

**2021 SALMON OUTLOOK – PACIFIC REGION  
PRELIMINARY, DECEMBER 2020**

**DRAFT**

## **PURPOSE**

The purpose of this document is to provide an ‘Outlook’ of expected abundance of salmon in 2021 to inform the harvest planning process.

This Preliminary Outlook provides a categorical abundance expectation based expert opinion.

This document will be updated in early April when ‘categorical outlooks’ will be replaced with expected abundance for those stocks with statistical forecasts.

## **CHANGES TO THE OUTLOOK**

For 2021, changes have been made to the Outlook document in order to:

1. Align CU groupings with stock management units (SMUs) to better inform decision-making consistent with *Fishery Act* and IFMP requirements.
2. For those SMUs with statistical forecasts, consolidate and report them in the Outlook Document.
3. For those SMUs without statistical forecasts, standardize the interpretation of SMU status in relation to outlook categories;
4. Remove language regarding fishery consequences.
5. Add information on SMU ‘stock trajectories’ and biological benchmarks and management references (where defined) for additional context.

It is hoped these changes will result in a document that provides more useful and relevant information to inform decision-making.

## **BACKGROUND**

### **Stock Management Units**

For the 2021 Outlook, ‘Stock Management Units’ (SMUs) replace ‘Outlook Units’ (OUs). This change has been made because many OUs did not correspond well with stock aggregates used to inform development of Integrated Fisheries Management Plans (IFMPs) for salmon. Refinement is also required for implementation of the fisheries-related revisions to the *Fishery Act*.

For salmon, the working definition of a ‘stock management unit’ (SMU) is a ‘group of one or more conservation units (CUs) that are managed together with the objective of achieving a joint status’, meaning harvest control rules would apply to the aggregate, at least in a coarse sense. Use of SMUs does not preclude considerations related to conserving CU-level diversity, but rather is a practical aggregation of CUs for harvest planning and reporting purposes. That is, it is the scale at which harvest management plans, or better, management and assessment procedures, are developed in Integrated Fisheries Management Plans (IFMPs). In many cases,

elements of the Precautionary Approach are implemented at finer scales of organization within a SMU.

### Biological and Management References

The purpose of a stock forecast or outlook is to provide information to harvest managers to potentially adjust harvest plans according to the expected stock abundance. Ideally in that regard, the status of the stock management unit (or sub-unit) is assessed against specified limits and targets and pre-defined harvest strategies (or harvest control rules) are in place that define the actions required to meet targets and avoid limits.

Therefore, where biological benchmarks and/or limit reference points are defined for CUs or SMUs, respectively, they are noted in the Outlook/Forecast tables below. Similarly, if management targets are in place they are identified. Lack of these references is a gap and work is on-going to develop methods and complete the analyses to define these references. The summary below describes how these biological and management references are applied and interpreted.

### WSP Lower Biological Benchmarks and Limit Reference Points (LRPs)

For implementation of the Wild Salmon Policy, the status of salmon Conservation Units (CU) is assessed against 'biological benchmarks'. The lower biological benchmark allows for substantial buffer between it and the level of abundance at which the stock would be considered at risk of extinction and is generally estimated as  $S_{GEN}$ . The upper biological benchmark delineates the 'amber' from 'green' WSP status zone and is generally estimated as  $.80 S_{MSY}$ . For more data-limited systems (i.e. where it is not possible to numerically estimate stock-recruit parameters), proxies for lower and upper biological benchmarks may be applied. For example, the lower and upper biological benchmarks are estimated as .25 and .60 percentiles of the long-term observed spawning abundance.

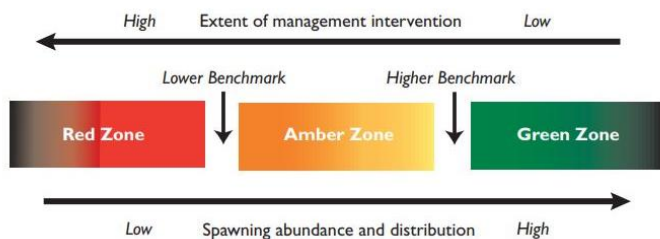


Figure 1. Benchmarks and biological status zones for CU assessments.

Under DFO's Precautionary Approach (PA), the stock management unit (SMU) limit reference point (LRP) is a biologically-defined reference that delineates the 'critical zone' from the 'cautious zone' for harvest management. It represents the status below which serious harm is occurring to the stock. There may also be resultant impacts to the ecosystem, associated species and a long-term loss of harvest opportunities.

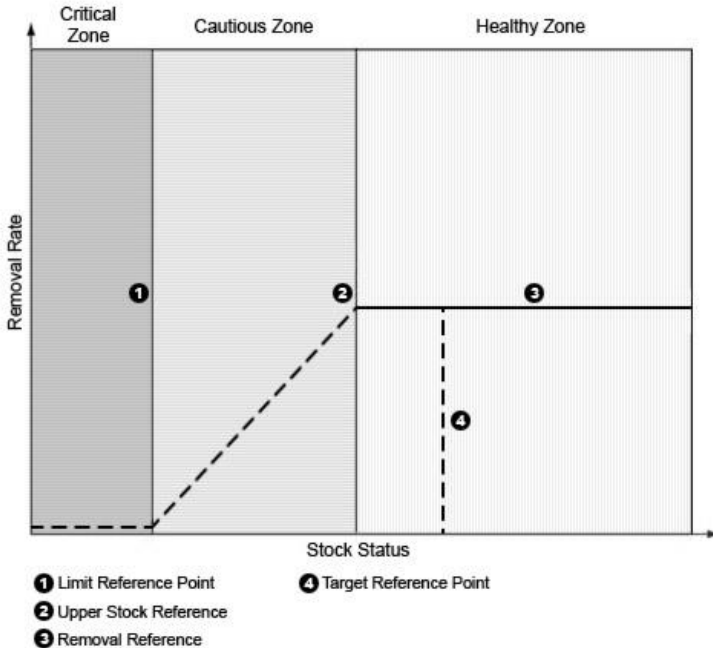


Figure 2. Schematic of a generalized harvest strategy under DFO's PA.

Given the intent is similar between the WSP and DFO's PA, it is practical to equate the SMU LRPs with lower biological benchmarks at the CU level. However, the WSP recognizes that serious harm to species occurs when CUs are depleted or lost. Therefore, to be consistent with the WSP, LRPs at the SMU scale should consider CU-scale biodiversity. Methodological approaches for defining LRPs are being developed to ensure CU-level biodiversity is taken into account and for both data-rich and data-limited assessment systems.

### Management Targets and Operational Control Points

While management targets or operational control points are often informed by biological benchmarks and stock-recruit reference points, they also take into account other objectives such as maximizing sustainable harvest, avoiding over-fishing, maintaining stable access and opportunity, allocation objectives such as how catch is distributed among harvesters, etc. As such, they are tightly linked to the harvest strategy and fishery management measures.

In some cases, the management target may be a simple trigger such as when a 'surplus-to-escapement-target' harvest control rule is in place. In other cases, there may be multiple management targets (or operational control points) used to adjust the harvest control rule at different levels of abundance.

Note that an SMU can be below its management target (and therefore subject to some level of harvest restriction as per the harvest control strategy), but well above levels that represent a serious conservation concern (i.e. the LRP or LBB). In other situations, an SMU may be well above its target but subject to harvest restrictions because the stock rears or co-migrates in mixed-stock fishing areas with other SMUs (or CUs) that are near or below their LRP (or LBB).

## STOCK OUTLOOKS

### Categorical stock outlooks

For the 'Preliminary Outlook' and for those SMUs for which statistical forecasts are not produced, either because the SMU is not intensively managed and/or is more data limited, categorical 'outlooks' are assigned. These outlooks are based on expert opinion qualified with information from monitoring programs. For each stock grouping an outlook of expected spawning abundance is assigned based on a scale of 1 to 4.

For CUs or SMUs with references in place (i.e. either lower (LBB) and upper biological benchmarks (UPP) and/or lower reference points (LRP) and upper stock references (USR) and Target Reference Point (TRP)), these references are used to assign Outlook category. For more data-limited CUs or SMUs (i.e. those without defined stock or management references), expected spawning abundance is compared to average or median abundance based on available information.

SMUs for which insufficient data are available to determine an Outlook are noted as 'Data Deficient'.

