2021 Escapement Plan Review of Options and Recommendations

Each year, Fisheries and Oceans Canada proposes two Escapement Plan Options for Fraser Sockeye that are distributed via the Draft Southern BC Salmon IFMP. These two Options are intended to be a starting point for discussions; the final Escapement Plan may differ from these two options. Typically, one Option is more conservative than the other, which is demonstrated in the supplementary tables found below that describe projected harvest and escapement for individual Management Units under both Options.

For the 2021 Escapement plan, the Department will seek input on two escapement options and their components. Option 1 is similar more similar to what was implemented in the brood year and Option 2 is more consistent with what was implemented last year given the poor forecast and concerns regarding BigBar passage. Consistent with other years, the Department will consider all input provided during final escapement plan development. The final Escapement Plan may differ from the two options below.

Draft Escapement Plan Options:

Option 1- Modified Brood Year (2017) Escapement Plan

Management Unit	Harvest Rule Parameters 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	0.69
Early Summer (w/o misc)	10%	60%	100,000	250,000	0.39
Summer (w/o misc)	10%	60%	640,000	1,600,000	0.09
Late (w/o misc)	10-20%	60%	300,000	750,000	0.96

Option 2: Modified 2020 Escapement Plan

Management Unit	Harvest Rule Parameters Low Abundance ER (LAER)	TAM Cap	Lower Fishery Reference Point	Upper Fishery Reference Point	Pre-season pMA @p50
Early Stuart	10%	50%	108,000	216,000	0.69
Early Summer (w/o misc)	10%	50%	100,000	200,000	0.39
Summer (w/o misc)	10%	50%	1,250,000	2,500,000	0.09
Late (w/o misc)	10%	50%	300,000	600,000	0.96

Note: grey cells emphasize changes between Option 1 and Option 2

Escapement Plan Options and Recommendation

Early Stuart

Option	LAER	TAM Cap	Lower Fishery Ref. Point	Upper fishery Ref. Point
1	10%	60%	108,000	270,000
2	10%	50%	108,000	216,000

LAER	Only one LAER Option (10%). **Expect LAER over entire forecast range**. No directed harvest expected.
TAM CAP	Two Options (60% and 50%). **TAM cap does not come into play** given the forecasts are much lower than the lower fishery reference point. No difference between the two options.

MA	Early Stuart migrates **above Big Bar but the MA does not come into play** as there is no TAC expected.
REF POINT	Early Stuarts will not exceed the Lower Reference Point in either Option under any forecast scenario presented (i.e. will be below the Ref. Point for both Options at the p90).
Option 1	**Option 1** for Early Stuarts, **no directed harvest expected**. This group passes Big Bar. A minimum **3 week window closure is expected.**
Option 2	**Option 2** for Early Stuarts, **no directed harvest expected**. This group passes Big Bar. **A minimum 3 week window closure is expected.**
Note: Projected spawners well below cycle average over entire forecast range. These options are essentially identical over the entire forecast range.	

