2022 Fraser Sockeye

Draft IFMP Escapement Options

Presented to: FSMC Forum

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March 2, 2022

Photo by Maxime Veilleux

Presentation Outline

1) Review of Pre-season Forecast

2) Draft Sockeye Escapement Options

- Total Allowable Mortality (TAM) rule description
- Review of 2022 draft escapement options
- Projected escapement tables for each option

Fraser Sockeye Forecast Conclusions

2022 forecast return at p50 is expected to be moderate (<10M), similar to 2018 return, and below the cycle line median

- Planning at p50 (and below, e.g., p10, p25 - also likely a good idea).

Early Stuart Run

- Represents the historically-dominant cycle line.

Early Summer Run

- 16% of total forecast at p50.

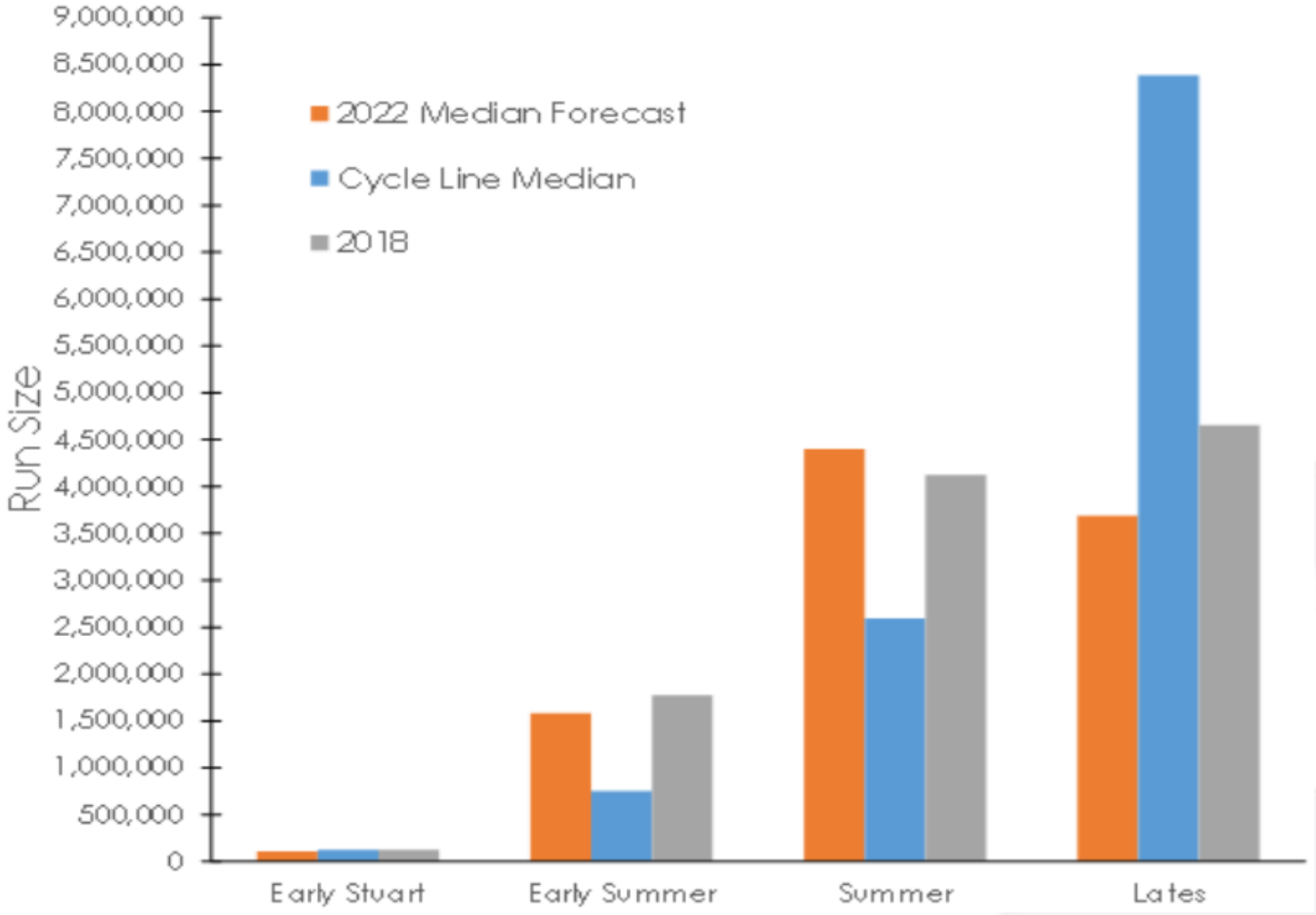
