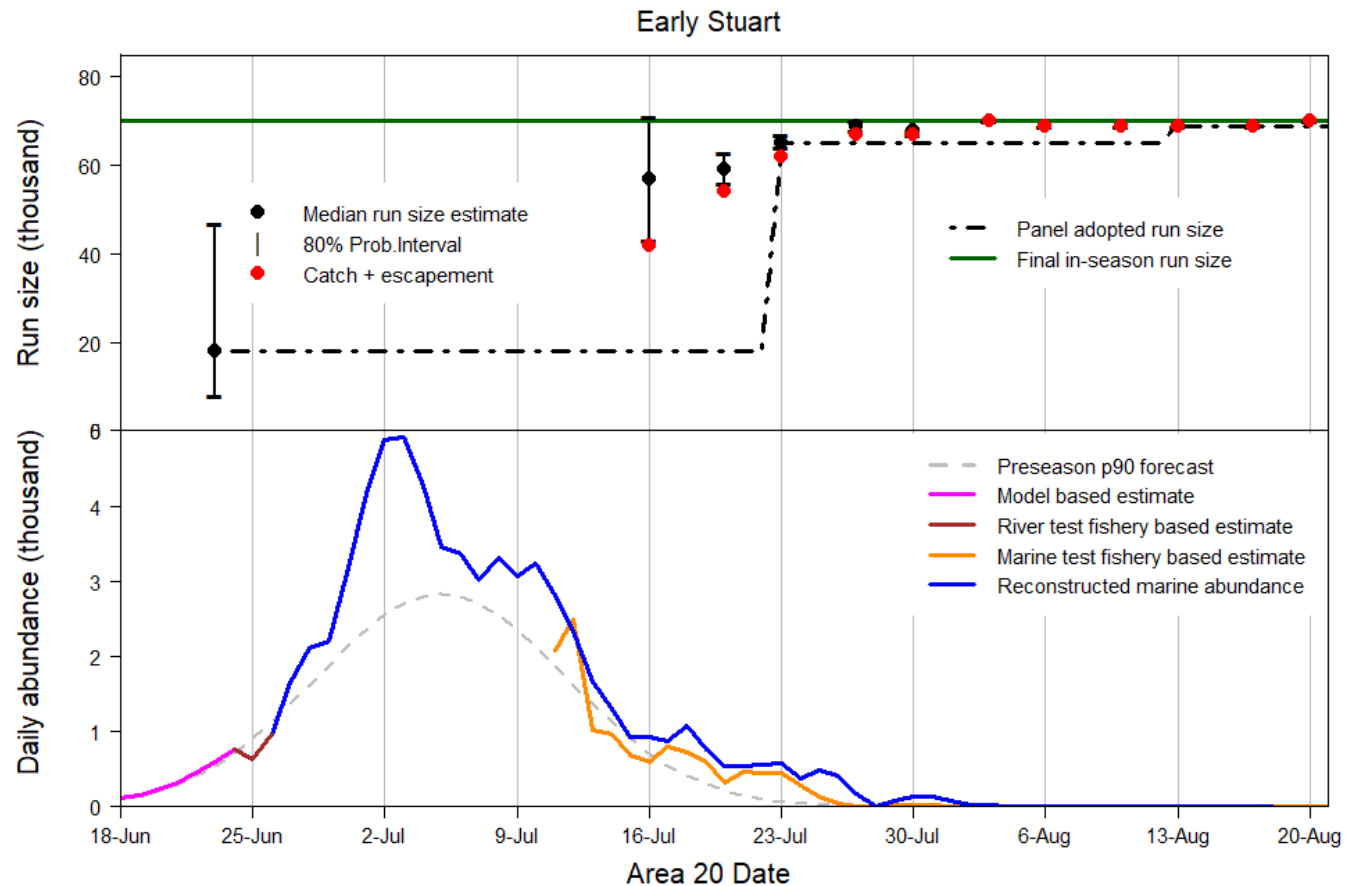


Photo by Maxime Veilleux

2021 Run size: Early Stuart

End-of-season estimate: 289% higher than p50 forecast;
49% higher than p90 forecast

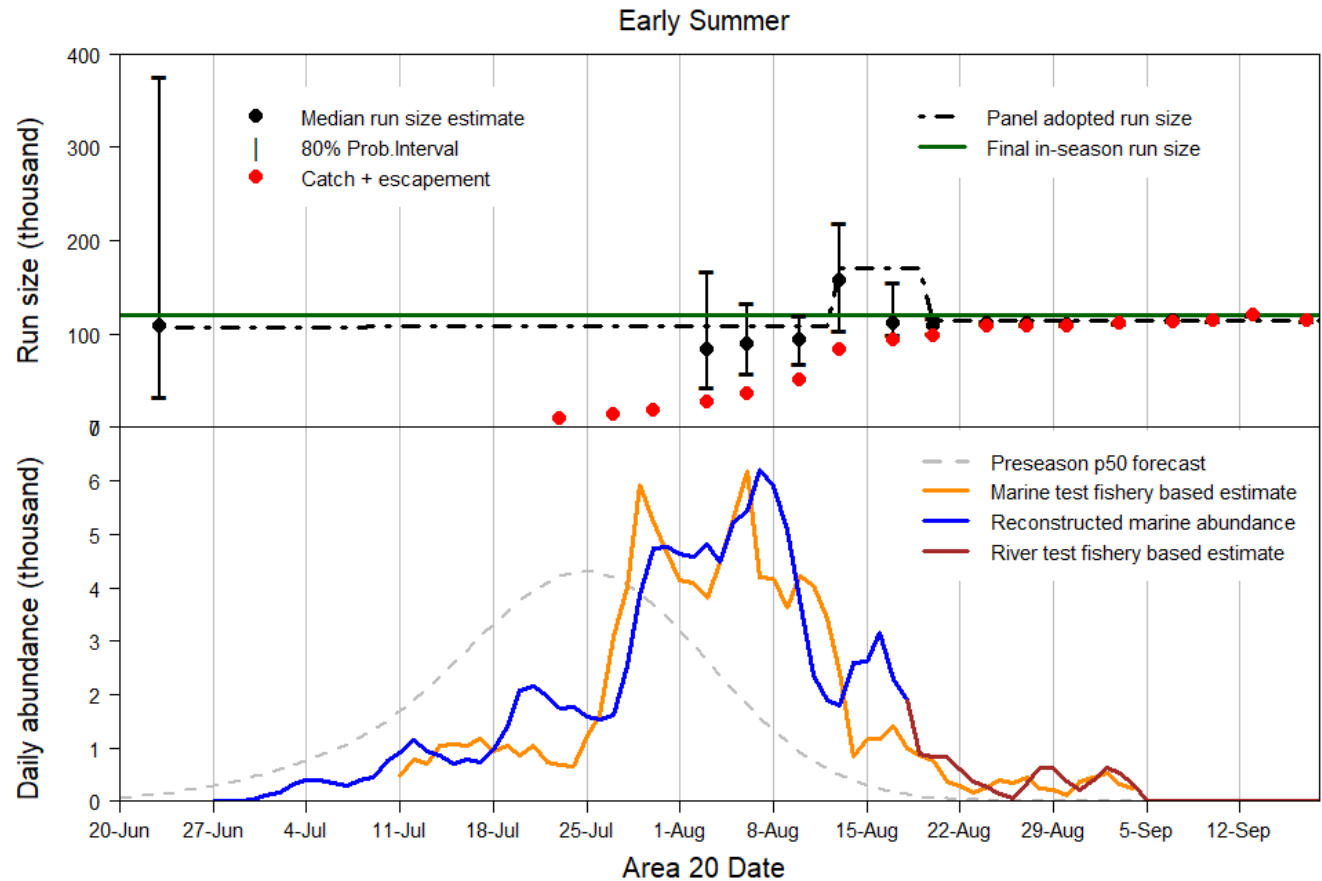
Date	Adopted Run Size
p50	18,000
23-Jul	65,000
13-Aug	69,000
Final Adopted	70,000
Accounted To Date	70,000