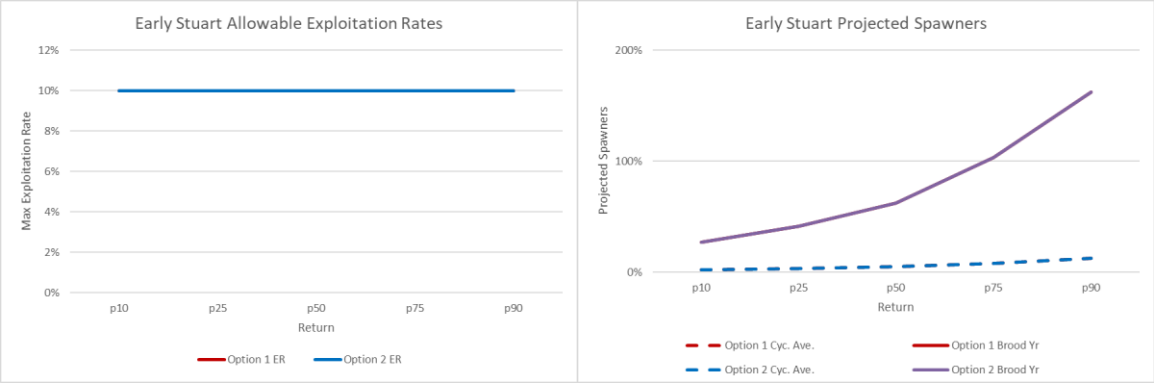


Figure: Escapement plan option allowable exploitation rates and projected spawners. Options 1 and 2 both under 10% LAER across entire forecast range.

Table: Detailed allowable exploitation rates and projected spawners over the forecast range.

Early Stuart	forecast	p10 8,000	p25 12,000	p50 18,000	p75 30,000	p90 47,000
Option 1	Allowable ER	**10%**	**10%**	**10%**	**10%**	**10%**
	Allowable Harvest	**800**	**1,200**	**1,800**	**3,000**	**4,700**
	Projected S (after MA)	4,200	6,400	9,600	15,900	25,000
	Proj. S as % BY S	27%	41%	62%	103%	162%
	Proj. S as % cycle S	2%	3%	5%	8%	12%
Option 2	Allowable ER	**10%**	**10%**	**10%**	**10%**	**10%**
	Allowable Harvest	**800**	**1,200**	**1,800**	**3,000**	**4,700**
	Projected S (after MA)	4,200	6,400	9,600	15,900	25,000
	Proj. S as % BY S	27%	41%	62%	103%	162%
	Proj. S as % cycle S	2%	3%	5%	8%	12%

forecast p-level is below lower fisheries reference point
forecast p-level is between lower & upper fisheries reference point
forecast p-level is above upper fisheries reference point

Early Summer

Option	LAER	TAM Cap	Lower Fishery Ref. Point	Upper fishery Ref. Point
1	10%	60%	100,000	250,000
2	10%	50%	100,000	200,000

LAER	Only one LAER Option (10%) given low return and possible Big Bar passage issues for stocks migrating above Big Bar.
TAM CAP	Two Options (60% and 50%). **TAM cap isn't reached in either option until the p90.**
MA	About **27% of the Early Summers projected to pass Big Bar**. The MA is likely going to be higher than currently assumed due to Big Bar and may impact harvest above the LAER if TAC is identified.
REF POINT	Option 1 is similar to brood year; Option 2 is similar to 2020. **It isn't until runs approach the p90 that the reference point really makes a difference**; at that level Option 2 will have a slightly lower ER than Option 1.
Option 1	Option 1 **may allow some directed harvest at p75 and above while the projected spawners will be above the cycle average.**
Option 2	Option 2 is more conservative; may allow some directed harvest **at the p75 and above** while **spawners are above cycle average**. Very similar to Option 1, though will result in **lower ER at the p90**.
Note: Largest forecast contributors to the Early Summer group are Upper Pitt (37%), Nadina (18%), and Chilliwack (9%). Many stocks throughout the forecast range are projected to **escape at levels well below cycle averages; Bowron and Taseko particularly low**. **Aggregate escapement reaches cycle average above the p50.**	