Summer Run

- 45% of total forecast at p50 (88% of Summer run Chilko, Quesnel, Stellako).

Late Run

- 38% of total forecast at p50 (93% of Late run Late Shuswap).

Run Size Forecast



Courtesy of PSC Staff
Fraser River Panel
February 2022

2022 Fraser Sockeye Escapement Options

Photo by Maxime Veilleux

Fraser Sockeye

2022 Draft Fraser Sockeye Escapement Plan Options

Escapement Planning Process

- Normally begin planning in February to have 2 options in draft IFMP.

- In 2022, Department is consulting on 3 options:
  - Option 1 - based on brood year
  - Option 2 - modified from brood year
  - Option 3 - more conservative plan

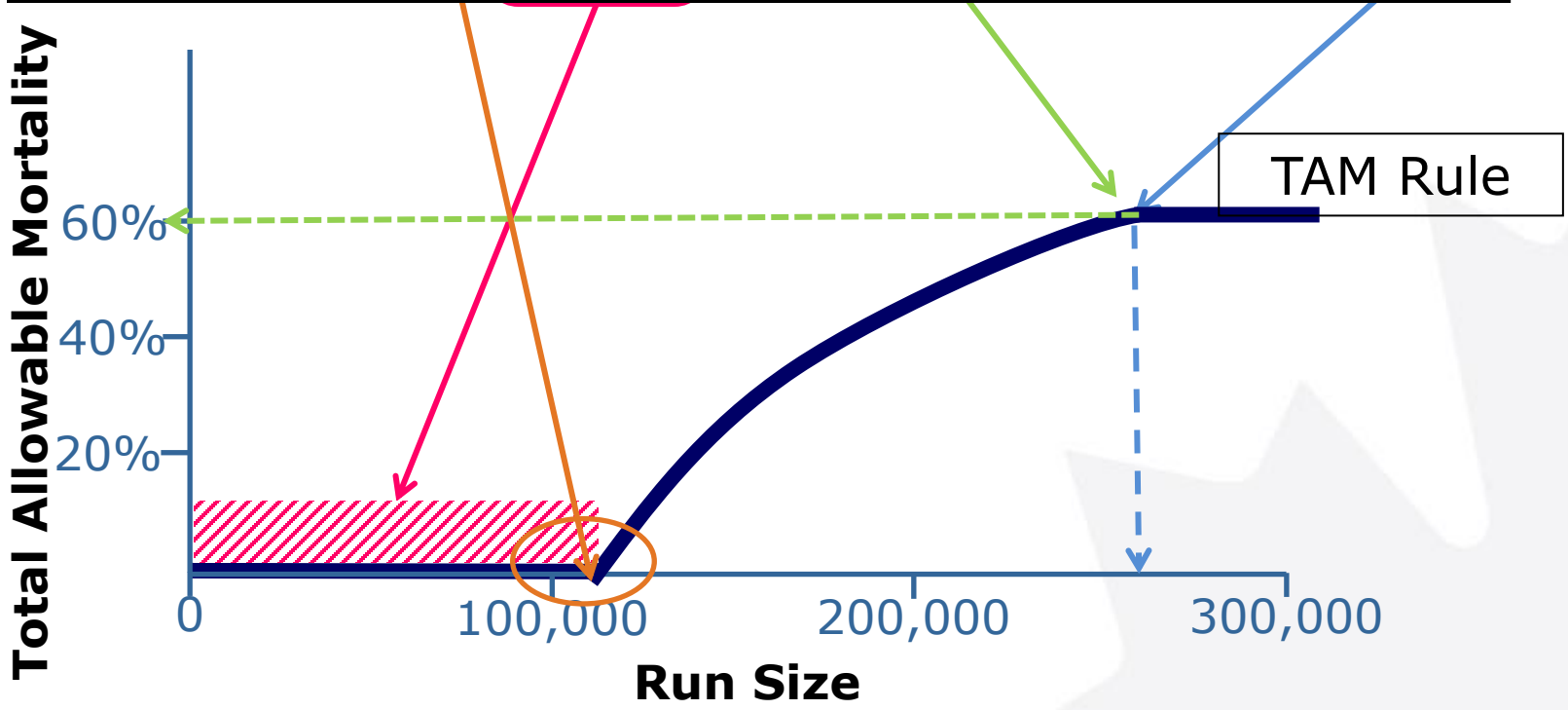
- Consultations occur via draft IFMP then based on feedback, Department adopts an option (or hybrid) in the final IFMP.