Outlook Category	CUs or SMUs with references		Data Limited CUs or SMUs	
	Wild Salmon Policy (CU Level)	Precautionary Approach (SMU Level)	Category Definition	Expected spawning abundance
1	Red Zone (i.e. below the LBB)	Critical Zone (i.e. below the LRP)	Well below average	<25 <sup>th</sup> percentile
2	Amber Zone (i.e. below the LBB, below the UPP)	Cautious Zone (i.e. above the LRP below the USR)	Below Average	25 to 40 <sup>th</sup> percentile
3	Green Zone (i.e. above the UBB)	Healthy Zone (i.e. above the USR)	Near Average	40 to 60 <sup>th</sup> percentile
4	Green Zone (i.e. at or above the TRP)	Healthy Zone (at or above the TRP)	Abundant	>60 <sup>th</sup> percentile
Data Deficient			Insufficient information	Unknown

**YUKON RIVER AND TRANSBOUNDARY AREA**

**YUKON RIVER**

Stock Management Unit	Conservation Unit / Sub-Unit	Average Run / Avg. Spawners	LRP / LBB	Management Target	2021 Outlook
<b>YUKON CHINOOK</b>	Aggregate includes 9 CUs	<b>51,000</b> (ESC. AVG. 2005+)		<b>48,750</b> (42,500 – 55,000) Escapement Target (S <sub>MSY</sub> )	<b>2</b>
	Porcupine Aggregate 3 CUs	Data Deficient (Mainstem as indicator)		N/A	
	The spawning escapement of Canadian-origin Yukon River mainstem Chinook salmon in 2020 was below average, at 31,000. The current spawning escapement goal endorsed by the U.S./Canada Yukon River Panel for Mainstem Chinook is 42,500-55,000 Chinook salmon and has been met only 50% of the time over the last decade. Five and six year-old fish dominate returns. Recent total production observed in Canadian-origin Yukon River Chinook salmon stocks is well below past years: averaging around 71,000 over the last ten years compared to 150,000 in the 1980s and 1990s. Assessment of Porcupine Chinook continues (limited data).				
<b>YUKON COHO</b>	Porcupine CU	<b>4000</b> (ESC. 5-year AVG)			<b>Data Deficient</b>
	Very little is known about Coho Salmon stock status within Canadian portions of the Yukon River drainage. Data from the U.S. portion of the drainage suggest returns to the drainage in the last five years have been near the long term average; however, no assessment programs are currently undertaken in Canada and the current stock status is unknown. It is known that coho salmon primarily return as 4-year-olds and overlap in run timing with fall chum salmon.				
<b>YUKON CHUM</b>	Mainstem – includes 5 CUs	<b>182,000</b> (ESC. AVG 2006+)		<b>87,000</b> (70,000 - 104,000) Escapement Target (S <sub>MSY</sub> )	<b>1-2</b>
	The spawning escapement of Canadian-origin Yukon River mainstem Chum salmon in 2020 was among the lowest on record, at 23,500. Runs are typically dominated by four year-old fish, followed by five year-old fish; much lower-than-expected returns of four year-old fish in 2020 contributed to the poor run. The current mainstem spawning escapement goal endorsed by the Yukon River Panel is 70,000 – 104,000 Chum salmon, which has been met every year in the past decade except 2020.				
	Porcupine – includes 2 CUs	<b>46,000</b> (ESC. 1972 – 2020 AVG) <b>22,000</b> (ESC. 5-year AVG)		<b>35,500</b> (22,000 - 49,000) Escapement Target (S <sub>MSY</sub> )	<b>1-2</b>
The spawning escapement of Fishing Branch River Chum salmon in 2020 was also historically low, at 4,795. The current spawning escapement goal for the Porcupine River (as assessed at the Fishing Branch River) endorsed by the U.S./Canada Yukon River Panel is 22,000-49,000 Chum salmon. Returns over the last five years have been well below expected and the minimum escapement goal was not achieved in three of the last five years.					

**TRANSBOUNDARY AREA**

Stock Management Unit	Conservation Unit / Sub-Unit	Average Run / Avg. Spawners	LRP / LBB	Management Target	2021 Outlook	
	Klukshu	16,500		<b>9,700</b> (esc. Goal range 7,500 – 11,000)		
	Based on brood year escapements below the MSY target range and stock-recruitment relations from historical records, a below average, but within the escapement goal range run is expected. This aggregate stock is dominated by lake and river type age 5 fish. 2021 Outlook Category is 2.					
	Klukshu	1,500		<b>1,000</b> (esc. Goal range 800 – 1,200)		
	Based on brood year escapements that were both above and below average but near the MSY target range and recent sibling survival data, an average run within the escapement goal range is expected. Alek Chinook are stream type dominated by 5- and 6-year olds.					
<b>ALSEK COHO</b>	Alek CU				2	
	Only a partial weir count is carried out. Brood year counts were slightly below average. Run is dominated by 4 year olds					
<b>STIKINE SOCKEYE</b>	Aggregate includes 3 CUs	<b>26,700 (Tahltan)</b> (ESC. 10-year Avg.)		<b>24,000</b> (18,000 to 30,000) Escapement Target (S <sub>MSY</sub> )	2	
		<b>23,000 (Mainstem)</b> (ESC. 10-year Avg.)		<b>30,000</b> (20,000 to 40,000) Escapement Target (S <sub>MSY</sub> )		
	Based on a combination of primary brood year smolt counts and sibling-based predictions, a below average run is anticipated for 2021 but above escapement goals. Recent poor marine survival may influence this. This is an aggregate stock of lake and river type 5 year olds.					
<b>STIKINE CHINOOK</b>	Aggregate includes 2 CUs	<b>15,300</b> (ESC. 10-year Avg.)		<b>17,400</b> (14,000 - 28,000) Escapement Target (S <sub>MSY</sub> )	9,900	
	2021 run is is forecasted to be well below the 10-year average of 19,200 and below the escapement goal range of 14,000 – 28,000. The anticipated run size does not provide for directed fisheries. Stikine Chinook are stream type dominated by 5- and 6-year olds.					
<b>STIKINE COHO</b>	Stikine CU				Data Deficient	
	Reliable brood year escapement data are limited and ancillary observations are sometimes contradictory.					
<b>TAKU SOCKEYE</b>	Aggregate includes 4 CUs	<b>70,500</b> (ESC. 10-year Avg.)		<b>58,000</b> (Esc. Goal Range 40,000 - 75,000)	3	
	Enhanced (Tatsamenie)	<b>5,000 – 10,000</b> (ESC. 10-year Avg.)	n/a			

Stock Management Unit	Conservation Unit / Sub-Unit	Average Run / Avg. Spawners	LRP / LBB	Management Target	2021 Outlook
	Based on stock-recruitment data, the 2021 run is expected to be near the 10 year average of 154,100 but well over the management objective of 58,000. This is an aggregate stock of lake and river type 5 year olds.				
TAKU CHINOOK	Aggregate includes 3 CUs	<b>19,400</b> (ESC. 10-year Avg.)		<b>25,500</b> (19,000 - 36,000) Escapement Target (S <sub>MSY</sub> )	10,300
	2021 is expected to again be well below the 10-year average of 19,400 and well below the escapement goal range of 19,000-36,000. The anticipated run size does not provide for directed fisheries. Taku chinook are stream type dominated by 5 and 6 year olds.				
TAKU COHO	Aggregate includes 3 CUs	<b>80,000</b> (ESC. 10-year Avg.)		<b>70,000</b> (50,000 - 90,000) Escapement Target (S <sub>MSY</sub> )	3
	Based on preliminary smolt abundance in 2020 combined with recent smolt-to-adult survival rates, an average run above the management target of 70,000 is expected for 2021. Run is dominated by 3 year olds.				
TRANSBOUNDARY CHUM	Taku Chum CU				Data Deficient

**NORTH COAST AREA**

**HAIDA GWAI**

<b>Stock Management Unit</b>	<b>Conservation Unit / Sub-Unit</b>	<b>Average Run / Avg. Spawners</b>	<b>LRP / LBB</b>	<b>Management Target</b>	<b>2021 Outlook</b>
<b>HAIDA GWAI SOCKEYE</b>	Aggregate includes 10 CUs	1990-present avg. spawners ~ 25000	None	Under development for several CUs	<b>2 (low to average)</b>
	Low to average returns for systems that were surveyed in 2020 (Copper, Yakoun, Awun, Naden, total count for 4 biggest systems was ~15K).				
<b>HAIDA GWAI PINK – ODD</b>	Aggregate includes 6 CUs (even and odd year)				<b>n/a</b>
	Haida Gwaii stocks are primarily even year stocks with little to no returns in odd years.				
<b>HAIDA GWAI CHINOOK</b>	Aggregate includes 2 CUs				<b>Data Deficient</b>
	No recent assessments of Yakoun Chinook.				
<b>HAIDA GWAI COHO</b>	Aggregate includes 3 CUs				<b>Data Deficient</b>
	Limited assessments since 2002. Returns to enumeration sites such as Tlell and Deena have been generally good over the past decade, with weaker than average escapement observed at Tlell and the Deena in 2020.				
<b>HAIDA GWAI CHUM</b>	Aggregate includes 5 CUs				<b>Data Deficient</b>
	Haida Gwaii Chum stocks have been consistent over the past decade with poor productivity and returns in Area 2E and moderate productivity in Area 2W. Chum returns to Tasu Sound have generally had good productivity with returns achieving management targets in most years over the past decade. Terminal fishing opportunities in Tasu Sound dependent on good marine survival.				