2021 Run size: Early Summer Run

End-of-season estimate: 11% higher than p50 forecast

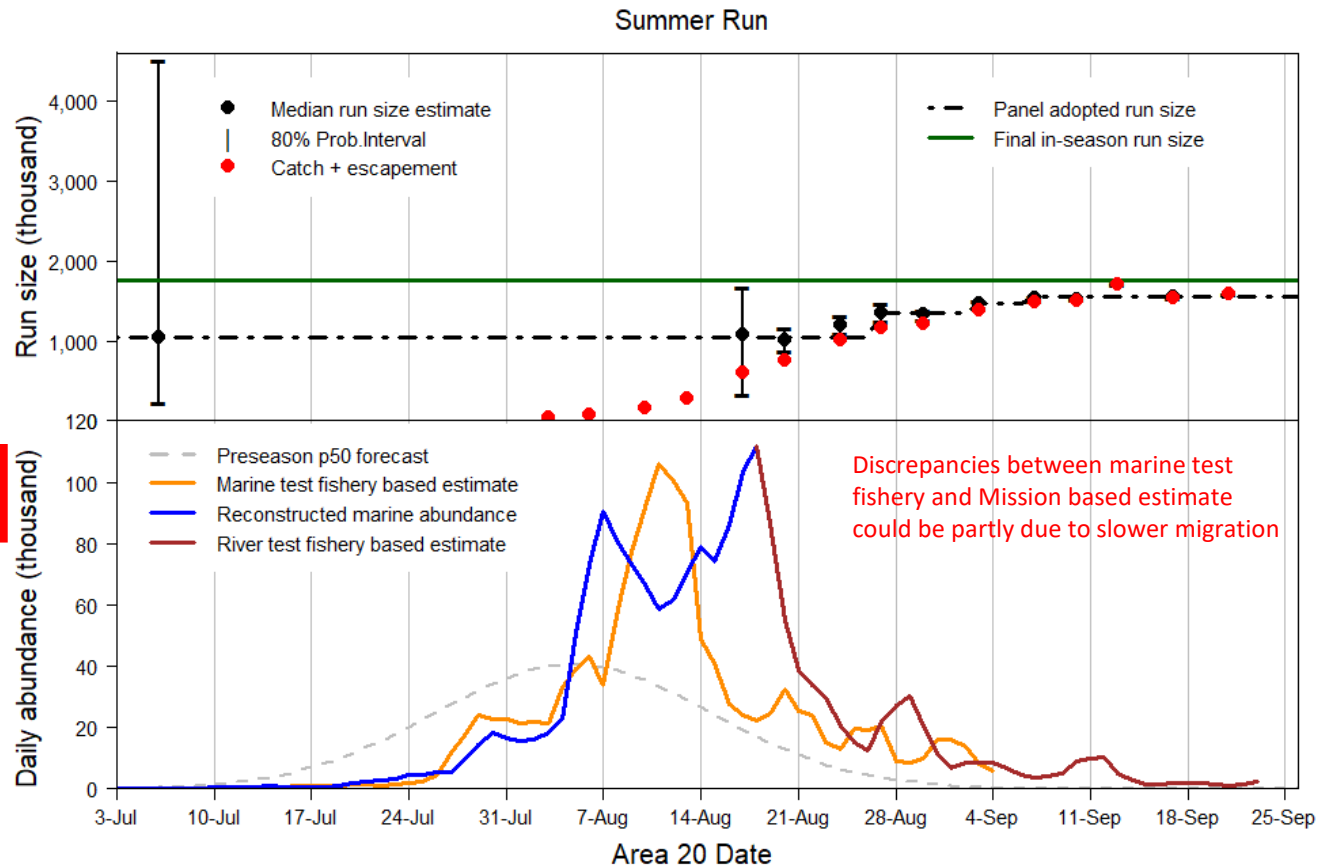
Date	Adopted Run Size
p50	108,000
13-Aug	170,000
20-Aug	115,000
Final Adopted	120,000
Accounted To Date	120,000



2021 Run size: Summer Run

End-of-season estimate: 68% higher than p50 forecast, but 21% below the p75 forecast