Escapement Plan Implementation

- Actual implementation of escapement plan is not as straight forward as it may seem on paper.
- In-season, uncertainty related to achieving escapement goals may impact fisheries decisions and the ability to achieve allowable mortalities.
- *Some* examples: LAER implementation, environmental and migration conditions, MU overlap, low productivity, and precautionary adoption of run sizes that support fisheries.
- Although 2022 is a dominant return year for many stocks, consideration for the precautionary approach and managing for weak stocks will be important.
- Additional initiatives such as PSSI may also impact planning.

Total Allowable Mortality Rule

Management Unit	Harvest Rule Parameters			
	LAER	TAM Cap	Lower Fishery Reference Point	Upper Fishery Reference Point
Early Stuart	10%	60%	108,000	270,000
misc)	20%	60%	180,000	450,000
Summer (w/o misc)	20%	60%	1,020,000	2,550,000
Late (w/o misc)	20-30%	60%	1,100,000	2,750,000



Escapement Plan Options

Option 1- Brood Year (2018) Escapement Plan

	Harvest Rule Parameters				
Management Unit	Low Abundance ER (LAER)	TAM Cap	Lower Fishery Reference Point	Upper Fishery Reference Point	Pre-season pMA @p50
Early Stuart	10%	60%	108,000	270,000	0.89
Early Summer	20%	60%	180,000	450,000	0.45
Summer (w/o	20%	60%	1,020,000	2,550,000	0.06
Late (w/o misc)	20-30%	60%	1,100,000	2,750,000	0.22

Option 2: Modified Brood Year (2018) Escapement Plan

	Harvest Rule Parameters				
Management Unit	Low Abundance ER (LAER)	TAM Cap	Lower Fishery Reference Point	Upper Fishery Reference Point	Pre-season pMA @p50
Early Stuart	10%	20%	108,000	135,000	0.89
(w/o misc)	20%	50%	180,000	360,000	0.45
Summer (w/o	20%	50%	1,250,000	2,500,000	0.06
Late (w/o misc)	20%	50%	1,100,000	2,200,000	0.22

Option 3: Conservative Escapement Plan

	Harvest Rule Parameters				
Management Unit	Low Abundance ER (LAER)	TAM Cap	Lower Fishery Reference Point	Upper Fishery Reference Point	Pre-season pMA @p50
Early Stuart	10%	20%	108,000	135,000	0.89
(w/o misc)	10%	40%	180,000	300,000	0.45
misc)	10%	40%	1,250,000	2,083,000	0.06
Late (w/o misc)	10%	40%	1,100,000	1,833,000	0.22