**SKEENA AND NASS RIVERS**

Stock Management Unit	Conservation Unit / Sub-Unit	Average Run / Avg. Spawners	LRP / LBB	Management Target	2021 Outlook
<b>NASS SOCKEYE</b>	<b>Aggregate includes 7 CUs</b>	<b>261,790</b> (Avg. ESC, 1982+)			<b>2 (Low)</b>
	2020 was the lowest return to the Nass since 1992, and below average returns expected for 2021. Forecast TRTC range from 177-861K .				
<b>SKEENA SOCKEYE</b>	<b>Aggregate (wild and hatchery)</b>	<b>2,584,000</b> (Avg. Return 1973+)	<b>Under review</b>	<b>Under review, esc target is 1,050,000, 400,000 lower operational control point</b>	<b>2 (Low)</b>
	Skeena – Wild Aggregate includes 32 CUs	Variable	Under review	Included in Skeena aggregate, under review	<b>Low to Average</b>
	Overall, expecting a low to average return in 2021. Return rates for Skeena - Wild are more variable than Babine Lake – Enhanced. Extremely poor returns for lower Skeena sockeye CUs, average returns for some middle and upper Skeena systems, poor for others. Generally poor abundance is forecast in 2020 for wild age-4 Sockeye based on poor age-3 returns in 2020. Stronger age-5 returns expected in 2020 based on higher than expected age-4 returns in 2020. Return rates have become more uncertain in recent years, with greater variability among the Skeena stock components.				
	Babine Lake - Enhanced		Under review	Spawning channel capacity = 470,000	
	Overall, expecting a low return in 2019 unless age-4 Sockeye return stronger than expected, as was the case in 2018 when more age-4 Sockeye returned relative to poor returns of age-3 observed in 2017. Low age-4 returns expected in 2019 based on very low age-3 returns in 2018. Modest abundance forecast in 2019 for age-5 Sockeye based on modest age-4 returns in 2018.				<b>Low</b>
<b>MAINLAND COASTAL SOCKEYE</b>	Areas 3 to 6				
	Very low escapements relative to average for all coastal and lower Skeena sockeye systems, and for Area 6 sockeye systems				
<b>NASS PINK</b>	Aggregate includes 5 CUs				<b>2</b>
	The Nass pink return is expected to be below average (2). The brood year return was below 25% but better emergence conditions may lead to a slight increase.				
<b>SKEENA PINK</b>	Aggregate includes 3 CUs				<b>1 to 2</b>
	The Skeena pink return is expected to be “well below average”(1) to “below average” (2). The brood year return was below 25% but better emergence conditions may lead to a slight increase				
<b>NASS CHINOOK</b>		<b>31,000</b> (TRTC 1994-2020)			<b>2</b>
	The 2021 return is uncertain after record low escapements in 2017. Preliminary forecast is for 24,000 return to Canada (Nisga’a Fish & Wildlife). There is generally low productivity among stream-type stocks in the north-west				
<b>SKEENA CHINOOK</b>	Aggregate includes 12 CUs	<b>72,000</b> (GSI mark-recapture based on KLM Petersen)			<b>2</b>

Stock Management Unit	Conservation Unit / Sub-Unit	Average Run / Avg. Spawners	LRP / LBB	Management Target	2021 Outlook
		estimates 1984-2020)			
	Kitsumkalum Indicator Stock	13,200 (KLM Petersen mark-recapture 1984-2020)			
	Below average returns are expected for both summer and spring timed Skeena Chinook. The 2021 return is highly uncertain after record low escapements in 2017 and 2020. There is generally low productivity among stream-type stocks in the north-west				
<b>NASS COHO</b>	Aggregate includes 3 CUs				<b>1-2</b>
	Total escapement is expected to be below average in 2021. The 2020 run size was well below average with low productivity and marine survival evident in the preceding years.				
<b>SKEENA COHO</b>	Aggregate includes 3 CUs				<b>1-2</b>
	Lower productivity over previous years is forecasted based on low returns in 2020 for both interior and coastal coho populations and continuance of lower marine survivals.				
<b>NASS CHUM</b>	Nass CU	<b>13,632 (1950-Present)</b>	none	Under Review. MEG is 72,000	<b>2</b>
	Below average (2). Some very low returns in dominant brood year but better ocean conditions in recent years.				
<b>SKEENA CHUM</b>	Aggregate includes 2 CUs				<b>1</b>
	Well below average (1). All brood returns have been at or below 25% (note: data limited)				

**CENTRAL COAST**

Stock Management Unit	Conservation Unit / Sub-Unit	Average Run / Avg. Spawners	LRP / LBB	Management Target	2021 Outlook
<b>MAINLAND COASTAL SOCKEYE</b>	Areas 7 and 8				<b>Variable – Data deficient, 1, 2</b>
	Most systems in areas 7 and 8 are data deficient. Average returns relative to recent period (2000+) for systems that were surveyed in Area 8 (Atnarko, Koeeye, Kadjusdis, Namu). Atnarko sockeye returns are well below historic and population is in recovery.				
<b>RIVERS / SMITH SOCKEYE</b>	Rivers – Aggregate includes 2 CUs (Wannock River and Owikeno Lake)	272,000 (Avg. ESC, 2000+)	Under development	None	<b>2</b>
	2020 return to Rivers Inlet based on DIDSON-ARIS estimate was lower than in recent years. Low to average returns are expected in Areas 9 and 10. Docee Fence (Area 10/Smith Inlet/Long Lake) sockeye is not operational, no escapement information for this system available since 2017 .				
	Smith – Aggregate includes x CUs	62,000 (Avg. ESC, 2000+)			<b>Data Deficient</b>
<b>CENTRAL COAST PINK</b>	Area 6	821,999 (odd year)		MEG - 1,447,000	<b>2</b>
	Area 7	288,232 (odd year)		MEG – 444,720	<b>1</b>
	Area 8	908,042 (odd year)		MEG – 1,520,400	<b>1</b>
	Area 9			MEG – 342,450	
	Area 10			MEG – 65,600	
	Low returns are expected in Area 7 and average to above average returns in Area 8. The odd year Bella Coola/Atnarko stock exceeded escapement target in 2017. Odd year returns are expected to be above average if marine survival is good.				
<b>CENTRAL COAST CHINOOK</b>	Atnarko Indicator Stock	<b>15,500</b> (Maximum likelihood model 1990-2020)		<b>5009 (Atnarko wild)</b> Escapement Target (SMSY)	<b>2</b>
	These stocks are generally depressed and this pattern is expected to continue or worsen given generally low productivity among stocks in the north-west. Assessments are of poor quality.				
	Areas 7 and 8 –				<b>3 / Data Deficient</b>
	2019 Bella Coola returns are expected to be average based on below average 2017 and above average 2018 returns. Other assessments are of poor quality.				
	Areas 9 and 10 – Aggregate includes X CUs				<b>3 / 2 / Data Deficient</b>
Wannock River Chinook returns are expected to be average. The spring-run stocks including the Owikeno tributary stocks and Chuckwalla/Kilbella stocks are expected to be below average based on recent trends; however, assessments are of poor quality or are no longer conducted.					

Stock Management Unit	Conservation Unit / Sub-Unit	Average Run / Avg. Spawners	LRP / LBB	Management Target	2021 Outlook
<b>CENTRAL COAST COHO</b>	Areas 5 and 6 – Aggregate includes X CUs				<b>2 (Low)</b>
	Lower productivity over previous years is forecasted based on low Area 6 returns and continuance of lower marine survivals.				
	Areas 7 to 10 – Aggregate includes X CUs				<b>2 (Low)</b>
	Lower productivity over previous years is forecasted based on low returns in 2020 for both interior and coastal coho populations and continuance of lower marine survivals. However, there is very little data to review to develop an overall assessment.				
<b>CENTRAL COAST CHUM</b>	Area 5	17,480		MEG – 22,000	<b>1</b>
	Area 6	165,409		MEG – 134,000	<b>1 – 2</b>
	Area 7	196,659		MEG – 311,950	<b>1</b>
	Area 8	162,000			<b>3</b>
	Area 9	30,981		MEG – 150,700	<b>1 (data limited)</b>
	Area 10	17,807			<b>1 – 2 (data limited)</b>
	Wild brood year escapements were generally good in Area 8 but low in other areas. Returns of enhanced stocks remain dependent upon variable ocean survivals				