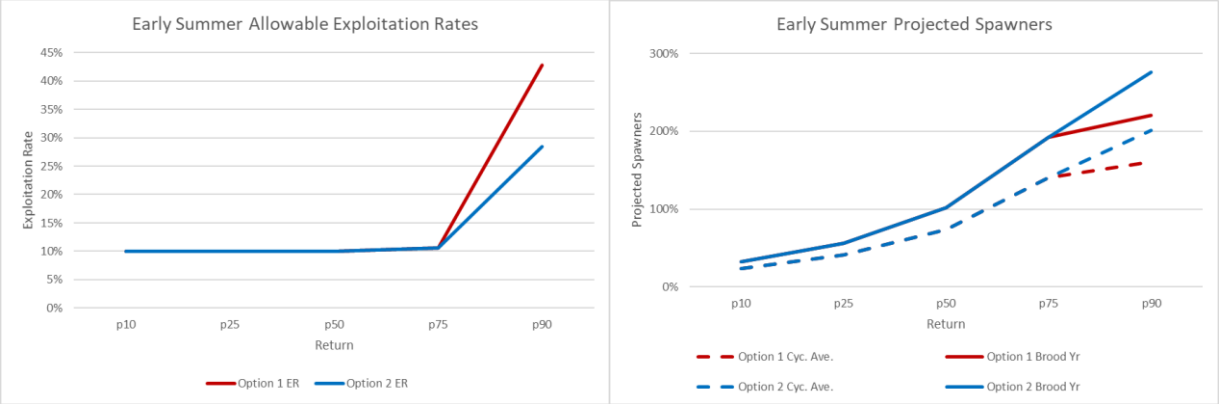


Figure: Escapement plan option allowable exploitation rates and projected spawners.

Table: Detailed allowable exploitation rates and projected spawners over the forecast range.

Early Summer	forecast (incl. misc)	p10 33,430	p25 58,760	p50 107,500	p75 206,900	p90 375,300
Option 1	Allowable ER	**10%**	**10%**	**10%**	**11%**	**43%**
	Allowable Harvest	**3,300**	**5,900**	**10,800**	**21,900**	**160,600**
	Projected S (after MA)	22,000	38,300	69,700	131,900	151,100
	Proj. S as % BY S	32%	56%	102%	193%	221%
	Proj. S as % cycle S	23%	41%	74%	140%	161%
Option 2	*Allowable ER*	**10%**	**10%**	**10%**	**11%**	**28%**
	Allowable Harvest	**3,300**	**5,900**	**10,800**	**21,900**	**107,000**
	Projected S (after MA)	22,000	38,300	69,700	131,900	188,900
	Proj. S as % BY S	32%	56%	102%	193%	276%
	Proj. S as % cycle S	23%	41%	74%	140%	201%
	Proj. S as % cycle S					
	forecast p-level is between lower & upper fisheries reference point					
	forecast p-level is above upper fisheries reference point					

Summers

Option	LAER	TAM Cap	Lower Fishery Ref. Point	Upper fishery Ref. Point
1	10%	60%	640,000	1,600,000
2	10%	50%	1,250,000	2,500,000

LAER	Only one LAER Option (10%) given low return relative to average and Big Bar.
TAM CAP	Two Options (60% and 50%). **TAM cap is not approached for Option 1 until the p75 and for Option 2 not until the p90** given the low forecast returns relative to the upper fishery reference points.
MA	Although unlikely, the MA could be slightly higher than currently assumed due to Big Bar. Severe environmental conditions could result in a higher MA as well.
REF POINT	**Option 1** has a lower set of reference points compared to Option 2; Option 1 projects some harvest **above the p25**, whereas **Option 2 projects some harvest above the p50**.
Option 1	Option 1 will allow **some directed harvest at the p50 while the projected spawners will be below the cycle and brood averages**.
Option 2	This is a **more conservative** option; harvest will not begin until returns above the p50 due to the **higher reference points**. At the p50 projected spawners are less than cycle average but above the brood average.
Note: Projected escapements are **below the cycle average until near the p90 return,** but getting to brood year abundance and above at p75 for Option 1 and p50 for Option 2. About **95% of the forecast Summer return originate from above Big Bar and would have migrated past the slide as juveniles;** the impact of migration past Big Bar as a juvenile on survival is unknown.	

