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WCVI Salmon Bulletin
June 28, 2018 Assessment Update
Area 23 Sockeye – Barkley Sound/Alberni Inlet

Catch Estimates:

Total catch estimated to date is 55,847 adult sockeye:

Maanulth Treaty	8,623	8 high capacity vessels fishing, no individual vessels, high? CPUE in Barkley to be confirmed
Tsu-ma-uss	29,799	Weekly catch of 5000 from Tseshaht beach seining over 2 days, 11,392 from gillnets, and 280 from dipnet.
Commercial Gillnet (Area D)	10,785	June 12 catch of 3442, 116 vessels with CPUE of 30. June 19 catch of 7343, 118 vessels with CPUE of 62
Commercial Seine Net (Area B)	0	
Recreational	2,696	Weekly catch of 500 at Papermill dam and 1157 in marine area. Estimate 436 boats this week with a CPUE of 2.65.
Test Fishery	3,944	
Stewardship	0	
TOTAL	**55,847**	

Escapement Estimates:

Escapement through the Sproat River counters totals 54,566 adult sockeye, and 8,488 adult sockeye to Great Central Lake, for a total adult sockeye escapement to the Somass system of 63,054 sockeye adults, through Wednesday, June 27 (the estimates are extrapolated for June 27). About 13% of the observed escapement to date is into Great Central Lake and 87% into Sproat Lake.

Fisheries management of Somass sockeye as a combined stock requires similar productivity among the two populations, which has resulted in an average ratio of 56% GCL and 44% Sproat in the total return.

Below are a series of figures that express 2018 sockeye escapement observations relative to average escapement timing for the period from 2001 to 2017 and target escapement. The combined Somass escapement target is from the sockeye management table for the forecasted run size, and the stock-specific escapement targets are based on the average stock composition of Somass returns (i.e., 56% Great Central Lake and 44% Sproat Lake). Note that escapement timing tends to be more variable than run timing into Alberni Inlet and is influenced by the impact of fisheries and environmental conditions, such as weather, river temperature, or flow. In periods with low immigration into the river and higher pooling in the Inlet, the observed escapement rate may not be a good indicator of overall abundance.

In 2018, there is no evidence of significant delay or pooling of sockeye in Alberni Inlet.