Note: blue cells indicate changes from the Option 1 Escapement Plan

Early Stuart Options Comparison

Early Stuart	forecast	p10 39,000	p25 63,000	p50 105,000	p75 172,000	p90 268,000
Option 1	Max. Allowable ER	**10%**	**10%**	**10%**	**10%**	**24%**
	Allowable Harvest	**3,900**	**6,300**	**10,500**	**17,200**	**63,900**
	Projected S (after MA)	18,600	30,100	50,100	82,000	108,200
	Proj. S as % BY S	38%	62%	103%	169%	223%
	Proj. S as % cycle S	53%	86%	143%	234%	309%
Option 2	Max. Allowable ER	**10%**	**10%**	**10%**	**10%**	**10%**
	Allowable Harvest	**3,900**	**6,300**	**10,500**	**17,200**	**26,800**
	Projected S (after MA)	18,600	30,100	50,100	82,000	127,800
	Proj. S as % BY S	38%	62%	103%	169%	264%
	Proj. S as % cycle S	53%	86%	143%	234%	365%
Option 3	Max. Allowable ER	**10%**	**10%**	**10%**	**10%**	**10%**
	Allowable Harvest	**3,900**	**6,300**	**10,500**	**17,200**	**26,800**
	Projected S (after MA)	18,600	30,100	50,100	82,000	127,800
	Proj. S as % BY S	38%	62%	103%	169%	264%
	Proj. S as % cycle S	53%	86%	143%	234%	365%

Incidental Harvest (LAER)
Directed Harvest

Option	LAER	TAM Cap	Lower Fishery Ref. Point	Upper fishery Ref. Point
1	10%	60%	108,000	270,000
2	10%	20%	108,000	135,000
3	10%	20%	108,000	135,000

Early Summer Options Comparison

Early Summer	forecast (incl. misc)	p10 383,840	p25 764,100	p50 1,579,200	p75 3,159,400	p90 5,685,600
Option 1	Max. Allowable ER	**20%**	**29%**	**42%**	**42%**	**42%**
	Allowable Harvest	**76,800**	**219,600**	**663,200**	**1,326,900**	**2,388,000**
	Projected S (after MA)	211,900	375,700	632,000	1,264,400	2,275,300
	Proj. S as % BY S	29%	52%	88%	176%	317%
	Proj. S as % cycle S	60%	107%	180%	361%	649%
Option 2	Max. Allowable ER	**20%**	**28%**	**28%**	**27%**	**27%**
	Allowable Harvest	**76,800**	**210,200**	**434,300**	**868,800**	**1,563,500**
	Projected S (after MA)	211,900	382,200	790,000	1,580,500	2,844,200
	Proj. S as % BY S	29%	53%	110%	220%	396%
	Proj. S as % cycle S	60%	109%	225%	451%	812%
Option 3	Max. Allowable ER	**10%**	**13%**	**13%**	**13%**	**13%**
	Allowable Harvest	**38,400**	**99,300**	**205,300**	**410,800**	**739,100**
	Projected S (after MA)	238,400	458,700	948,000	1,896,500	3,413,100
	Proj. S as % BY S	33%	64%	132%	264%	475%
	Proj. S as % cycle S	68%	131%	271%	541%	974%

Incidental Harvest (LAER)
Directed Harvest

Option	LAER	TAM Cap	Lower Fishery Ref. Point	Upper fishery Ref. Point
1	20%	60%	180,000	450,000
2	20%	50%	180,000	360,000
3	10%	40%	180,000	300,000

Summer Options Comparison

Summer	forecast (incl. misc)	p10 1,239,370	p25 2,231,200	p50 4,402,600	p75 8,904,000	p90 17,468,000
Option 1	Max. Allowable ER	**20%**	**51%**	**58%**	**58%**	**58%**
	Allowable Harvest	**247,874**	**1,142,900**	**2,535,860**	**5,128,700**	**10,061,600**
	Projected S (after MA)	932,000	1,023,000	1,754,700	3,548,800	6,962,000
	Proj. S as % BY S	53%	58%	100%	203%	398%
	Proj. S as % cycle S	101%	111%	190%	385%	755%
Option 2	Max. Allowable ER	**20%**	**40%**	**47%**	**47%**	**47%**
	Allowable Harvest	**247,874**	**897,500**	**2,069,200**	**4,184,900**	**8,210,000**
	Projected S (after MA)	932,000	1,253,700	2,193,400	4,436,000	8,702,500
	Proj. S as % BY S	53%	72%	125%	253%	497%
	Proj. S as % cycle S	101%	136%	238%	481%	943%
Option 3	Max. Allowable ER	**10%**	**36%**	**36%**	**36%**	**36%**
	Allowable Harvest	**123,937**	**812,180**	**1,602,540**	**3,241,100**	**6,358,400**
	Projected S (after MA)	1,048,500	1,333,900	2,632,100	5,323,100	10,443,000
	Proj. S as % BY S	60%	76%	150%	304%	597%
	Proj. S as % cycle S	114%	145%	285%	577%	1132%