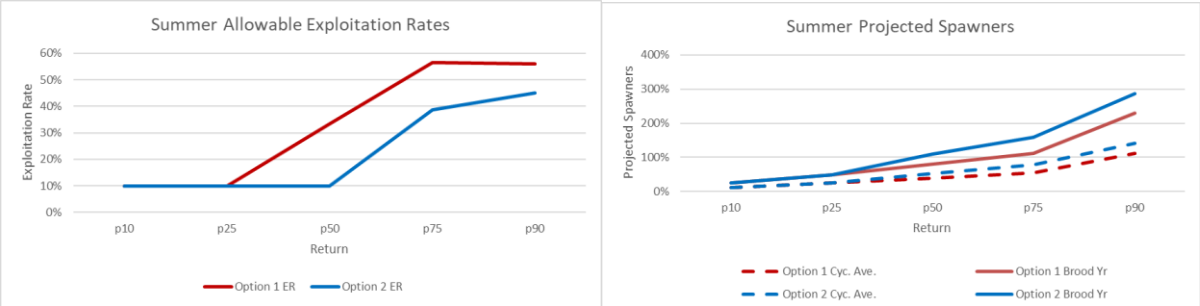


Figure: Escapement plan option allowable exploitation rates and projected spawners.

Table: Detailed allowable exploitation rates and projected spawners over the forecast range.

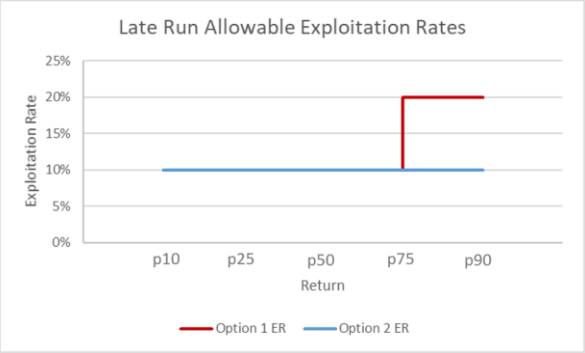
Summer	forecast (incl. misc)	p10 231,890	p25 474,300	p50 1,045,700	p75 2,225,000	p90 4,502,000
Option 1	Allowable ER	**10%**	**10%**	**33%**	**56%**	**56%**
	Allowable Harvest	**23,189**	**47,430**	**348,100**	**1,254,900**	**2,521,100**
	Projected S (after MA)	191,400	391,200	638,900	887,900	1,811,700
	Proj. S as % BY S	24%	50%	81%	113%	230%
	Proj. S as % cycle S	12%	24%	40%	55%	112%
Option 2	Allowable ER	**10%**	**10%**	**10%**	**39%**	**45%**
	Allowable Harvest	**23,189**	**47,430**	**104,570**	**862,500**	**2,025,900**
	Projected S (after MA)	191,400	391,200	861,900	1,247,000	2,264,600
	Proj. S as % BY S	24%	50%	109%	158%	287%
	Proj. S as % cycle S	12%	24%	53%	77%	141%
	Proj. S as % cycle S					
	forecast p-level is between lower & upper fisheries reference point					
	forecast p-level is above upper fisheries reference point					

Lates

Option	LAER	Tam Cap	Lower Fishery Ref. Point	Upper fishery Ref. Point
1	10-20%	60%	300,000	750,000
2	10%	50%	300,000	600,000

LAER	Two LAER Options considered (10-20% and 10%). Option 1 is similar to 2020. Option 2 is more conservative given low expected returns. Option 1 has more sockeye available for incidental harvest flexibility at returns in the upper levels of the forecast. **Cultus is not expected to meet recovery objectives.**
TAM CAP	Two Options (60% and 50%). **TAM cap does not come into play** for either Option given the low returns relative to reference points and the LAER.
MA	**Late run not affected by Big Bar; MA will not change in response to Big Bar impacts.** The MA is likely to have management implications under both Options; pre-season values result in a LAER across the entire forecasted range for both Options.
REF POINT	Option 2 has a slightly lower upper fishery reference point but does not come into play at any forecasted run size.
Option 1	Option 1. **No directed harvest** expected. Option 1 will provide some small amount of **additional flexibility for incidental harvest** over Option 2 (LAER).