**SOUTH COAST AREA**

**WEST COAST VANCOUVER ISLAND**

Stock Management Unit	Conservation Unit /Sub-Unit	Average Run / Avg. Spawners	LRP / LBB	Management Target	2021 Outlook
<b>WCVI - BARKLEY SOCKEYE</b>	<b>Somass Aggregate (GCL + SPL)</b>	<b>740,000</b> (Avg. Run Size 1977+)		<b>170,000</b> Run Size – lower operational control point	<b>3</b>
	Great Central Lake CU	400,000 (Avg. Run Size 1977+)	29,290 LBB		<b>3</b>
	Sproat Lake CU	340,000 (Avg. Run Size 1977+)	41,350 LBB		<b>3</b>
	For the 2021 return, the two main contributing brood years are 2016 and 2017 and the two main contributing smolt years are 2018 and 2019. Brood abundance was above average in 2016 and low in 2017. Smolt abundance was high in 2018 and xxx in 2019. Based on ocean indicators, marine survival rates for the 2018 and 2019 smolt years appear to be low. Given the considerations above, expectations are for a moderate Somass Sockeye return. The low returns in the last two years were mostly attributed to poor freshwater and marine survival despite the large returns of 2015 and 2016.				
	Henderson Lake CU	34,000 (Avg. Run Size 1978+)	5000 LBB	9% max. harvest rate at run sizes <15,000	<b>2</b>
	For the 2021 return, the two main contributing brood years are 2016 and 2017 and the two main contributing smolt years are 2018 and 2019. Brood abundances were moderate in both 2016 and 2017. Smolt abundance continues to be low. Based on ocean indicators, marine survival rates for the 2018 and 2019 smolt years may be low. Therefore, expectations are for a continued low Henderson sockeye return in 2021.				
<b>WCVI - OTHER SOCKEYE</b>	22 CUs are associated with this stock management unit.				<b>Data Deficient</b>
	Assessment data are not available to forecast others systems. However, WCVI populations tend to covary. Therefore, expectations are for low-to-moderate returns based on the outlooks for Somass and Henderson.				
<b>WCVI PINK</b>	3 CUs are associated with this stock management unit.				<b>Data Deficient</b>
	Since the collapse of WCVI pinks in the mid 1960s there has been negligible catch and only opportunistic assessment of returns during assessment of other species. The available data suggest WCVI pink salmon populations continue to persist at very low relative to historic levels with high variability.				
<b>WCVI CHINOOK</b>	Southwest Vancouver Island CU			10 – 15% maximum exploitation rate in key 'pre-terminal' CDN fisheries	<b>1</b>
	Nootka and Kyuquot CU				

Stock Management Unit	Conservation Unit /Sub-Unit	Average Run / Avg. Spawners	LRP / LBB	Management Target	2021 Outlook
	Northwest Vancouver Island CU				
	Recent year escapements of WCVI Chinook natural populations remain low. There has been improvement in Kyuquot (NWVI wild indicators) in recent years. Less improvement in Clayoquot (SWVI wild indicators) which remains the biggest concern; and specifically improvement is almost all in the Bedwell where low level enhancement seems to be resulting in improved returns. Survival rates of natural production is thought to be less than half that of hatchery production; similarly productivity remains relatively low. WCVI wild Chinook remain a stock of concern.				
	Somass/Robertson (Hatchery)	88,900 (Avg terminal run 1985-2019)	n/a	39M eggs (spawner target is adjusted for expected age/sex composition)	<b>3</b>
	Conuma Hatchery	37,900 (Avg terminal run 1992-2019)	n/a	10,000 ESC target but varies to ensure escapement of eggs associated with an average 10,000 escapement.	<b>3</b>
	Nitinat Hatchery	25,400 (Avg terminal run 1992-2019)	n/a	10,000 ESC including brood stock	<b>3</b>
	WCVI Other Hatchery Supplemented (e.g. Burman R, Sarita R.)	Varies by individual river; see local plans for details.	Work is underway to develop lower bench marks (C. Holt lead).	Varies by individual river; see local plans for details.	<b>3</b>
	Overall returns in 2021 will likely be similar to 2020 which was higher than average abundance in the SWVI and near average abundance in NWVI. Observed returns of earlier age classes suggest an above average marine survival rate for the 2016 brood year (age 5 in 2021), above average survival the 2017 brood year (age 4 in 2021) and maybe average survival for the 2018 brood year (age 3 in 2021). Age 3 returns were higher than expected in most WCVI areas in 2020; over 50% in the Somass return and also high % males in Conuma and Nitinat. This suggests a potential for an above average return of eggs in 2021 (means lower escapement goals in the harvest – hatchery directed systems).				
	3 CUs are associated with this stock management unit.				
<b>WCVI COHO</b>	Information to forecast Coho returns is limited. Therefore, there is considerable uncertainty in this assessment. 2020 had a poor return along most of the WCVI; for example, escapement through Stamp Falls was in the bottom 20% of all returns since 2000. For 2021, most of the return will originate from the 2018 brood year that went to sea in 2020. Robertson Hatchery coho jacks were higher than average in 2020 suggesting improvement in 2021 with average returns expected. For most WCVI areas, Coho spawning populations have been relatively stable.				<b>3</b>

Stock Management Unit	Conservation Unit /Sub-Unit	Average Run / Avg. Spawners	LRP / LBB	Management Target	2021 Outlook
<b>WCVI CHUM</b>	Area 23 (Barkley) – Southwest Vancouver Island CU	<b>69,000</b> (Avg. Return, 1995+)		48,000 Run size – lower operational control point, 15% max harvest rate	<b>2</b>
	Area 24 (Clayoquot) – Southwest Vancouver Island CU	<b>57,000</b> (Avg. Return, 1995+)		42,000 Run size – lower operational control point, 15% max harvest rate	<b>2</b>
	Area 25 (Nootka) – Southwest Vancouver Island CU	<b>41,000</b> (Avg. Return, 1995+)		26,000 Run size – lower operational control point, 20% max harvest rate	<b>2</b>
	Area 25 (Esperanza Inlet) – Southwest Vancouver Island Cu	<b>49,000</b> (Avg. Return, 1995+)		24,000 Run size – lower operational control point, 15% max harvest rate	<b>3</b>
	Area 26 (Kyuquot) – Southwest Vancouver Island CU	<b>60,000</b> (Avg. Return, 1995+)		25,000 Run size – lower operational control point, 15% max harvest rate	<b>3</b>
	Area 27 (Quatsino Sound) – Northwest Vancouver Island CU				<b>Data Limited</b>
	Area 25 (Conuma Hatchery) – Southwest Vancouver Island CU	<b>88,000</b> (Avg. Return, 1995+)			<b>2</b>
	Nitinat Hatchery	<b>491,000</b> (Avg. Return, 1995+)	n/a	225,000 Run size – lower operational control point	<b>3</b>
	Recent returns of WCVI Chum have been depressed in most areas relative to average abundances. Returns of WCVI Chum in 2021 will likely be below average to average in most areas. Brood years 2016, 2017 and 2018 will contribute to the 2021 return as age 5, 4 and 3, respectively. The 2016 brood year had an above average return in most areas and we expect an above average contribution of age 5s in 2021. The 2017 and 2018 brood year returns were below average abundances, and the 2018 and 2019 sea entry years resulted in below average to average survival. This will limit both the age 3 and 4 (dominant age class) contributions to the 2021 return.				

**EAST COAST VANCOUVER ISLAND/MAINLAND INLETS**

Stock Management Unit	Conservation Unit / Sub-Unit	Average Run / Avg. Spawners	LRP / LBB	Management Target	2021 Outlook
<b>ECVI / MAINLAND SOCKEYE</b>	Nimpkish	60,000 median spawners			<b>2</b>
	Sockeye returns to this system in 2020 were well below average. For the 2021 return, the two main contributing brood years are 2016 and 2017 and the two main contributing smolt years are 2018 and 2019. Brood abundance was above average in 2016 and below average in 2017. Based on ocean indicators, marine survival rates for the 2018 and 2019 smolt years appear to be low (poor returns of local pink and coho stocks that out-migrated in 2018 and 2019). Given the considerations above, expectations are for a below average Nimpkish Sockeye return. Brood years contributing to the 2021 return were 2016 (74K) and 2017 (30K).				
	Area 16 (Sakinaw)	<b>117</b> (Avg. Return, 1995+)	2,440	4,470	<b>1</b>
	Of the 33,442 smolts that left Sakinaw Lake in 2018 a total of 85 adult Sockeye returned in 2020. Marine survival continues to be extremely low; for the 2018 ocean entry year, the smolt-to-adult survival improved to 0.14% for hatchery-origin and 0.31% for natural-origin smolts. Smolt production increased to 75,823 in 2019 although just over 1,000 were from natural production. If marine survival is near the 4-year average, a total of 47 adults are expected; 2 natural origin and 45 from captive brood fry releases. 2021 escapement could increase to 111 fish if marine survival is consistent between 2018 and 2019 ocean entry years.				
	Other (Areas 11 to 13)	Heydon: 2,600 median spawners Quaste: 2,200 median spawners			
	Expectations for other populations such as Quatse, Heydon and Phillips are similar to Nimpkish.				
<b>ECVI / MAINLAND PINK</b>	Areas 11 to 13 - Odd	Reconstructed Median Returns Southern Fjords (Even): 1.6 million Southern Fjords (Odd): 613K Nahwitti (Odd): 12K			<b>1</b> <b>(NEVI and Area 12 Mainland Inlets)</b>
	Georgia Strait - Odd	Strait of Georgia (Odd): 536K Strait of Georgia (Even): 142K			<b>3</b> <b>(Southern portion of area on ECVI)</b>
	<b>Even Year:</b> 2020 saw varied returns throughout South Coast with poor returns in Northern Vancouver Island and generally improved/strong returns to the systems from Adam River south to Campbell River on the Island. Very poor (well below average) returns to Area 12 Mainland Inlets and very strong recovery and returns observed on the Philips River in Area 13 Mainland Inlets. In river return timing of pinks was much earlier than normal in many systems (i.e. Quinsam)				