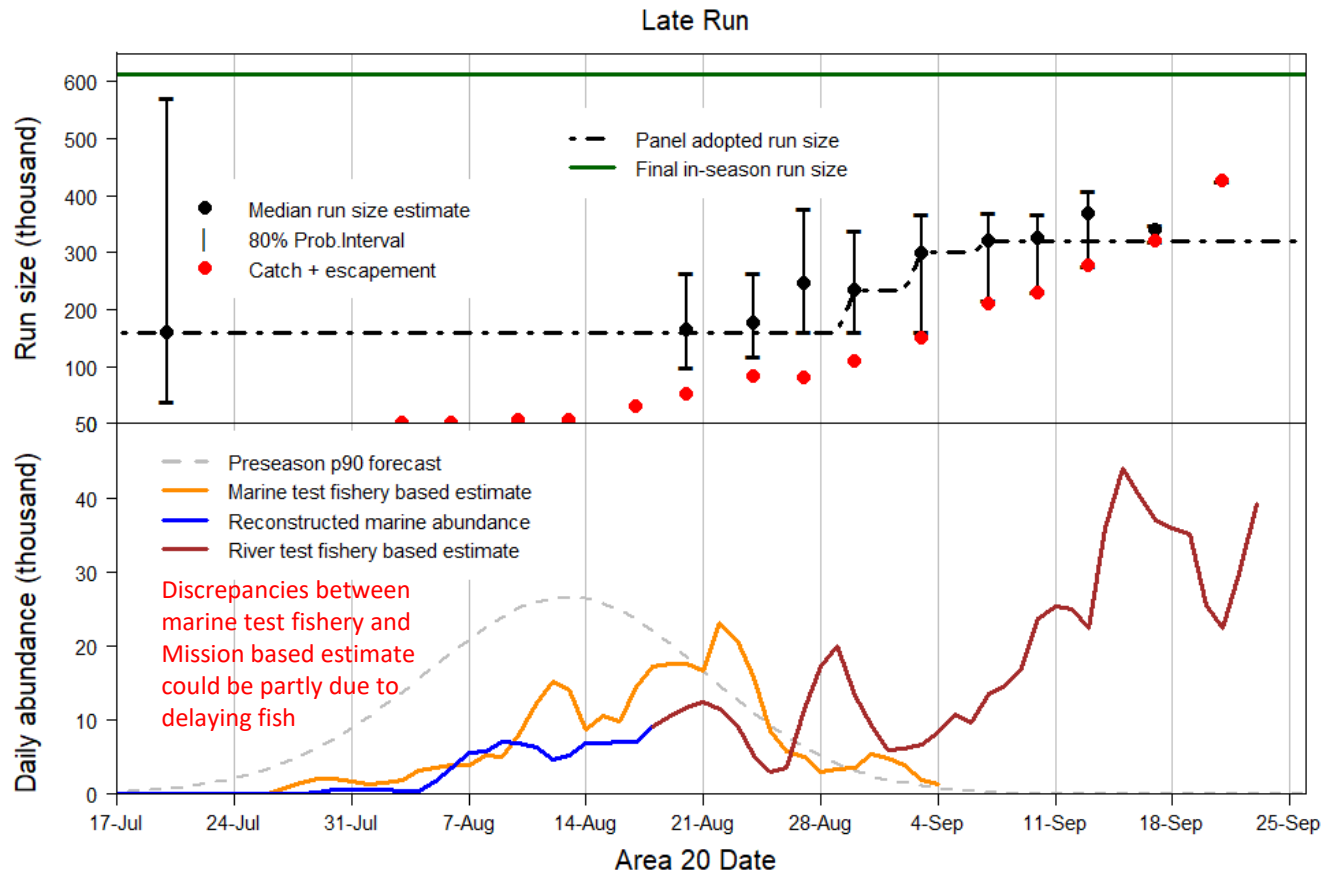
Date	Adopted Run Size
p50	1,046,000
27-Aug	1,350,000
3-Sep	1,475,000
7-Sep TAC	1,550,000
Final Adopted	1,763,000
Accounted To Date	1,758,000



2021 Run size: Late Run

End-of-season estimate: 286% higher than p50 forecast; 7% higher than the p90 forecast

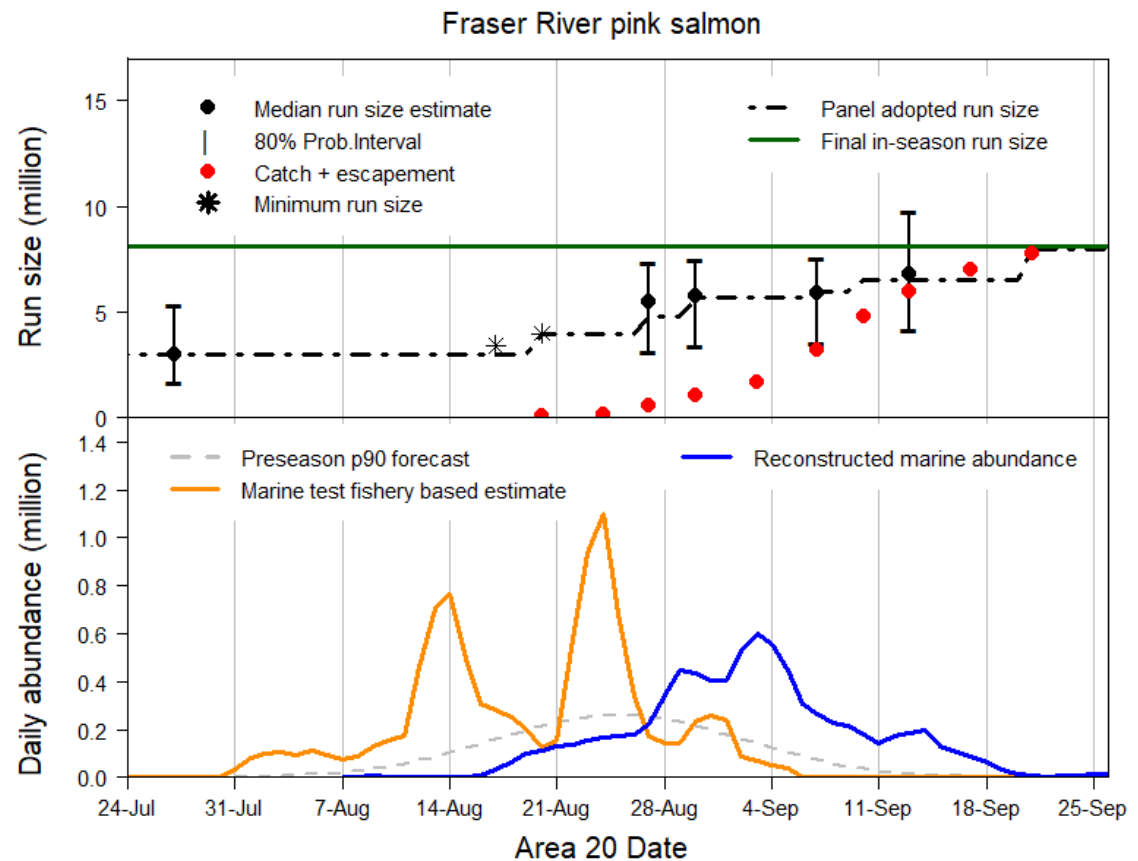
Date	Adopted Run Size
p50	159,000
30-Aug	234,000
3-Sep	300,000
7-Sep	320,000
Final Adopted	600,000
Accounted To Date	614,000