Incidental Harvest (LAER)
Directed Harvest

Option	LAER	TAM Cap	Lower Fishery Ref. Point	Upper fishery Ref. Point
1	20%	60%	1,020,000	2,550,000
2	20%	50%	1,250,000	2,500,000
3	10%	40%	1,250,000	2,083,000

Late Options Comparison

Lates	forecast (incl. misc)	p10 711,400	p25 1,603,600	p50 3,688,000	p75 8,160,000	p90 18,285,000
Option 1	Max. Allowable ER	**20%**	**20%**	**51%**	**51%**	**51%**
	Allowable Harvest	**142,280**	**320,720**	**1,888,300**	**4,177,900**	**9,361,900**
	Projected S (after MA)	466,700	1,052,000	1,475,800	3,265,300	7,316,900
	Proj. S as % BY S	29%	66%	93%	206%	462%
	Proj. S as % cycle S	18%	40%	56%	124%	278%
Option 2	Max. Allowable ER	**20%**	**20%**	**39%**	**39%**	**39%**
	Allowable Harvest	**142,280**	**320,720**	**1,438,300**	**3,182,400**	**7,131,100**
	Projected S (after MA)	466,700	1,052,000	1,844,800	4,081,600	9,146,200
	Proj. S as % BY S	29%	66%	116%	258%	577%
	Proj. S as % cycle S	18%	40%	70%	155%	347%
Option 3	Max. Allowable ER	**10%**	**16%**	**27%**	**27%**	**27%**
	Allowable Harvest	**71,140**	**255,700**	**988,400**	**2,186,900**	**4,900,400**
	Projected S (after MA)	525,000	1,105,300	2,213,700	4,897,900	10,975,400
	Proj. S as % BY S	33%	70%	140%	309%	693%
	Proj. S as % cycle S	20%	42%	84%	186%	417%

Incidental Harvest (LAER)
Directed Harvest

Option	LAER	Tam Cap	Lower Fishery Ref. Point	Upper fishery Ref. Point
1	20%-30%	60%	1,100,000	2,750,000
2	20%	50%	1,100,000	2,200,000
3	10%	40%	1,100,000	1,833,000