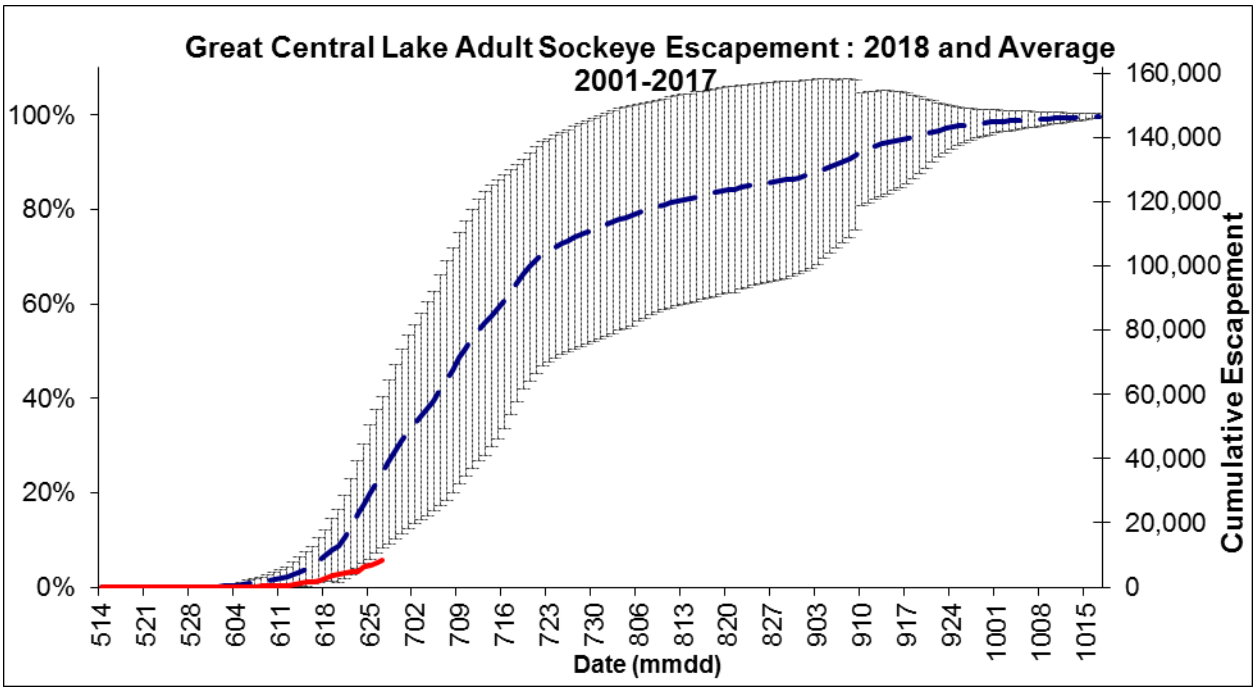


Figure 1. 2018 Great Central Lake sockeye escapement relative to average escapement timing. The total expected escapement is based on a target of 147,000 as assumed in the management table, based on Great Central Lake sockeye on average comprising 56% of the Somass aggregate return.

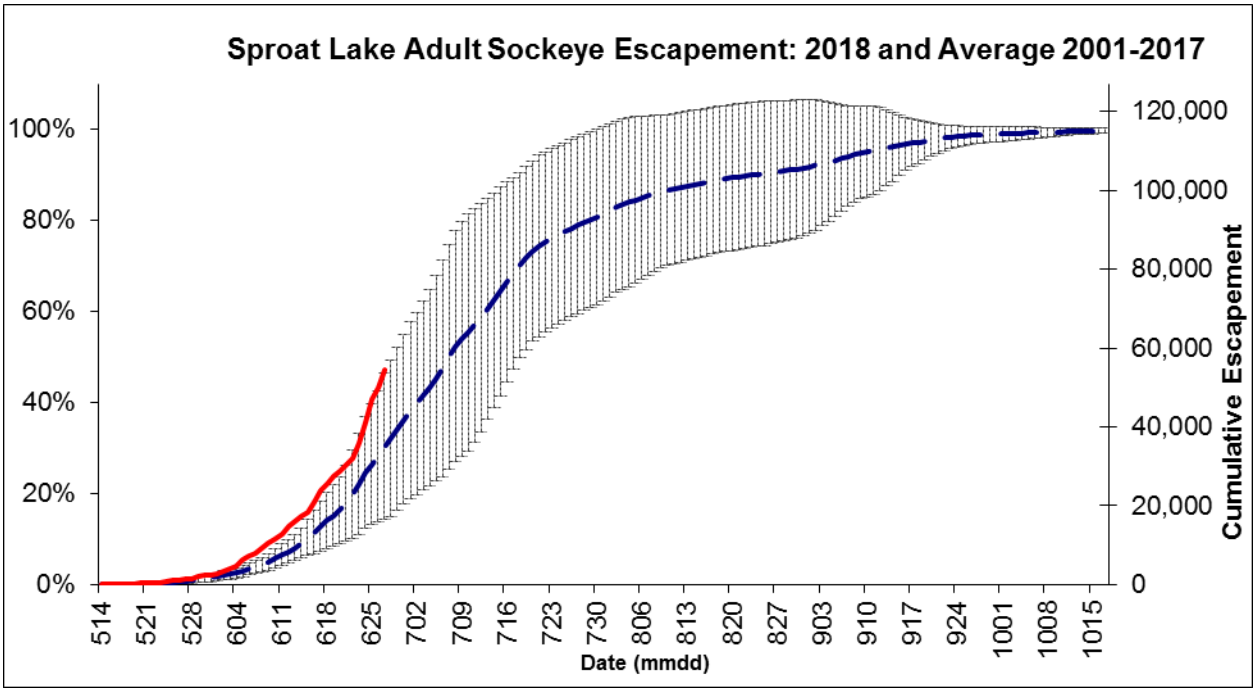


Figure 2. 2018 Sproat Lake sockeye escapement relative to average escapement timing. The total expected escapement is based on a target of 115,500 as assumed in the management table, based on Sproat Lake sockeye on average comprising 44% of the Somass aggregate return.

Test Fishery Observations:

The test fishery operated on June 24, 25, and 26. The estimates of abundance outside 10-Mile Point and inside 10-mile Point were 21,000 fish and 30,000 fish, respectively. The average catch per set was 103 and 337 in the outside and inside areas, respectively. Note that when abundance is low and migration rate is high the uncertainty in the test estimates may increase. The average weight was estimated at 3.7 lbs.