2021 Run size: Pink Run

End-of-season estimate: 169% higher than p50 forecast; 51% higher than the p90 forecast

Date	Adopted Run Size
p50	3,009,000
20-Aug	4,000,000
27-Aug	4,800,000
30-Aug	5,700,000
7-Sep	6,000,000
10-Sep	6,500,000
21-Sep	8,000,000
Final Adopted	8,000,000
Accounted To Date	8,105,000



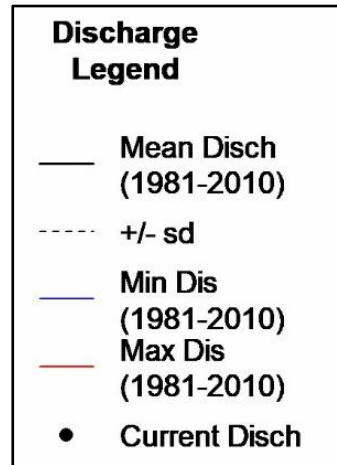
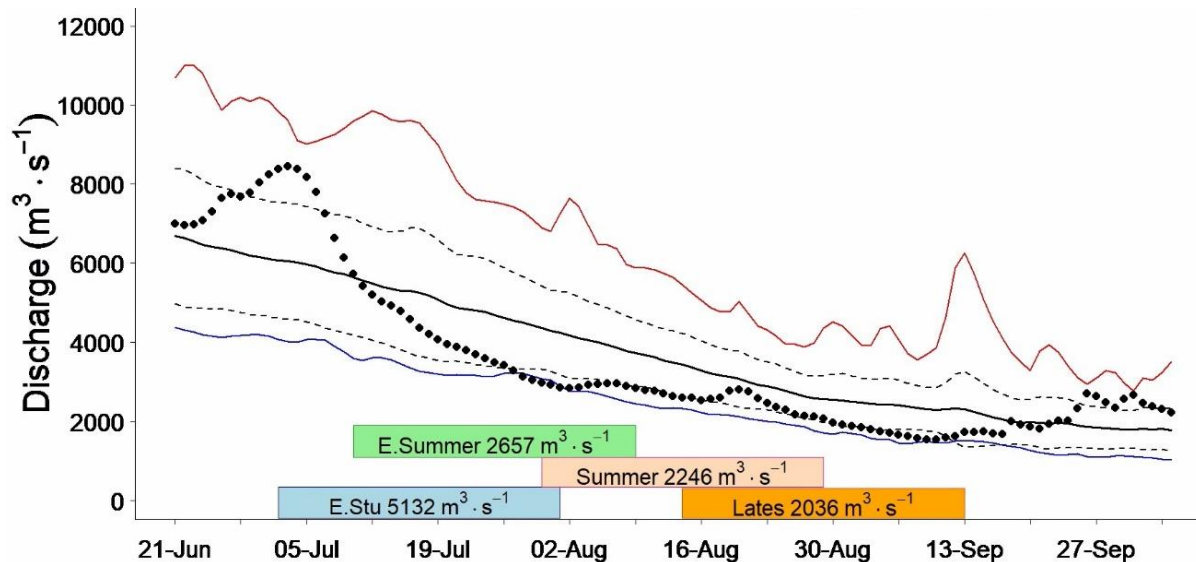
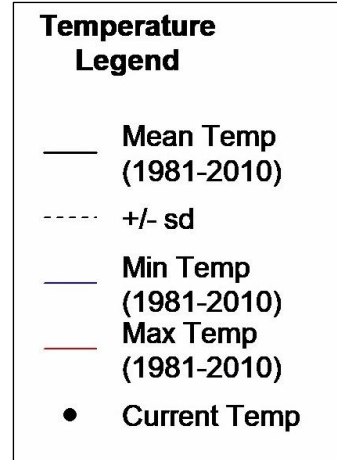
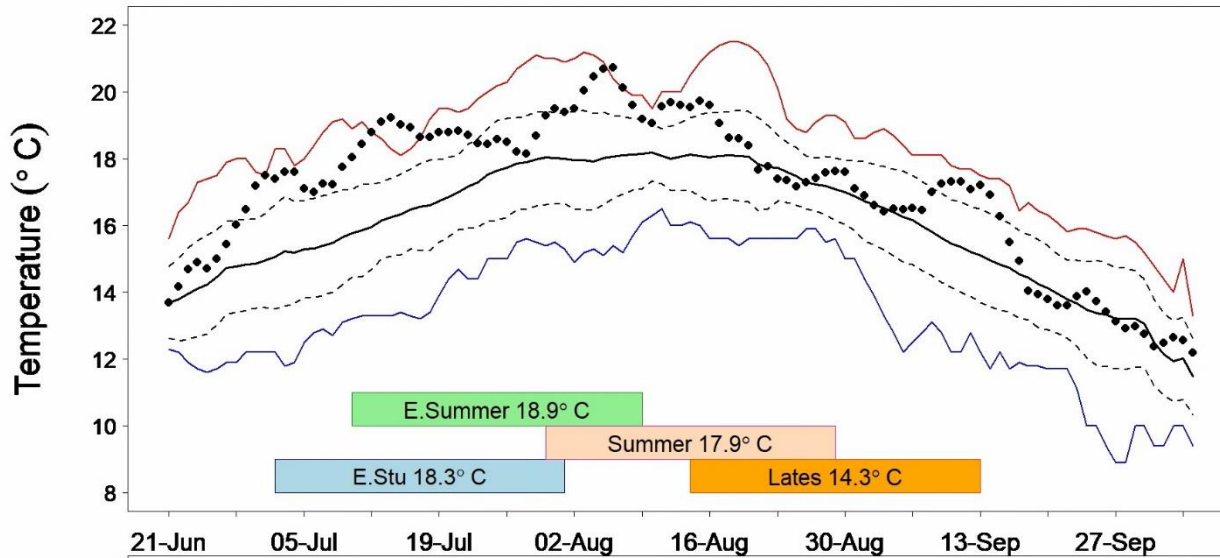
2021 Migration Timing