Option 1- Projected Escapement

Option 1- Projected Escapements Relative to Cycle Average and Brood Year

Run timing group / Stocks	Total Escapement Cycle Ave	Total Escapement Brood Year	Comparisons @p10 Cycle Ave	Comparisons @p10 Brood Year	Comparisons @p25 Cycle Ave	Comparisons @p25 Brood Year	Comparisons @p50 Cycle Ave	Comparisons @p50 Brood Year	Comparisons @p75 Cycle Ave	Comparisons @p75 Brood Year
Early Stuart	**35,041**	**48,489**	**53%**	**38%**	**86%**	**62%**	**143%**	**103%**	**234%**	**169%**
Early Summer	**350,379**	**718,390**	**60%**	**29%**	**107%**	**52%**	**180%**	**88%**	**361%**	**176%**
Bowron	6,054	8,406	46%	33%	89%	64%	139%	100%	317%	229%
Upper Barriere	5,835	2,430	8%	18%	17%	40%	27%	66%	62%	148%
Gates	5,065	4,338	120%	140%	184%	215%	285%	332%	553%	646%
Nadina	6,826	177,194	412%	16%	699%	27%	1132%	44%	2234%	86%
Pitt	26,139	13,949	27%	51%	40%	74%	54%	100%	89%	166%
Scotch	140,272	82,192	18%	30%	31%	53%	57%	97%	115%	196%
Seymour	93,614	141,888	41%	27%	67%	44%	115%	76%	216%	142%
Misc (EShu)	57,072	283,048	178%	36%	334%	67%	564%	114%	1157%	233%
Misc (Taseko)	1,626	70	1%	29%	3%	71%	5%	114%	10%	229%
Misc (Chilliwack)	2,697	2,341	41%	47%	91%	105%	148%	171%	297%	342%
Misc (Nahatlatch)	5,179	2,534	21%	43%	38%	78%	62%	126%	116%	237%
Summer	**922,714**	**1,750,333**	**101%**	**53%**	**111%**	**58%**	**190%**	**100%**	**385%**	**203%**
Chilko	408,208	619,623	89%	58%	91%	60%	143%	94%	260%	171%
Late Stuart	37,362	112,189	161%	54%	226%	75%	489%	163%	1164%	388%
Quesnel	242,069	818,828	151%	45%	174%	51%	314%	93%	688%	203%
Stellako	143,256	177,252	97%	78%	98%	79%	149%	121%	246%	199%
Harrison	79,894	15,177	2%	10%	3%	15%	6%	34%	18%	97%
Raft	5,792	3,544	39%	64%	40%	65%	69%	113%	131%	214%
Misc (N. Thomp. Tribs)	406	99	57%	232%	101%	414%	197%	808%	296%	1212%
Misc (N. Thomp River)	4,661	3,330	32%	45%	69%	96%	111%	156%	239%	335%
Misc (Widgeon)	1,066	291	5%	17%	13%	48%	23%	82%	38%	137%
Late	**2,634,372**	**1,584,836**	**18%**	**29%**	**40%**	**66%**	**56%**	**93%**	**124%**	**206%**
Cultus	14,093	336	2%	77%	3%	116%	3%	119%	9%	357%
Late Shuswap	2,426,849	1,517,302	17%	28%	40%	64%	56%	90%	125%	200%
Portage	14,140	35,548	125%	50%	241%	96%	303%	120%	640%	254%
Weaver	56,676	15,095	19%	70%	42%	156%	60%	225%	145%	546%
Birkenhead	117,719	15,051	12%	92%	20%	153%	21%	162%	39%	306%
Misc. non-Shuswap	4,895	1,504	27%	87%	94%	305%	131%	426%	229%	745%