Stock Management Unit	Conservation Unit / Sub-Unit	Average Run / Avg. Spawners	LRP / LBB	Management Target	2021 Outlook
	<p><b>Odd Year:</b> In 2019, returns were similar to what was observed in 2020, with very poor escapements in Northern Vancouver Island and across to the Mainland and much better returns to the lower portions of Area 12 and into 13 on the Island. It is anticipated that we will likely see a similar distribution of abundance as the last 2 years. Expectations for 2021 are well below average returns to NEVI and Mainland Inlets and average returns to the Southern Portions of the area on ECVI. Pink fry outmigration numbers from Quinsam in 2020 (~15 million) was the third largest abundance since 1997 and should convert to strong returns in 2021.</p> <p>Historically, Pink returns to this area have been highly variable and expectations continue to be highly uncertain.</p>				
<b>MAINLAND INLET CHINOOK</b>					<b>Data Deficient</b>
<b>UPPER GEORGIA STRAIT CHINOOK</b>	Quinsam River Fall Run	<b>9850</b> (AVG. Terminal Run Index, 1979+)			<b>3</b>
	2020 saw above average escapements to most systems monitored on Northern Vancouver Island. Hatchery returns at Quinsam were well above average, and other systems such as Nimpkish, Adam and the Salmon all showed signs of improving escapements. Expectations in 2021 are for continued improved escapements especially if Chinook harvest regulations to reduce impacts on Early timed Fraser Chinook continue.				
<b>MIDDLE GEORGIA STRAIT CHINOOK</b>	Puntledge and Big Qualicum Rivers Fall Run Enhanced	<b>14,385</b> (AVG. Terminal Run Index, 1995+)	7,193		<b>3</b>
	Following a strong return of 17,000 in 2019, just under 10,000 fish returned to the Puntledge River in 2020. Returns to the Big Qualicum River were above the four year average of 6,980 at 12,235. Stable production levels and modest survivals for several hatchery indicators suggest average to above average returns are likely for 2021.				
<b>LOWER GEORGIA STRAIT CHINOOK</b>	Cowichan River Fall Run Unenhanced (<20% hatchery origin)	<b>6,826</b> (AVG. Terminal Run Index, 1982+)	3,413	<b>6500 (Cowichan) Escapement Target (SMSY)</b>	<b>2</b>
	<p>Adult Chinook returns to the Cowichan River in 2020 exceeded the target escapement of 6,500 naturally spawning adults for the fifth consecutive year. The number of jacks in the population was high; similar to observations in 2017 which produced strong returns of three year olds in 2018 and four year olds in 2019. The 2021 outlook is for average to above average returns but this may be altered depending on final escapement estimates and age composition. Wild production continues to drive the escapement with the proportion of hatchery fish in the population estimated at 10% for all age classes in 2020.</p> <p>A similar rebuilding trend has not been observed in the Nanaimo River where counts remain low and stable (&lt;5,000). 2021 escapement is expected to remain low and stable.</p>				

Stock Management Unit	Conservation Unit / Sub-Unit	Average Run / Avg. Spawners	LRP / LBB	Management Target	2021 Outlook
<b>GEORGIA STRAIT SPRING AND SUMMER</b>	Nanaimo and Puntledge Summer Enhanced	<b>1,712</b> AVG. Terminal Run Index, 2004+)			<b>2</b>
	Several surveys of spring/summer Chinook holding areas in the Nanaimo River were conducted producing a count of 583 fish in 2020 which was up from 267 in 2019. Puntledge summer Chinook were below the 4-year average of 820 fish at just over 400. Most of the reduction can be attributed to reduced smolt releases in preceding years. Rebuilding efforts for these populations are continuing. At these levels, rebuilding will take several generations even with improved survival				
<b>JOHNSTONE STRAIT / MAINLAND INLET COHO</b>	Area 12				<b>2</b>
	Returns showing some improvement– but still below long term average escapements in many systems surveyed. Keogh- preliminary escapement (1,500) is a clear improvement over the previous 4 years but lower than the long term average. Estimated escapement has steadily increased from that observed in 2016 (230), despite relatively stable but high juvenile recruitment, indicating improving marine survival. The return in 2020 stems from an above average smolt abundance of 72K. 2020 out migration was also strong (87K). Expectations in 2021 are for this improved survival to continue but still below average returns. Forecast will be available in the spring and will likely be similar to the recent 3 year average.				
	Area 13 - North				<b>3</b>
	Most Coho monitoring programs are still ongoing in Area 13. Hatchery indicators for this outlook unit are Quinsam and Big Qualicum. It is very preliminary, but both systems are seeing average, or slightly better than average returns. General observations to date suggest better than forecasted returns across the area. Village Bay Creek on Quadra Island is being monitored by video and has observed higher than expected numbers of Coho through the fence. The wild indicator is Black Creek (included below in the Georgia Strait OU).				
<b>STRAIT OF GEORGIA COHO</b>	Quinsam				<b>2</b>
	Big Qualicum				
	Black Creek				
	Hatchery indicators for this Outlook Unit are the Quinsam and Big Qualicum rivers. Preliminary 2020 adult returns to the Big Qualicum are well above the four year average of 8,600 at over 22,300. An unplanned reduction in smolt output in 2018 produced a low return of 2,600 fish in 2019. Production levels are back to normal and 2021 returns are expected to be average to above average. The wild indicator is Black Creek. 2020 preliminary estimate of 1,935 adults through fence is an improvement over the 2017 brood year (1,333 adults). 2020 escapement is below the long-term average but was expected based on poor marine forecasts and below average smolt production in 2019 (~40K). Fewer jacks returned in 2020 than seen in recent years (1,690) but still making up a large proportion of the total return. Improvement to marine survival are evident from 2019 to 2020 and it is anticipated that will continue. Smolt production in 2020 (83.1K) is significantly above the long-term average which be contributing to the 2021 return.				

Stock Management Unit	Conservation Unit / Sub-Unit	Average Run / Avg. Spawners	LRP / LBB	Management Target	2021 Outlook
INNER SOUTH COAST CHUM - Non-Fraser	Johnstone Strait Area and Mainland Inlets (Areas 11 to 13)				2
	<p>Summer run Chum Salmon stocks in 2020 appear to have done poorly relative to recent years and remained below average throughout the area. This will likely continue through 2021.</p> <p>Fall run Chum returns in 2020 are still being assessed; however, abundance appears to be below average in most systems surveyed. Productivity of these stocks has declined over the last 4 years and has been attributed to poor marine conditions for salmon. There is some indication that survivals have been better in the Southern range of the distribution of Inside Southern Chum.</p> <p>For the 2021 return, below average parental brood abundances in both 2017 and 2018 and a 4 year decline in Chum productivity will likely mean below average return of fall Chum in 2021. Recovery initiatives continue for the Nimpkish Chum Stock within this area.</p> <p>Expect variability in Chum returns.</p>				
	Jervis/Narrows Inlet (Brittian, Deserted, Skwawka, Tzoonie, Vancouver)	<b>51,151</b> (Avg. Return, 2004+)		85,000	2
	Mid-Vancouver Island (Puntledge, Big Qualicum, Little Qualicum)	<b>225,697</b> (Avg. Return, 1995+)		230,000	
	Nanaimo River	<b>61,288</b> (Avg. Return, 2004+)		40,000	
	Cowichan River	<b>177,032</b> (Avg. Return, 2006+)		160,000	
	Goldstream River	<b>27,070</b> (Avg. Return, 2000+)		15,000	
	<p>Preliminary escapement data for 2020 suggest well below target escapements for systems in mid to northern Georgia Strait and Jervis/Narrows Inlet. Returns to Nanaimo, Cowichan and Goldstream were near or slightly above target.</p> <p>For 2021, abundance is expected to follow a similar pattern with stocks in the southern part of Georgia Strait such as Cowichan, Nanaimo, and Goldstream forecast near escapement targets. Mid-Island systems (Puntledge, Little Qualicum, Big Qualicum) are expected to remain well below target levels. Jervis/Narrows Inlet stocks are forecast to be below target abundance.</p>				

**LOWER AND INTERIOR FRASER AREA**

**FRASER SOCKEYE SALMON**

Quantitative forecasts for Fraser Sockeye stocks are produced annually. The 2021 forecasts will be presented to the Fraser River Panel at the Pacific Salmon Treaty meeting in February.

To generate outlooks specific to each Outlook Unit, the brood year escapement was compared to the abundance-based benchmarks calculated for the recent Wild Salmon Policy re-evaluation where available and the recent median escapement (or cycle line escapement for cyclic stocks). Where stock recruitment data exists for non-cyclic stocks, the lower abundance-based benchmark is calculated using the Ricker model and corresponds to  $S_{GEN}$ , while the upper abundance-based benchmark is 80% of  $S_{MSY}$ .