	Area 20 Timing		
Management Group	Pre-season forecast ¹	End of season	Difference
Early Stuart	5-July	5-July	0
Early Summer	24-July	4-Aug	+11
Summer	5-Aug	14-Aug	+9
Late	13-Aug	19-Aug	+6
Pink	25-Aug	20-Aug	-5

¹Based on Panel agreed timing estimates following June meeting. DFO's pre-season timing estimates were: July 5 for Early Stuart, August 3 for Chilko.

- **Sockeye timing:** Early Stuart was the same as forecast. All other management groups were later than forecast.
- **Sockeye delay:** Late run (excl. BiBS) sockeye delayed their upstream migration by 21 days. The cycle line median delay is 6 days & the all-years median delay is 8 days.
- **Pink timing:** Pink timing was earlier than forecast.

2021 Fraser River Temperature & Discharge



Big Bar Landslide – Mitigation Work

- 2019 & 2020:
 - Construction of a nature-like fishway,
 - Installation of Whooshh passage portal (not operated in 2021).
 - Construction of road for truck & transport options
 - Development of emergency hatchery enhancement for stocks most at risk

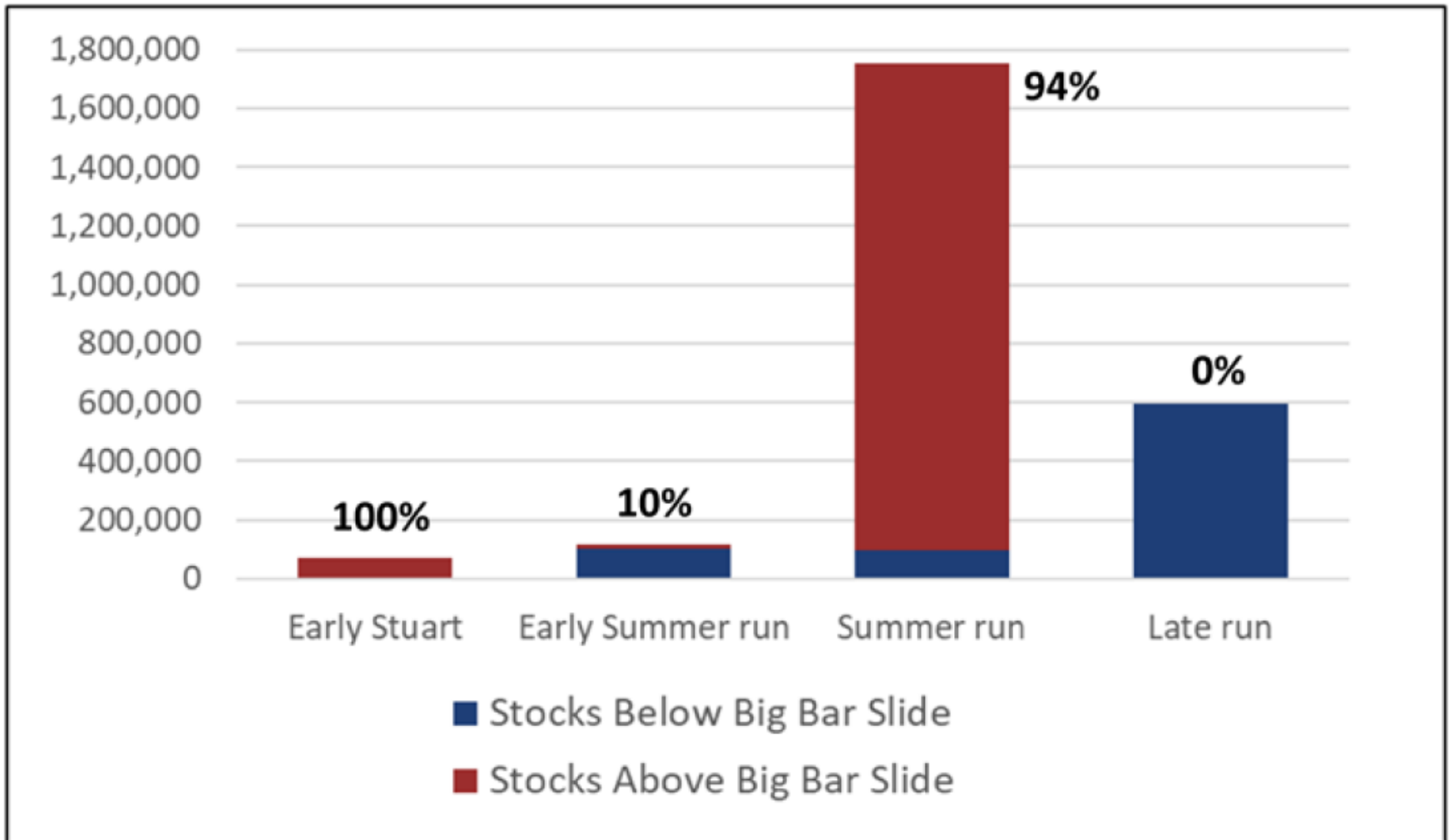


Big Bar Landslide

- Discharge thresholds for Sockeye increased in 2021 compared to 2020.
- Passage problems continue to exist at high discharge.
- Remediation has improved Sockeye passage at the slide. Sockeye were able to pass the site successfully.
- >1.8M salmon have migrated past Big Bar.