= or > 125%
< 125%
< 75%
< 25%

Option 2 - Projected Escapement

Option 2- Projected Escapements Relative to Cycle Average and Brood Year

Run timing group / Stocks	Total Escapement Cycle Ave	Total Escapement Brood Year	Comparisons @p10 Cycle Ave	Comparisons @p10 Brood Year	Comparisons @p25 Cycle Ave	Comparisons @p25 Brood Year	Comparisons @p50 Cycle Ave	Comparisons @p50 Brood Year	Comparisons @p75 Cycle Ave	Comparisons @p75 Brood Year
Early Stuart	**35,041**	**48,489**	**53%**	**38%**	**86%**	**62%**	**143%**	**103%**	**234%**	**169%**
Early Summer	**350,379**	**718,390**	**60%**	**29%**	**109%**	**53%**	**225%**	**110%**	**451%**	**220%**
Bowron	6,054	8,406	46%	33%	91%	65%	174%	125%	397%	286%
Upper Barriere	5,835	2,430	8%	18%	17%	41%	34%	82%	77%	185%
Gates	5,065	4,338	120%	140%	188%	219%	356%	415%	691%	807%
Nadina	6,826	177,194	412%	16%	711%	27%	1414%	54%	2792%	108%
Pitt	26,139	13,949	27%	51%	40%	75%	67%	126%	111%	208%
Scotch	140,272	82,192	18%	30%	32%	54%	71%	121%	144%	245%
Seymour	93,614	141,888	41%	27%	68%	45%	144%	95%	270%	178%
Misc (EShu)	57,072	283,048	178%	36%	340%	69%	705%	142%	1446%	292%
Misc (Taseko)	1,626	70	1%	29%	3%	71%	6%	143%	12%	286%
Misc (Chilliwack)	2,697	2,341	41%	47%	93%	107%	185%	214%	371%	428%
Misc (Nahatlatch)	5,179	2,534	21%	43%	39%	79%	77%	158%	145%	296%
Summer	**922,714**	**1,750,333**	**101%**	**53%**	**136%**	**72%**	**238%**	**125%**	**481%**	**253%**
Chilko	408,208	619,623	89%	58%	111%	73%	179%	118%	325%	214%
Late Stuart	37,362	112,189	161%	54%	277%	92%	611%	203%	1455%	484%
Quesnel	242,069	818,828	151%	45%	213%	63%	392%	116%	860%	254%
Stellako	143,256	177,252	97%	78%	120%	97%	186%	151%	308%	249%
Harrison	79,894	15,177	2%	10%	4%	19%	8%	43%	23%	121%
Raft	5,792	3,544	39%	64%	49%	79%	86%	141%	164%	267%
Misc (N. Thomp. Tribs)	406	99	57%	232%	126%	515%	246%	1010%	367%	1505%
Misc (N. Thomp River)	4,661	3,330	32%	45%	84%	118%	139%	195%	299%	419%
Misc (Widgeon)	1,066	291	5%	17%	16%	58%	28%	103%	47%	172%
Late	**2,634,372**	**1,584,836**	**18%**	**29%**	**40%**	**66%**	**70%**	**116%**	**155%**	**258%**
Cultus	14,093	336	2%	77%	3%	116%	4%	149%	11%	446%
Late Shuswap	2,426,849	1,517,302	17%	28%	40%	64%	70%	113%	156%	250%
Portage	14,140	35,548	125%	50%	241%	96%	379%	151%	800%	318%
Weaver	56,676	15,095	19%	70%	42%	156%	75%	282%	182%	683%
Birkenhead	117,719	15,051	12%	92%	20%	153%	26%	203%	49%	382%
Misc. non-Shuswap	4,895	1,504	27%	87%	94%	305%	163%	532%	286%	932%

= or > 125%
< 125%
< 75%
< 25%

Option 3 - Projected Escapement

Option 3- Projected Escapements Relative to Cycle Average and Brood Year

Run timing group / Stocks	Total Escapement Cycle Ave	Total Escapement Brood Year	Comparisons @p10 Cycle Ave	Comparisons @p10 Brood Year	Comparisons @p25 Cycle Ave	Comparisons @p25 Brood Year	Comparisons @p50 Cycle Ave	Comparisons @p50 Brood Year	Comparisons @p75 Cycle Ave	Comparisons @p75 Brood Year
Early Stuart	**35,041**	**48,489**	**53%**	**38%**	**86%**	**62%**	**143%**	**103%**	**234%**	**169%**
Early Summer	**350,379**	**718,390**	**68%**	**33%**	**131%**	**64%**	**271%**	**132%**	**541%**	**264%**
Bowron	6,054	8,406	51%	37%	109%	79%	208%	150%	476%	343%
Upper Barriere	5,835	2,430	9%	21%	21%	49%	41%	99%	93%	222%
Gates	5,065	4,338	135%	157%	225%	263%	427%	498%	830%	969%
Nadina	6,826	177,194	464%	18%	853%	33%	1697%	65%	3351%	129%
Pitt	26,139	13,949	31%	58%	48%	90%	80%	151%	133%	250%
Scotch	140,272	82,192	20%	34%	38%	65%	85%	145%	172%	294%
Seymour	93,614	141,888	46%	31%	82%	54%	172%	114%	324%	214%
Misc (EShu)	57,072	283,048	200%	40%	408%	82%	846%	171%	1735%	350%
Misc (Taseko)	1,626	70	1%	29%	4%	86%	7%	171%	15%	343%
Misc (Chilliwack)	2,697	2,341	46%	53%	111%	128%	222%	256%	445%	513%
Misc (Nahatlatch)	5,179	2,534	24%	49%	46%	95%	93%	189%	174%	355%
Summer	**922,714**	**1,750,333**	**114%**	**60%**	**145%**	**76%**	**285%**	**150%**	**577%**	**304%**
Chilko	408,208	619,623	100%	66%	118%	78%	214%	141%	390%	257%
Late Stuart	37,362	112,189	181%	60%	294%	98%	733%	244%	1746%	581%
Quesnel	242,069	818,828	170%	50%	226%	67%	471%	139%	1032%	305%
Stellako	143,256	177,252	109%	88%	128%	103%	224%	181%	369%	298%
Harrison	79,894	15,177	2%	11%	4%	20%	10%	51%	28%	146%
Raft	5,792	3,544	44%	72%	52%	84%	103%	169%	196%	321%
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Cultus	14,093	336	2%	89%	3%	122%	4%	179%	13%	536%
Late Shuswap	2,426,849	1,517,302	20%	31%	42%	67%	85%	135%	188%	300%
Portage	14,140	35,548	141%	56%	253%	101%	454%	181%	959%	382%
Weaver	56,676	15,095	21%	78%	44%	164%	90%	338%	218%	819%
Birkenhead	117,719	15,051	13%	103%	20%	160%	31%	243%	59%	459%
Misc. non-Shuswap	4,895	1,504	30%	98%	98%	320%	196%	638%	343%	1118%