	Will only rise to 20% LAER if the Summer and Late Sockeye returns are at p75 or above. Expected spawners will be higher compared to brood above the p50 but will still be well below cycle average.
Option 2	Option 2. **No directed harvest** expected. **LAER likely to be restrictive, particularly if harvest of Summers or Pink Salmon occurs later in the season.**
Note: Above the p50 the aggregate projected spawners are expected to be over brood but well below the cycle average unless returns are near the p90 forecast. Many stocks are projected to return well below cycle and brood year.	



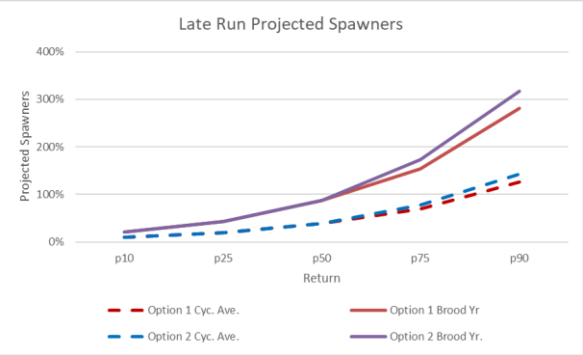


Figure: Escapement plan option allowable exploitation rates and projected spawners.

Table: Detailed allowable exploitation rates and projected spawners over the forecast range.

Lates	forecast (incl. misc)	p10 39,600	p25 79,300	p50 158,900	p75 313,000	p90 572,000
Option 1	Allowable ER	**10%**	**10%**	**10%**	**20%**	**20%**
	Allowable Harvest	**3,960**	**7,930**	**15,890**	**62,600**	**114,400**
	Projected S (after MA)	17,100	35,900	72,800	127,500	234,200
	Proj. S as % BY S	21%	43%	88%	153%	282%
	Proj. S as % cycle S	9%	19%	39%	69%	127%
Option 2	Allowable ER	**10%**	**10%**	**10%**	**10%**	**10%**
	Allowable Harvest	**3,960**	**7,930**	**15,890**	**31,300**	**57,200**
	Projected S (after MA)	17,100	35,900	72,800	143,400	263,500
	Proj. S as % BY S	21%	43%	88%	173%	317%
	Proj. S as % cycle S	9%	19%	39%	78%	143%
	forecast p-level is below lower fisheries reference point					
	forecast p-level is between lower & upper fisheries reference point					
	forecast p-level is above upper fisheries reference point					

Summary:

Table: The difference between harvest and projected escapement between the two (draft) Options over the forecast range.

	p10	p25	p50	p75	p90
Option 1					
Allowable Harvest (TF, US, CDN)	31,249	62,460	376,590	1,342,400	2,800,800
Total projected spawners	234,700	471,800	791,000	1,163,200	2,222,000
Option 2					
Allowable Harvest (TF, US, CDN)	31,249	62,460	133,060	918,700	2,194,800
Total projected spawners	234,700	471,800	1,014,000	1,538,200	2,742,000
Difference (Option 2 - Option 1)					
Allowable Harvest (TF, US, CDN)	-	-	(243,530)	(423,700)	(606,000)
Total projected spawners	-	-	223,000	375,000	520,000

Table: Historical Reference Points TAM and LAER

Management Unit Fishery Reference Points	**Early Stuart**		**Early Summer[a]**		**Summer[a]**		**Late[a] [b]**		*Cultus Sockeye*[b]
	Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper	Exploitation rate limit
2011	108,000	270,000	120,000	300,000	520,000	1,300,000	400,000	1,000,000	20%[c]
2012	52,000	130,000	100,000	250,000	640,000	1,600,000	300,000	750,000	20%[c]
2013	108,000	270,000	100,000	250,000	1,250,000	3,125,000	300,000	750,000	20%[c]
2014	108,000	270,000	180,000	450,000	1,020,000	2,550,000	1,100,000	2,750,000	20%[c]
2015	108,000	270,000	100,000	250,000	1,000,000	2,500,000	300,000	750,000	20%[c]
2016	108,000	270,000	100,000	250,000	640,000	1,600,000	300,000	750,000	20%[c]
2017	**108,000**	**270,000**	**100,000**	**250,000**	**1,250,000**	**3,125,000**	**300,000**	**750,000**	**20%[c]**
2018	108,000	270,000	100,000	250,000	1,250,000	3,125,000	300,000	750,000	20%[c]
2019	108,000	270,000	100,000	250,000	1,000,000	2,500,000	300,000	750,000	20%[c]
2020	108,000	216,000	100,000	200,000	640,000	1,280,000	300,000	600,000	10%c
2021	**108,000**	**270,000**	**100,000**	**250,000**	**640,000**	**1,600,000**	**300,000**	**750,000**	**20%[c]**
2021	**108,000**	**216,000**	**100,000**	**200,000**	**1,250,000**	**2,500,000**	**300,000**	**600,000**	**10%c**