In-Season Estimates of Stocks Expected to Migrate Past the Big Bar Landslide



Total Estimate of Successful Passage of Sockeye Past Big Bar Landslide

% Survival (Natural + Assisted)	July Migrants	Late July – Early Sept	Mid-Aug – Sept
2019	<1%	~50%	~80%
2020	<5%	80-100%	100%
2021*	100%	100%	100%

*Preliminary

- A detailed review of passage estimates by species and stock is currently being undertaken by DFO Stock Assessment and Science.
- 2021: 100% successful Sockeye passage over the landslide was due to several factors.

2021 Sockeye Fisheries

- Limited licensed terminal fisheries directed on FR Sockeye in Canadian in-river FSC fisheries (FSC ESSR, terminal limited access).
- Retention of FR Sockeye in fisheries directed on other species was not authorized by DFO until Summer TAC was identified.
- The main fisheries that impacted FR Sockeye in 2021 were:

Licensed Sockeye
directed FSC
fisheries targeting
the Summer MU

Isolated
unlicensed FSC
fisheries

Bycatch of Sockeye
in Chinook FSC
fisheries

2021 Pink Fisheries

First Nations Fisheries

- Retention of Pink in FSC fisheries directed on other species
 - Chinook and Chum.
- Lower Fraser Pink fisheries using selective gear.
 - Beach seine and fishwheel.

Commercial Fisheries

- Area H Troll.
- Area B Seine.
- Lower Fraser EO and Demo.

Recreational Fisheries

- Limited lower Fraser mainstem and tributary openings.
- 4 per day in SCA.



Fisheries and Oceans
Canada

Pêches et Océans
Canada

2021 Post-Season*

Fraser Sockeye and Pink Salmon

*relative to fisheries management season
...it's still in-season for Stock Assessment!



Photo by Maxime Veilleux

Preliminary Post-Season: Run Size Summary

Management Group	Pre-season Run Size	End-of-season Run Size	Difference
Early Stuart	18,000	70,000	+289%
Early Summer Run	108,000	120,000	+11%
Summer Run	1,046,000	1,758,000	+68%
Late Run	159,000	614,000	+286%
Total Sockeye Run	1,331,000	2,562,000	+92%
Total Pink Run	3,009,000	8,105,000	+169%

- **Total Sockeye Run Size:** 73% above the brood year (1.5M) but 64% below the historical cycle-line (7.08M)
- **Total Pink run size:** 9% below the brood year (8.9M) and 30% below historical averages (11.49M).

Preliminary Post-Season Kept Catch

		<u>Sockeye</u>		<u>Pink</u>	
TOTAL ALLOWABLE CATCH					
In-season Total Run Size (adopted)	1	2,553,000		8,000,000	
Deductions		2,474,600		6,004,300	
In-season Spawning Escapement Target	1	1,740,000		6,000,000	
In-season Management Adjustment	1	316,600		na	
Aboriginal Fishery Exemption (AFE)	2	400,000		na	
AFE catch		45,680			
Remaining AFE		354,320			
Post-season Test Fishing Catch		18,000		4,320	
Total Allowable Catch	3, 4	175,700		1,995,680	
UNITED STATES					
Washington Share		28,500		512,890	
Washington Share of TAC	3	29,000	16.5%	512,890	25.7%
Payback		-470		0	
Washington Catch		20		195,970	
Deviation		28,500		316,920	
CANADA					
Balance to Canada + U.S. Payback + AFE		547,220		1,482,790	
Canadian Catch (includes Charter, excludes ESSR)		46,250		63,110	
Unsanctioned Catch	5	23,220		0	
Deviation		477,750		1,419,680	

* Alaska data not yet available
 ** Includes Qualark
 *** All catches in marine areas and in Fraser d/s of Mission
 **** Estimates do not include all recreational catch.

- 1 Estimates in effect on Sep. 28, 2021, the last date the Panel adopted an in-season run size as per paragraph 3(a) Annex IV, Chapter 4 of Pacific Salmon Treaty.
- 2 Actual Catch as per paragraph 3c, Annex IV, Chapter 4, of the Pacific Salmon Treaty
- 3 TAC and Washington sockeye share according to Annex IV, Chapter 4, of the Pacific Salmon Treaty.
- 4 TAC may not equal the total run minus total deductions shown due to adjustments required when the run size of individual management groups is less than the nominal deductions.
- 5 May include unauthorized directed retention or unauthorized bycatch retention in fisheries directed at other species