**AVERAGE AGGREGATE RETURN (ALL CYCLES, ALL STOCKS): 7,812,200**

**Stock management Unit: EARLY STUART**

**Average aggregate return (all cycles): 286,600**

Conservation Unit	Average Return (all cycles)	LRP / LBB	Management Target	WSP / COSEWIC STATUS	2021 OUTLOOK
<b>Early Stuart</b> <i>(CU: Takla-Trembleur-EStu)</i> - Cyclical: Yes	31,600			WSP – RED COSEWIC – END	1
Below average returns are expected for this CU. The brood-year effective total spawners (ETS; 12,870) was below the WSP lower benchmark for ETS (97,682). Brood-year effective female spawners (EFS; 7,136) was below the long-term cycle line average EFS (95,066) and below the recent cycle line average EFS (29,958). This stock was heavily impacted by the Big Bar landslide in 2019 and 2020 return years, and is expected to continue to suffer additional en-route mortality associated with the slide.					

**Stock management Unit: EARLY SUMMER**

**Average aggregate return (all cycles): 516,000**

Conservation Unit	Average Return (all cycles)	LRP / LBB	Management Target	WSP / COSEWIC STATUS	2021 OUTLOOK
<b>LOWER FRASER</b>					
<u>Upper Pitt River</u> (CU: Pitt-ES) - Cyclical: No	83,900	10,627 LBB		WSP – Green COSEWIC – NAR	<b>3</b>
<p>Moderate-to-good returns are expected for this CU. Historically, the five-year-old component has contributed substantially to this population, especially for this cycle line. Both the 2017 and 2016 brood-year effective total spawners (ETS; 23,612 and 35,329, respectively) were above the WSP lower benchmark ETS (10,627); the 2017 ETS were below the upper benchmark (26,845) while the 2016 ETS were above the upper benchmark.</p> <p>As well, the 2017 and 2016 brood-year effective female spawners (EFS; 13,297 and 18,401, respectively) were both above the recent average EFS (11,546). Relative to the long-term EFS (13,445), the 2017 brood-year EFS were barely below average while the 2016 brood-year EFS were above average.</p> <p>Note these comparisons include the Upper Pitt River spawning channel escapements to be consistent with Grant et al (2020).</p>					
<u>Chilliwack</u> (CU: Chilliwack-ES) - Cyclical: Yes*				WSP – AM/GR COSEWIC – NAR	<b>3</b>
<p>*While this stock exhibits cyclical returns, limited data preclude cycle-specific benchmarks (Grant et al 2020). Historically, the five-year-old component has contributed a considerable amount of the population for this cycle line. The uncertainty in both the age structure and relevant benchmarks for comparison is reflected in the outlook status.</p> <p>Moderate to below-average returns are expected for this CU. The four-year-old (2017) effective total spawners (ETS; 6,525) was below the WSP lower benchmark (8,000), but the five-year-old (2016) ETS (52,761) was above the WSP upper (16,000) benchmark. Likewise, the 2017 effective female spawners (EFS; 2,536) was below both the long-term (5,147) and recent (3,074) average EFS, while the 2016 EFS (30,138) was above both long-term and recent averages.</p> <p>Given that 2020 (i.e., the 2016 cycle line) was the dominant return, this CU is expected to have a sub-dominant return in 2021.</p>					
<u>Nahatlatch River</u> (CU: Nahatlatch-ES) - Cyclical: No	1400 (median esc)			WSP – Amber COSEWIC – SC	<b>2</b>
<b>SOUTH THOMPSON</b>					
(CU: Shuswap-ES) Two populations represent this CU, but they share one set of benchmarks. - Cyclical: Yes & Yes				WSP – Amber COSEWIC – NAR	<b>1</b>
<p>Collectively, below-average returns are expected for this CU given that both the Scotch Creek effective total spawners (ETS; 4,859) and the Seymour River ETS (3,160) together were below the WSP lower benchmark (40,035). Scotch Creek brood-year effective female spawners (EFS; 2,356) was also below the long-term average (2,999) and the recent average EFS (4,666) for this cycle line. Seymour River brood-year EFS (1,675) was also below the long-term (3,693) and recent average EFS (5,210) for this cycle line.</p>					

Conservation Unit	Average Return (all cycles)	LRP / LBB	Management Target	WSP / COSEWIC STATUS	2021 OUTLOOK
Misc. (ESHU)					
<b>MID AND UPPER FRASER</b>					
(CU: Anderson-Seton-ES) - Cyclical: No		3700 LBB		WSP – AM/GR COSEWIC – NAR	<b>2</b>
Moderate-to-below-average returns are expected for this CU. Brood-year effective total spawners (ETS; 5,942) was above the WSP lower benchmark for ETS (3,662), while the brood-year effective female spawners (EFS; 3,204) was below the long-term (4,340) and recent average EFS (6,230). It is important to note that these comparisons include the Gates Spawning Channel, but as of January 2020 the channel operations are discontinued which may influence interpretation of these trends moving forward.					
(CU: Nadina-Francois-ES) - Cyclical: No	77,500	21,694 LBB		WSP – AM/GR COSEWIC – NAR	<b>2</b>
Moderate returns are expected for this CU. Historically, the five-year old component has contributed moderately to this cycle line. While the 2017 effective total spawners (ETS; 4,429) were below the WSP lower benchmark (21,694), the 2016 ETS (25,589) were above it (but below the upper benchmark of 68,273). Likewise, the four-year-old (2017) effective female spawners (EFS; 2,323) was below both the long-term (9,439) and recent average EFS (14,646). However, the five-year-old (2016) EFS (16,110) was above both long-term and recent mean EFS. These comparisons include the Nadina spawning channel escapement estimates to be consistent with Grant et al (2020).					
CU: Bowron-ES) - Cyclical: No	68,700	5200 LBB		WSP – RED COSEWIC – END	<b>1</b>
Below-average returns are expected for this CU. Brood-year effective total spawners (ETS; 244) was below the WSP lower benchmark for ETS (5,249). The brood-year effective female spawners (EFS; 122) was also below the long-term (3,998) and recent average EFS (2,137). This stock was heavily impacted by the Big Bar landslide in 2019 and 2020 return years, and is expected to continue to suffer additional en-route mortality associated with the slide.					
Taseko-ES	250 (median esc)			WSP – RED COSEWIC – END	<b>1</b>
Reliable return data are not available for this CU, thus no WSP benchmarks are available (see Appendix). Low returns are typically expected for this CU. Brood-year effective female spawners (EFS; 10) was below the long-term average EFS (1,215) and below the recent average EFS (158). Limited sample size precludes statements about the age structure of sockeye in Taseko Lake. This stock was heavily impacted by the Big Bar landslide in 2019 and 2020 return years, and is expected to continue to suffer additional en-route mortality associated with the slide.					

**Stock management Unit: SUMMER RUN**

**Average aggregate return (all cycles): 3,953,500**

Conservation Unit	Average Return (all cycles)	LRP / LBB	Management Target	WSP / COSEWIC STATUS	2021 OUTLOOK
<b>Harrison River</b> (CU: Harrison River-Type)-S) - Cyclical: No	138,400	39,900 LBB		WSP – Green COSEWIC – NAR	2
Low-to-moderate returns are expected for this CU. Historically, this population can have a considerable three-year-old component. The four-year-old (2017) effective total spawners (ETS; 48,953) was above the WSP lower benchmark for ETS (38,928), while the three-year-old (2018) ETS (14,998) was below it. The 2017 effective female spawners (EFS; 29,391) was below both the long-term (29,934) and recent average EFS (90,120), as was the 2018 EFS (8,171).					
<b>Raft River</b> (CU: Kamloops-ES) - Cyclical: No	29,800	5000 LBB		WSP – Amber COSEWIC – SC	1
Below-average returns are expected for this CU. Brood-year effective total spawners (ETS; 3,933) was below the WSP lower benchmark for ETS (4,958). Brood-year effective female spawners (EFS; 2,269) was also below the long-term (4,288) and recent average EFS (6,072). This population occasionally has a five-year-old component, but it is variable and inconsistent, thus was not considered.					
<b>Quesnel</b> (CU: Quesnel-S) - Cyclical: Yes	1,369,900	172,300 LBB		WSP – RED/AM COSEWIC – END	1
Below-average returns are expected for this CU. Brood-year effective total spawners (ETS; 105,880) was below the WSP lower benchmark for ETS (180,491). Brood-year effective female spawners (EFS; 59,636) was also below the long-term (443,226) and recent average EFS (177,775). These comparisons include the Horsefly River spawning channel escapements. This stock was impacted by the Big Bar landslide in 2019 and 2020 return years, and is expected to continue to suffer additional en-route mortality associated with the slide.					
<b>Stellako River</b> (CU: Francois-Fraser-S) - Cyclical: No	463,300	24,400 LBB		WSP – AM/GR COSEWIC – SC	3
Good returns are expected for this CU. Brood-year effective total spawners (ETS; 89,387) was above the WSP lower benchmark for ETS (24,256) but below the upper benchmark (122,612). However, brood-year effective female spawners (EFS; 49,425) was below the long-term (55,446) and recent average EFS (88,305). This stock was impacted by the Big Bar landslide in 2019 and 2020 return years, and is expected to continue to suffer additional en-route mortality associated with the slide.					
<b>Chilko</b> (CUs: Chilko-S and Chilko-ES) - Cyclical: No	1,435,000	64,220 LBB		WSP – Green COSEWIC – NAR	3
Good to above-average returns are expected for this CU. Brood-year effective total spawners (ETS; 356,268) was above the WSP lower benchmark (64,220) and above the upper benchmark (353,863) for ETS. However, brood-year effective female spawners (EFS; 212,956) was below the long-term (223,927) and recent average EFS (343,492). The smolt brood returning as adults in 2021 was the 5th highest on record, with 62.6 million smolts recorded leaving Chilko Lake in the spring of 2019. These comparisons include the historical Chilko River spawning channel escapement. This stock was impacted by the Big Bar landslide in 2019 and 2020 return years, and is expected to continue to suffer additional en-route mortality associated with the slide.					
	526,000	103,300 LBB		WSP – RED/AM	2

<b>Late Stuart</b> (CU: <i>Takla-Trembleur-Stuart-S</i> ) - Cyclical: Yes				COSEWIC – END	
	Moderate to below-average returns are expected for this CU. Brood-year effective total spawners (EFS; 142,409) was above the WSP lower benchmark for ETS (112,600), but below the upper benchmark (622,626). However, brood-year effective female spawners (EFS; 80,081) was below the long-term (220,413) and recent average EFS (89,712) for this cycle-line. These comparisons include the historical Chilko River spawning channel escapement. This stock was impacted by the Big Bar landslide in 2019 and 2020 return years, and is expected to continue to suffer additional en-route mortality associated with the slide.				