Notes:
a) For Early Summers, Summers, and Lates, the fishery refernce points may be scaled up annually to account for the expected contribution of unforecasted miscellaneous stocks in the MU.
b) A separate management objective is identified for Cultus Lake sockeye in the salmon IFMP and includes an exploitation rate constraint that limits harvest of Late run sockeye.
c) Beginning in 2010, the maximum allowable exploitation rate for Cultus sockeye was permitted to increase above 20% if conditions were expected to permit continued rebuilding of the population based on inseason information on returns of Late run sockeye and potential numbers of effective spawners.

Table: Historical selection of LAERs and TAMs including the brood year:

	LAERs				**TAMs**			
MU/Year	**2017**	2018	2019	2020	**2017**	2018	2019	2020
E. Stuart	**10%**	10%	10%	10%	**60%**	60%	60%	50%
E. Summer	**10%**	20%	20%	10%	**60%**	60%	60%	50%
Summer	**10%**	20%	20%	10%	**60%**	60%	60%	50%
Lates	**20-30%**	20-30%	20%	10-20%	**60%**	60%	60%	50%

Sockeye Window Closure Dates

There are two options to consider for the Sockeye Window Closure; a 3 week option and a 4 week option. The 3 week option is more commonly known as the Early Stuart Window Closure and provides protection to the Early Stuart Sockeye as they migrate to their spawning grounds. The 4 week window closure option will provide additional protection to some early-timed Early Summer stocks (Bowron, Taseko) that have only slightly later migration timing compared to the Early Stuarts.

Areas	**Start Date**	**End Date ~3 weeks**	**End Date ~4 weeks**
Areas 11 to 17, 19 to 21, 121 and 123 to 127	June 19	July 15	July 22
Areas 18 and 29	June 28	July 21	July 27
Steveston to Mission	June 28	July 21	July 27
Mission to Sawmill	June 29	July 22	July 29
Sawmill to Deadman	July 3	July 25	Aug 1
Deadman-Hixon	July 8	Aug 2	Aug 9
Hixon to Prince George	July 11	Aug 2	Aug 9
Prince George to Stuart River	July 13	Aug 4	Aug 11

Seeking Feedback on 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?

Do you recommend a 3 (Early Stuart) or 4 week (Early Stuart and some Early Summer) Sockeye Window Closure?

Key Considerations

Forecast model selection deviated slightly from past forecasts in order to attempt to align more closely with recent productivity

Although the 2021 forecast distribution aligns better with recent productivity estimates the recent productivity observations fall somewhere between the p25 and p50 forecast distribution (but closer to the p25 forecast for some stocks).

Forecast distribution of stocks within the management groups

Forecast and projected spawners of weak and strong stocks within the management groups

Stocks that migrate above Big Bar Slide

Timing overlaps between the stock management groups and other species.

If returns are poor, all management units may be in a LAER for 2021

Rolling window closure to support IFR Steelhead conservation will apply to all FSC fisheries in the Fraser River

FSC fisheries will be planned to maximize use of selective gear types to reduce bycatch where possible

In some cases full harvest targets may not be harvestable due to conservation concerns and management considerations identified in-season