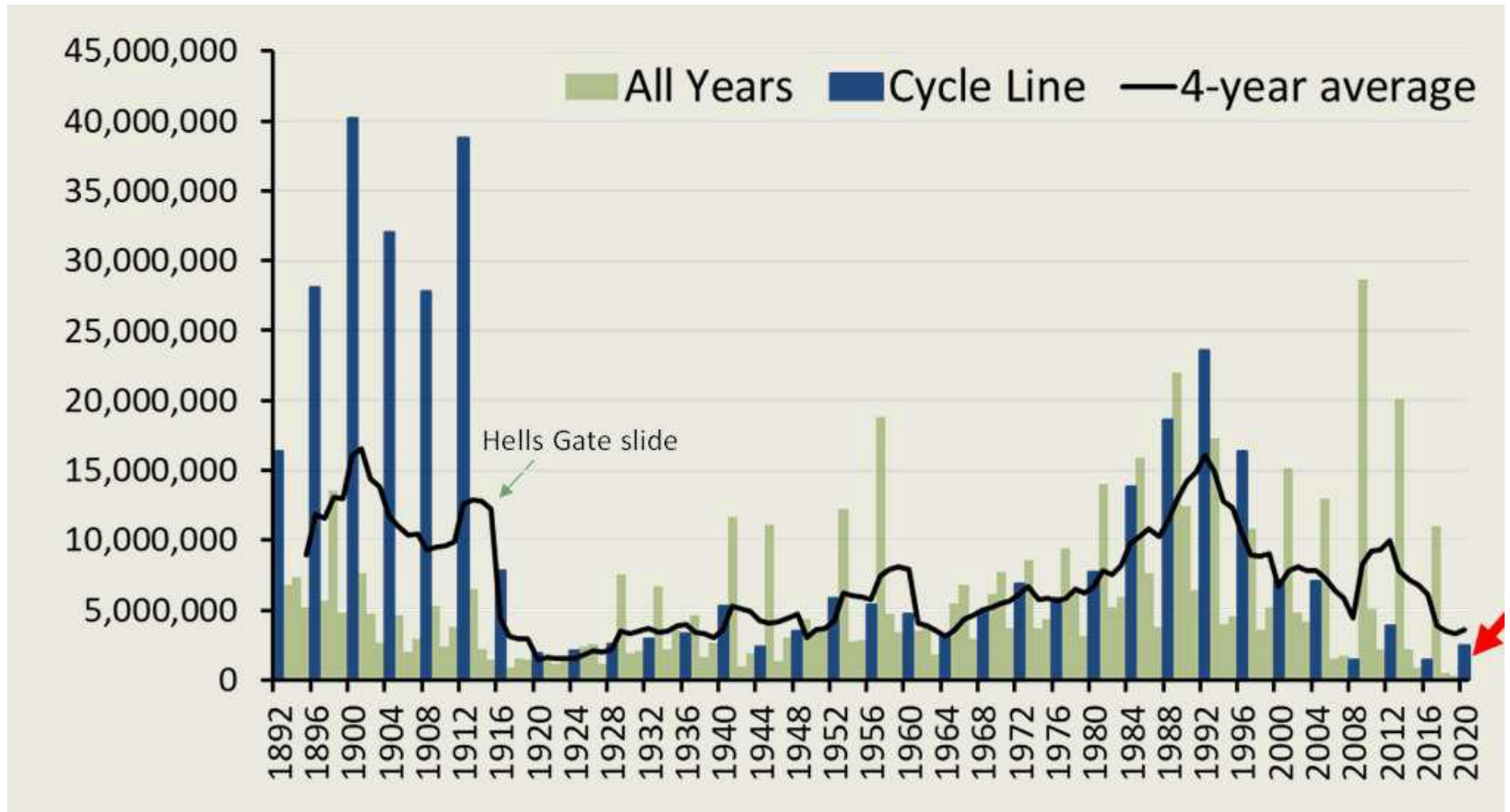
Preliminary Post-Season Exploitation Rates

	Fraser Sockeye					Fraser Pink
	Early Stuart	Early Summer	Summer	Late	Total	Total
Preliminary Post Season Run Size	70,000	120,000	1,758,000	614,000	2,562,000	8,105,000
Preliminary Catch	1,000	2,000	81,800	2,600	87,500	263,400
Allowable ER (Sept. 21)	10%	10%	10.5%	10%	7%	24.7%
Allowable ER (Sept. 28)	10%	10%	21.3%	36.0%	23%	24.7%
*Preliminary ER	1.4%	1.7%	4.7%	0.4%	3.4%	3.2%

*Preliminary exploitation rates include fisheries-related incidental mortalities and Washington catch.

- Fishery-induced mortalities estimated in-season and included in catch estimates.
- Due to low forecasted returns and migration concerns for all Sockeye MUs, fisheries were planned to limit Sockeye impacts.
- TAC identified very late in season for Summer and Late run Sockeye.
 - In some cases, TAC was unexpectedly generated after fisheries could be considered.