**Stock management Unit: LATE RUN**

**Average aggregate return (all cycles): 3,056,100**

Conservation Unit	Average Return (all cycles)	LRP / LBB	Management Target	WSP / COSEWIC STATUS	2021 OUTLOOK
<b>Cultus Lake</b> (CU: <i>Cultus-L</i> ) - Cyclical: No	31,600			WSP – RED COSEWIC – END	<b>1</b>
	Below-average returns are expected for this CU. Brood-year effective total spawners (EFS; 421) was below the WSP lower benchmark for ETS (15,454). Brood-year effective female spawners (EFS; 274) was below the long-term (841) and recent average EFS (450). The smolt brood returning as adults in 2021 was composed of 7070 marked (hatchery-origin) and 4796 unmarked (lake-origin) individuals which is extremely low relative to past outmigration.				
<b>Portage Creek</b> (CU: <i>Seton-L</i> ) - Cyclical: No	39,600	2,200 LBB		WSP – RED COSEWIC – END	<b>1</b>
	Below-average returns are expected for this CU. Brood-year effective total spawners (EFS; 1,033) was below the WSP lower benchmark for ETS (2,193). Brood-year effective female spawners (EFS; 441) was below the long-term (4,022) and recent average EFS (3,202).				
<b>South Thompson</b> (CU: <i>Shuswap-L</i> ) - Cyclical: Yes	2,320,200	429,400 LBB		WSP – AM/GR COSEWIC – NAR	<b>1</b>
	Below-average returns are expected for this CU. Brood-year effective total spawners (EFS; 13,767) was far below the cycle-specific WSP lower benchmark for ETS (713,769). Brood-year effective female spawners (EFS; 8,445) was below the long-term (9,185) and recent average EFS (32,098). These comparisons include the historical Adams River spawning channel escapements.				
<b>Birkenhead River</b> (CU: <i>Lillooet-Harrison-L</i> ) - Cyclical: No	335,000	15,700 LBB		WSP – Amber COSEWIC – SC	<b>2</b>
	Moderate returns are expected for this CU. Historically, this population has a considerable five-year-old component. Both the 2017 and 2016 brood-year effective total spawners (ETS; 17,668 and 27,564) were above the WSP lower benchmark (15,685) but below the upper benchmark (81,023). However, both the 2017 and 2016 brood-year effective female spawners (EFS; 9,900 and 13,474) were below the long-term (40,822) and recent average EFS (17,418).				
<b>Weaver Creek</b> (CU: <i>Harrison (U/S)-L</i> ) - Cyclical: No	329,700	10,700 LBB		WSP – AM/GR COSEWIC – SC	<b>2</b>
	Moderate returns are expected for this CU. Brood-year effective total spawners (EFS; 28,855) was above the WSP lower benchmark (10,731), but below the upper benchmark (84,597). Brood-year effective female spawners (EFS; 14,382) was below the long-term average EFS (21,081) but above the recent				



Conservation Unit	Average Return (all cycles)	LRP / LBB	Management Target	WSP / COSEWIC STATUS	2021 OUTLOOK
	average EFS (6,514). These comparisons include the Weaver Creek spawning channel escapements to be consistent with Grant et al (2020).				
<b>Big Silver Creek</b> (CU: Harrison (D/S)-L) - Cyclical: No				WSP – AM/GR COSEWIC – SC	<b>3</b>
	Reliable return data are not available for this CU, thus no WSP benchmarks are available (see Appendix). Moderate to good returns are expected for this population. Brood-year effective female spawners (EFS; 3,072) was above the long-term (1,668) and recent average EFS (2,844).				
<b>Widgeon Slough</b> (CU: Widgeon (River-Type)) - Cyclical: No				WSP – RED COSEWIC – END	<b>1</b>
	Reliable return data are not available for this CU, thus no WSP benchmarks are available (see Appendix). Below average returns are expected for this CU. The 2017 effective female spawners (EFS; 83) was below the long-term average EFS (324) and the recent average EFS (94). This population may have contribution from the 3-year-old component, but this is uncertain due to small population and sample sizes over time. For reference, the 2018 EFS (68) was below the long-term average EFS and below the recent average EFS.				

#### FRASER PINK

Conservation Unit	Average Return (all cycles)	LRP / LBB	Management Target	WSP / COSEWIC STATUS	2021 OUTLOOK
Fraser - Odd only (CU: Fraser River)					<b>2/3</b>
	Since juvenile enumeration did not take place in Spring 2020, the only information we have to assess stock status comes from escapement and return in 2019. Escapement in 2019 (8,307,419) was above historical average (6,187,390). 2019 returns (8,858,203) were below historical average (11,492,861), owing to exceptionally low escapement in 2017 (3,392,159). While Fraser Pink salmon do not have associated Wild Salmon Policy benchmarks, and have not been assessed by COSEWIC, there is an escapement target of 6,000,000 when returns are above 7,059,000. When returns are below 7,059,000, exploitation rate declines with decreasing return abundance linearly from 15% to 0%. When returns are above 20,000,000 there is an exploitation rate cap of 70%. These fisheries reference points supply some insight into stock status. 2019 returns and escapements satisfied both the “lower” reference point of 7.059 million, and the escapement goal of 6,000,000. It should be noted that Pink salmon enumeration methods (used both for escapement and returns) have changed substantially over time, and therefore historical values may not be comparable to recent estimates of escapement and return. Therefore, stock status should be approached with caution.				

**FRASER CHINOOK**

Stock Management Unit	Conservation Unit	Average Run / Avg. Spawners	LRP / LBB	Management Target	WSP / COSEWIC STATUS	2021 Outlook
<b>SPRING RUN 4<sub>2</sub> CHINOOK SALMON</b>	<b>Aggregate SMU</b>	<b>16,511</b> (Terminal Run, 1979+)		<b>22,146</b> Escapement Target (S <sub>MSY</sub> )		<b>1</b>
	CK-17 Lower Thompson	<b>6360</b> (ESC, 5yr Avg.)	4613		WSP – Red COSEWIC – END.	
	CK-16 South Thompson-Bessette Creek	<b>66</b> (ESC, 5yr Avg.)	222		WSP – Red	
	Expectations are for continued depressed abundance due to low parental escapements in 2017, ongoing unfavorable marine and freshwater survival conditions and low productivity. The 2020 escapement estimate was below the parent brood escapement in 2016, and for those systems that escapement estimates are available, escapement was below the recent average. (2019 Outlook Category was 1)					
<b>SPRING RUN 5<sub>2</sub> CHINOOK SALMON</b>	<b>Aggregate SMU</b>	<b>36,985</b> (Terminal Run, 1979+)		<b>42,165</b> Escapement Target (S <sub>MSY</sub> )		<b>1</b>
	CK-04 Lower Fraser	<b>278</b> (ESC, 5yr Avg.)	347		COSEWIC – Special Concern	
	CK-08 Middle Fraser- Fraser Canyon	<b>24</b> (ESC, 5yr Avg.)	230		WSP – Data D. COSEWIC – END	
	CK-10 Middle Fraser	<b>2339</b> (ESC, 5yr Avg.)	5327		WSP – Red COSEWIC – Threat.	
	CK-12 Upper Fraser	<b>162</b> (ESC, 5yr Avg.)	5277		WSP – Red COSEWIC – END	
	CK-14 South Thompson	<b>875</b> (ESC, 5yr Avg.)	964		WSP – Amber	
	CK-18 North Thompson	<b>8387</b> (ESC, 5yr Avg.)	935		WSP – Red COSEWIC – END	
	Expectations are for continued low abundance related to depressed parental escapements and continuing unfavorable marine and freshwater survival conditions and low productivity. The 2020 escapement estimate was below parental brood escapements in 2015 and similar to the recent average. (2019 Outlook Category was 1)					