= or > 125%
< 125%
< 75%
< 25%

Escapement Options - Summary

	p10	p25	p50	p75	p90
Option 1					
Max Allowable Harvest Rate	20%	36%	52%	52%	52%
Allowable Harvest (TF, US, CDN)	470,854	1,689,520	5,097,860	10,650,700	21,875,400
Total projected spawners	1,629,200	2,480,800	3,912,600	8,160,500	16,662,400
Option 2					
Max Allowable Harvest Rate	20%	31%	40%	40%	41%
Allowable Harvest (TF, US, CDN)	470,854	1,434,720	3,952,300	8,253,300	16,931,400
Total projected spawners	1,629,200	2,718,000	4,878,300	10,180,100	20,820,700
Option 3					
Max Allowable Harvest Rate	10%	25%	29%	29%	29%
Allowable Harvest (TF, US, CDN)	237,377	1,173,480	2,806,740	5,856,000	12,024,700
Total projected spawners	1,830,500	2,928,000	5,843,900	12,199,500	24,959,300

- Department is seeking input on 3 escapement options.
- FSC needs expected to be met at p25 & above for Options 1&2, and between the p25 and p50 for Option 3 .
  - Dependent on in-season MA values and Big Bar landslide passage.
- International TAC at p10 return under current assumptions is unlikely.
- Early Stuarts will likely be in a LAER for the entire forecast range.
- Early Summers and Summers harvestable surplus at or above p25 for all options.
- Late run harvestable surplus at or above p25 for Option 3 and at or above p50 for Options 1 & 2.
- Projected spawners to exceed cycle average and/or brood year at p50 return in majority of cases.

Escapement Options - Key Questions

- Given recent returns and uncertainty in the forecast, are there additional actions that should be considered to address returns at the lower end of the forecast?
- Are there additional measures that should be considered for specific stocks within the aggregates that are a concern as far as expected escapements, large or weak?
- Given the return forecast distribution and potential constraints to access allowable harvest, should additional harvest in terminal areas where surpluses are expected be considered?

Questions?

Photo by Maxime Veilleux

EXTRA SLIDES

2022 Fraser Sockeye Forecast Summary

Group	Probability that return will be at/or Below Specified Run Size				
	10%	**25%**	**50%**	**75%**	**90%**
E. Stuart	39,000	63,000	105,000	172,000	268,000
E. Summer	384,000	767,000	1,579,000	3,159,000	5,686,000
Summer	1,239,000	2,231,000	4,403,000	8,904,000	17,468,000
Late	711,000	1,604,000	3,688,000	8,160,000	18,285,000
TOTAL	**2,374,000**	**4,662,000**	**9,775,000**	**20,395,000**	**41,707,000**