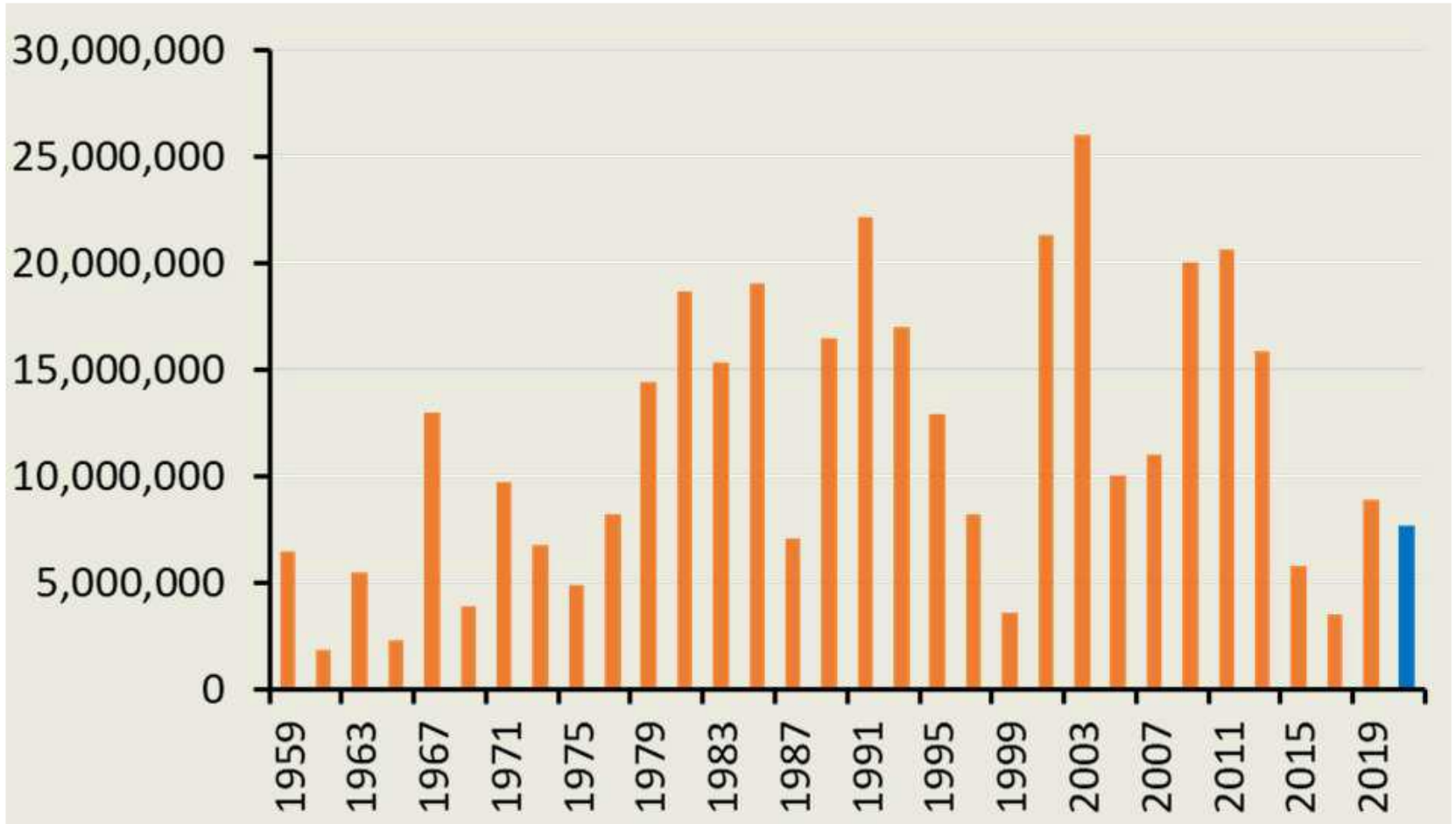
2021 Sockeye Run Size Summary



Graph from PSC

Red arrow indicates preliminary estimate of 2021 run size

2021 Pink Run Size Summary



Graph from PSC

Preliminary Escapement

Early Stuart

- Preliminary escapement of **54,014** adults.
- Highest escapement on this cycle line since 2013 (86,311 spawners).
- Significantly higher than the 2017 brood year (15,433) and 28% of the longterm cycle average of 194,632.
- In 2021, **636** Early Stuart Sockeye were captured for broodstock.
- Successful migration of Early Stuart due to advantageous low discharge levels early in the season among other factors.

Early Summer

- Preliminary aggregate escapement of **89,573**.
- Higher than the 2017 broodyear (68,477) and very close to the cycle-line average (85,428) but below spawning escapement targets (120,000).
- The largest contributors to aggregate escapement: Shuswap-ES (27,600), Pitt-ES (19,439) and Anderson-Seton-ES (15,986) CUs.

Next Steps & Timelines

2021 Preliminary Escapements

- Early Stuart, Early Summer: Released
- Summer, Late: Jan 2022

2021 Near Final Run Size and ER

- May 2022

2022 Fraser Sockeye Forecast

- February 2022

2022 Fraser Sockeye Escapement Plans

- Options in draft 2022/2023 IFMP

Questions?



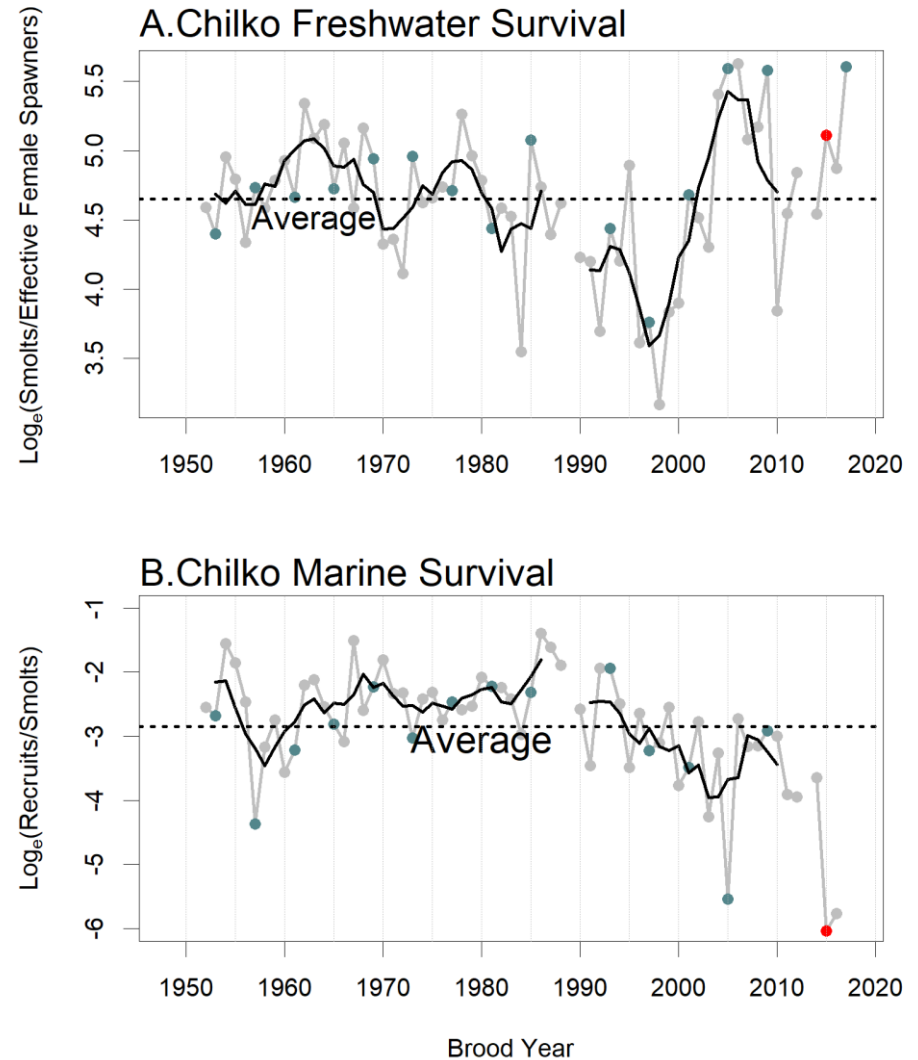
Extra Slides

2021 Challenges

- Species composition issues:
 - Significant uncertainty in in-season estimates for Sockeye and Pink.
 - New species composition methods implemented in-season to address differences between Mission estimates and test fishery data and upstream data.
 - PSC/Panel to review updates to species composition methods post-season.
- Delayed adjustment of abundance estimates:
 - Due to uncertainties in species composition methods and migration concerns.
 - TAC was unexpectedly generated late in the season.
 - Generated Summer TAC constrained by the Late MU LAER limits.
 - Late Run TAC generated Sept. 28 unavailable to harvest.
 - Window closures to protect IFC and IFS further limited Fraser fisheries.

Climate Conditions and Productivity

- Chilko freshwater productivity has been good. This may not be the case for the whole watershed
- Chilko marine productivity has been poor. Climatic conditions have likely not been favourable for Sockeye survival



Big Bar Rock Slide

- Occurred between Oct - Nov 2018
- Reported June 2019
- 2019 mitigation relied heavily on helicopter transport upstream of the slide



Courtesy of PSC, September 2019