Stock Management Unit	Conservation Unit	Average Run / Avg. Spawners	LRP / LBB	Management Target	WSP / COSEWIC STATUS	2021 Outlook
<b>SUMMER RUN 5<sub>2</sub> CHINOOK SALMON</b>	<b>Aggregate SMU</b>	<b>36,732</b> (Terminal Run, 1979+)		<b>23,567</b> Escapement Target (S <sub>MSY</sub> )		<b>1</b>
	CK-05 Lower Fraser – Upper Pitt	<b>60</b> (ESC, 5yr Avg.)	256		WSP – Data D. COSEWIC – END	
	CK-06 Lower Fraser	<b>63</b> (ESC, 5yr Avg.)	325		WSP – Data D. COSEWIC – Threat.	
	CK-09 Middle Fraser - Portage	<b>68</b> (ESC, 5yr Avg.)	346		WSP – Red COSEWIC – END	
	CK-11 Middle Fraser	<b>9147</b> (ESC, 5yr Avg.)	5871		WSP – Amber COSEWIC – Threat.	
	CK-19 North Thompson	<b>1907</b> (ESC, 5yr Avg.)	1829		WSP – Red COSEWIC – END	
Expectations are for continued overall low abundance related to low parental escapements, low marine and freshwater survival, and low productivity. The 2020 escapement estimate was below parental brood escapements in 2015 and below the recent average. (2019 Outlook Category was 1).						
<b>SUMMER RUN 4<sub>1</sub> CHINOOK SALMON</b>		<b>93,242</b> (Terminal Run, 1977+)		<b>120,322</b> Escapement Target (S <sub>MSY</sub> )		
	CK-13 South Thompson	<b>97,611</b> (ESC, 5yr Avg.)	23,469		WSP – Green COSEWIC – Not at Risk	<b>4</b>
	CK-15 Shuswap River	<b>23,185</b> (ESC, 5yr Avg.)	2,096		COSEWIC – Not at Risk	<b>4</b>
	CK-07 Maria Slough	<b>343</b> (ESC, 5yr Avg.)	15		Not assessed.	<b>1</b>
Expectations are for the prefishery abundance to exceed spawner escapement objective at the Lower Shuswap indicator stock. The 2020 escapement estimate was above the parental brood escapement in 2016 and above the recent average for all locations except for Maria Slough where abundance was extremely low. (2019 Outlook Category was 1/4).						
<b>FALL RUN 4<sub>1</sub> CHINOOK SALMON</b>	<b>Aggregate</b>	<b>131,822</b> (Terminal Run, 1977+)				

Stock Management Unit	Conservation Unit	Average Run / Avg. Spawners	LRP / LBB	Management Target	WSP / COSEWIC STATUS	2021 Outlook
	(P)Hatchery Exclusion-Lower Fraser River	26,600 (ESC, 1975+)	n/a (hatchery stock)		Not assessed.	4
	CK::Lower Fraser River-fall timing (white) - Harrison	83,600 (ESC, 1975+)	15,318	75,100 Escapement Target (S <sub>MSY</sub> )	WSP – Green COSEWIC – Threat.	2
<p>The 2020 Harrison (natural) preliminary escapement estimate was similar to the parental brood escapement in 2016, and below the recent average and escapement goal. The 2020 Chilliwack (hatchery) escapement estimate and the forecasts for 2021 will be available in late winter. Current marine conditions and stock productivity appear to be unfavorable, with escapement estimates only meeting the escapement objective for the Harrison River once in the past 9 years. Chilliwack hatchery production, marine survival, and recent fishery exploitation are expected to return sufficient abundance to achieve hatchery production objectives.</p>						

#### FRASER COHO

STOCK MANAGEMENT UNIT	Conservation Unit / Sub Unit	Average Return	LRP / LBB	Management Target	WSP / COSEWIC STATUS	2021 OUTLOOK
Interior Fraser Coho	Mid and Upper – Fraser – Aggregate includes 2 CUs	Ongoing poor marine conditions continue to hamper rebuilding. Escapement programs for 2020 are underway, and it is too early to evaluate return abundance. A formal forecast will be produced in the spring. (2019 Outlook Category was 1)				1
	Thompson – Aggregate includes 3 CUs	Ongoing poor marine conditions continue to hamper rebuilding. Escapement programs for 2020 are underway, and it is too early to evaluate return abundance. A formal forecast will be produced in the spring. (2019 Outlook Category was 1)				1
Lower Fraser Coho	Lower Fraser – Aggregate includes 3 CU	Escapement programs for 2020 are underway, and it is too early to evaluate return abundance. (2019 Outlook Category was 1)				1

**FRASER CHUM**

Stock Management Unit	Conservation Unit	Average Return (all cycles)	LRP / LBB	Management Target	WSP / COSEWIC STATUS	2021 OUTLOOK
<b>Inner South Coast Chum - Fraser</b>	Lower Fraser CU			There is a management goal of 800,000 wild spawners.		<b>2</b>
		<p>Fraser River Chum Salmon spawning escapement in 2017 fell below the 800,000 goal for the first time since 2010. Returns in 2021 will be dominated by 4 year old brood from the 2017 escapement (660,000 spawners). With the exception of the unusually high escapement in 2016 (1.98 mil spawners), spawning escapement has trended down since the 2012 return. Spawning escapement in 2019 was estimated at 300,000 Chum; this is the lowest recorded escapement in over 20 years.</p> <p>The October 22, 2020 in-season estimate of the Fraser Chum terminal return was 1.08 million fish with an 80% probability the terminal return would be between 0.70 and 1.7mil Chum. Escapement assessments in 2020 are currently underway but early indications are the terminal return will be close to the lower end of the range. An estimate of the 2020 spawning escapement will be available by April 2021</p>				

**HOWE SOUND / BURRARD INLET**

Stock Management Unit	Conservation Unit / Sub-Unit	Average Run / Avg. Spawners	LRP / LBB	Management Target	2021 Outlook
<b>PINK</b>	Part of the Southern Fjords odd and even CUs				
<b>CHINOOK</b>	Part of the South Coast – Southern Fjords CU				Data Deficient
<b>COHO</b>	Howe Sound – Burrard Inlet CU				
<b>INNER SOUTH COAST CHUM – Non-Fraser</b>	Howe Sound – Burrard Inlet CU				

**BOUNDARY BAY**

Stock Management Unit	Conservation Unit / Sub-Unit	Average Run / Avg. Spawners	LRP / LBB	Management Target	2021 Outlook
<b>CHINOOK</b>	Part of the South Coast – Southern Fjords CU				Data Deficient
<b>COHO</b>	Boundary Bay CU				
<b>INNER SOUTH COAST CHUM – Non-Fraser</b>	Boundary Bay CU				

**OKANAGAN**

Stock Management Unit	Conservation Unit / Sub-Unit	Average Run / Avg. Spawners	LRP / LBB	Management Target	WSP / COSEWIC STATUS	2021 Outlook
<b>OKANAGAN SOCKEYE</b>						
	<p>The 2015 brood year escapement of 5,734 (peak live plus dead terminal count) achieved only 20 % of the current Canadian domestic target for this CU (29,365 as peak live plus dead in the terminal index area). Returns of Okanagan sockeye adults to the Columbia and Okanagan rivers in 2019 will be derived from smolt cohorts that migrated seaward in spring 2016 (returning as 5-year-olds), 2017 (returning as 4-year-olds) and 2018 (returning as 3-year old “jacks” or “jills”). Although year-specific smolt-to-adult survival values for these specific cohorts are not available as yet, Okanagan sockeye marine survival variations are known to be similar to Barkley Sound sockeye in that above and below average survivals occur in association with either cold-ocean (La Niña) or warm ocean (El Niño) events, respectively. Marine survival of only sea entry year 2016 noted above was influenced by warm ocean conditions due to the development of a very strong El Niño event in 2015-2016. Further, examination of an association between historic smolt-to-adult return (SAR) variations and NOAA Fisheries “stop-light” indicators suggests that both the 2017 and 2018 sea-entry smolts are likely to have experienced an improvement in survival rates relative to the &lt;2% SAR applied to 2015 and 2016 sea entry year smolts. Applying a 3.6 % SAR to smolt cohorts for the 2017 and 2018 sea-entry years yields an estimate of around 69,000 adults contributing to the 2018-2021 return years. Allocation of this production to specific return years based on average age-at-return values for Okanagan sockeye suggests a total return in 2019 of 62,000 age-4 and age-5 Okanagan wild-origin fish. Production of hatchery-origin fish from Skaha Lake may increase these returns by 10-20 % for a total maximum return of 74,000 adult sockeye of Okanagan origin in 2019. (2018 Outlook Category was 2)</p>					
<b>OKANAGAN CHINOOK</b>					COSEWIC - END	1
	<p>Expectations for 2021 are for continued depressed abundance related to low parental escapements, low marine and freshwater survival, low productivity, and low hatchery production. Escapement information for 2020 is not yet available. The COSEWIC identified the status as endangered (2017).</p>					

## CONTRIBUTORS

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## STOCK TRAJECTORIES

**ADD GRAPHS AND TABLES**