Location	In / Out	Date	Set No	Surface Water Temperature °C	Tide	Sockeye Adult Encounters	Sockeye Jack Encounters	Total Sockeye Encounters	Total Adult Sockeye Kept	Total Jack Sockeye Kept	Area estimate
Follinsbee Creek	In	24-Jun-18	1	18	Flood	226	0	226	224	0	
Lone Tree Point	In	24-Jun-18	2	18	Flood	83	0	83	83	0	**Alberni - Ten Mile =**
China Creek	In	24-Jun-18	3	18	High Slack	34	0	34	34	0	30,000
Underwood Cove	In	24-Jun-18	4	17.5	Ebb	3	0	3	3	0	
Sprout Narrows	In	24-Jun-18	5	17.5	Ebb	111	0	111	111	0	
Sprout Narrows	In	24-Jun-18	5a	17.5	Ebb	234	0	234	234	0	
Sprout Narrows	In	24-Jun-18	5b	17.5	Ebb	106	0	106	106	0	
Hocking Point (Opst)	In	24-Jun-18	6	17.5	Ebb	381	0	381	381	0	
Inside Totals						**1,178**	**0**	**1,178**	**1,176**	**0**	
Ten Mile Point	Out	6/25/2018	1	16	Flood	30	0	30	30	0	
Coleman Creek	Out	6/25/2018	2	15.5	Flood	3	0	3	3	0	
Pocahontas Point	Out	6/25/2018	3	15.5	Flood	150	0	150	150	0	
Sprout Narrows	In	6/25/2018	4	16.5	Flood	630	0	630	630	0	
Sprout Narrows	In	6/25/2018	4a	16.5	Flood	199	0	199	199	0	
Dunsmuir Point	In	6/25/2018	5	16.5	Ebb	3	0	3	3	0	
Follinsbee Creek	In	6/25/2018	6	17	Ebb	13	0	13	13	0	
Outside / Inside Totals						**1,028**	**0**	**1,028**	**1,028**	**0**	
Pill Point	Out	6/26/2018	1	15.5	Ebb	5	0	5	5	0	
Hissin Point	Out	6/26/2018	2	15	Flood	45	0	45	45	0	**Ten Mile - Pill Point =**
Coyote Bluff	Out	6/26/2018	3	15.5	Flood	87	0	87	87	0	20,000 - 22,000
Pocahontas Point	Out	6/26/2018	4	16	Flood	200	0	200	200	0	
Coleman Creek	Out	6/26/2018	5	17	Flood	15	0	15	15	0	
Ten Mile Point	Out	6/26/2018	6	16.5	Flood	43	0	43	43	0	
Sprout Narrows	In	6/26/2018	7	17	High Slack	40	0	40	40	0	
Outside Totals						**435**	**0**	**435**	**435**	**0**	
Stat Week 06/4 Total						**2,641**	**0**	**2,641**	**2,639**	**0**	

Comments from the test boat: The water temperature inside 10-Mile Point was warmer than previous weeks. There was an extreme amount of white jellyfish at Follingsbee Creek on Sunday, but much less at other set locations on the inside. Fish were bright. No evidence of significant pooling or delay.

Environmental Monitoring Results:

- Daily river temperatures over the past week ranged between 15.6 and 20.0^{o}C (average 17.1oC) at the Stamp Falls fishway (Figure 6), and between 18.3 and 23.1^{o}C (average 20.9 oC) at the Sproat River fishway (Figure 7).
- Over the past 4 years (2014-2017) daily river temperatures from June 19-26 ranged between 14.3 and 23.2 ^{o}C (average 17.8 oC) at the Stamp Falls fishway and between 16.5 and 25.3 ^{o}C (average 19.8 ^{o}C) at the Sproat River fishway.
- Alberni Inlet surface temperatures inside 10-Mile Point were measured between 16.5 and 18.0 ^{o}C by the test boat on June 24 and 25. The sea surface temperatures measured outside 10-Mile Point were between 15.0 ^{o}C and 17.0 ^{o}C on June 25 and 26.

Biological Monitoring Results:

So far, the overall estimated age composition of the run (see table below) is very high to age 4_2 fish as expected.

DNA samples are available from three weeks of test fishing, two weeks of commercial gillnet fishing (June 12 and 19), and the Maa-nulth fishery from June 10. The results are tabulated below. The portion of Henderson sockeye observed remains not significantly different than zero. As expected the relative portions of Great Central Lake sockeye are low across all samples. The portion of Great Central Lake sockeye estimated from test boat samples has increased in the outside area since last week but it has decreased in the inside area. The portion Great Central Lake increased in the second Area D gillnet opening. Forecast % Great Central is 21% and Sproat is 79%.

	2018		2018		2018		2018		2018		2018		2018		2018		
	161		162		163		163		169		170		170		176-177		175-176		
	gill		seine test		seine test		gill		seine test		seine test		gill		seine test		seine test		
	BarkleySnd		BarkleySnd		BarkleySnd		BarkleySnd		BarkleySnd		BarkleySnd		BarkleySnd		BarkleySnd		BarkleySnd		
	FN (Maa-nulth)		W-OUTSIDE		W-INSIDE		Commercial		W-OUTSIDE		W-INSIDE		Commercial		W-OUTSIDE		W-INSIDE		
	10-Jun		11-Jun		12-Jun		12-Jun		18-Jun		19-Jun		19-Jun		June25-June26		June24-June25		
	20(0)		96(0)		96(0)		94(0)		96(0)		96(0)		100(0)		144(0)		141(0)		
Stock	Estimate	SD	Estimate	SD	Estimate	SD	Estimate	SD	Estimate	SD	Estimate	SD	Estimate	SD	Estimate	SD	Estimate	SD	Average
Great_Central	20.7	(9.0)	6.8	(2.9)	16.3	(4.1)	10.4	(3.5)	15.5	(4.3)	26.5	(4.9)	26.4	(4.7)	20.7	(3.6)	14.2	(3.3)	17.5
Henderson	0.0	(2.6)	0.0	(0.6)	0.0	(0.6)	0.0	(0.5)	0.6	(1.2)	0.0	(0.6)	0.0	(0.6)	0.8	(0.8)	0.0	(0.5)	
Sproat	79.3	(9.2)	93.2	(3.0)	83.7	(4.1)	89.6	(3.5)	83.9	(4.3)	73.5	(4.9)	73.6	(4.7)	78.5	(3.7)	85.8	(3.3)	

Accounting to Date:

The following tables summarize the accounting for Somass sockeye to June 27, 2018. Based on the stock-specific accounting to date there has been a harvest rate of approximately 31% on the Sproat Lake stock and a harvest rate of 34% on the Great Central Lake stock.

Parameter		Observed	Expected	Target
Escapement	Sproat	54,566 (87%)	64% (June 27)	115,500
	Great Central	8,488 (13%)	36% (June 27)	147,000
	TOTAL	**63,054**		**262,500**
Catch	Sproat	46,264	-	-
	Great Central	9518	-	-
	TOTAL	**55,782**		
Stock Composition	Sproat	84%	79% (preseason forecast)	44%
	Great Central	16%	21% (preseason forecast)	56%
Harvest Rate		31%		25%

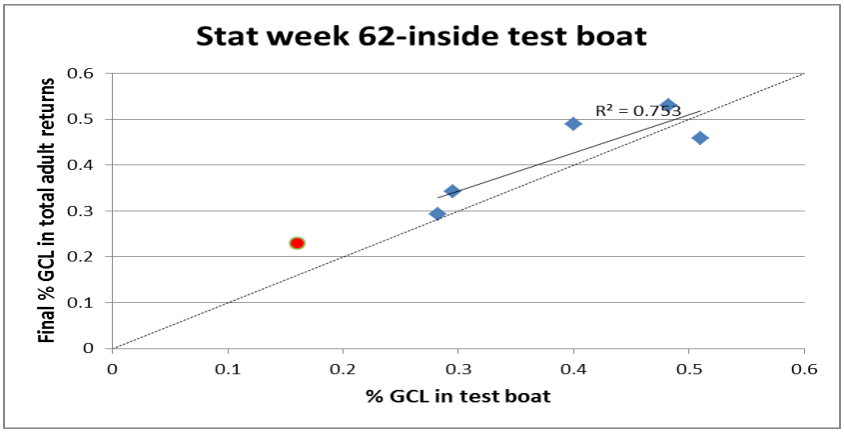
Stock	Catch	Esc	Catch + Esc	Catch + Esc Stock comp (%)	Test boat - inside	Test boat-outside	In-river estimate	Total Accounting	Total accounting Stock comp (%)	Harvest rate
SPR	46,264	54,566	100,830	85%	25,740	16,485	7,868	150,923	84%	31%
GCL	9,518	8,488	18,005	15%	4,260	4,347	1,366	27,978	16%	34%
HED	65	-	65	-	0	168				
TOTAL	**55,847**	**63,054**	**118,901**	**100%**	**30,000**	**21,000**	**9,234**	**178,901**	**100%**	**31%**

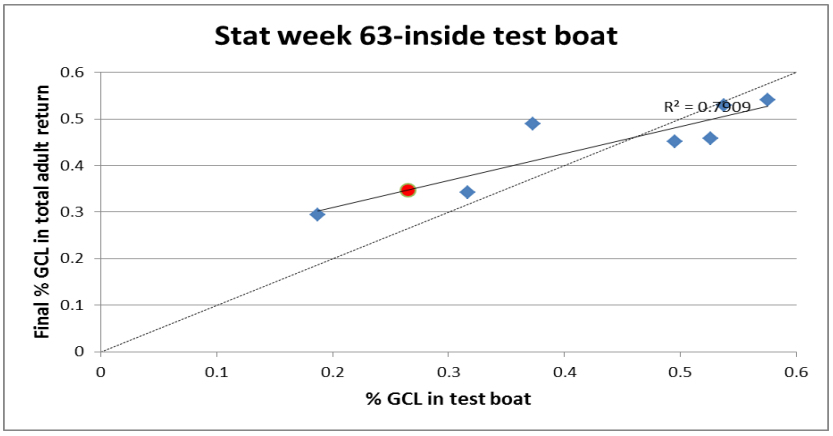
Parameter		Observed	Preseason Forecast	Target
Somass Age Composition (Adults)	4_2	87%	81%	-
	5_2	6%	15%	-
	5_3	4%	3%	-
	6_3	3%	1%	-
Somass Run Size Forecast		Pre-season management forecast: 350,000-500,000 (low)		

SOMASS (GCL + SPL)			
	TOTAL ADULT CATCH=	55,781	
	TOTAL ADULT ESCAPEMENT=	**63,054**	
	TOTAL CATCH PLUS ESCAPEMENT=	118,834	
	Abundance Estimates:	Estimate	Lower CI
	inner Alberni inlet estimate=	30,000	15,000
	outer Alberni Inlet estimate=	20,832	10,416
		50,832	25,416
	lower river	9,234	-
	TOTAL ACCOUNTING=	**178,900**	144,250
	Harvest rate	**31%**	**39%**

Predicting Stock Composition from the test fishery:

Information from the test fishery in June appears to give a good indication of the relative proportions of Great Central and Sproat Lake at the end of the run (see below). Based on this relationship the percent Great Central in the final Somass adult return may range between 23 and 35%.





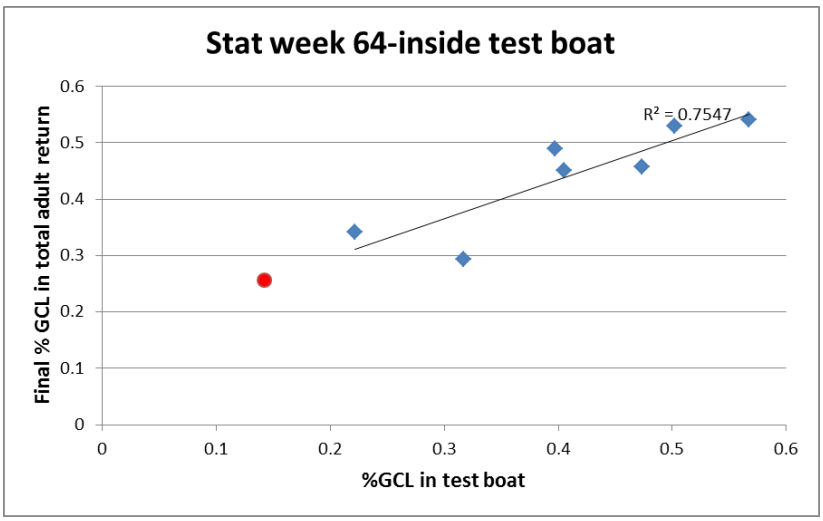


Figure 4. The relationship between the percent composition of Great Central lake sockeye in the inside test boat samples in June and the percent composition of Great Central Lake sockeye in total adult returns.

Area D Gillnet Catch:

Information from the Area D gillnet catch in Area 23 in the third and fourth weeks of June appear to give a good indication of the final Somass sockeye adult return (see below). Based on this relationship the Somass sockeye adult return in 2018 would be forecast at approximately 224,000.

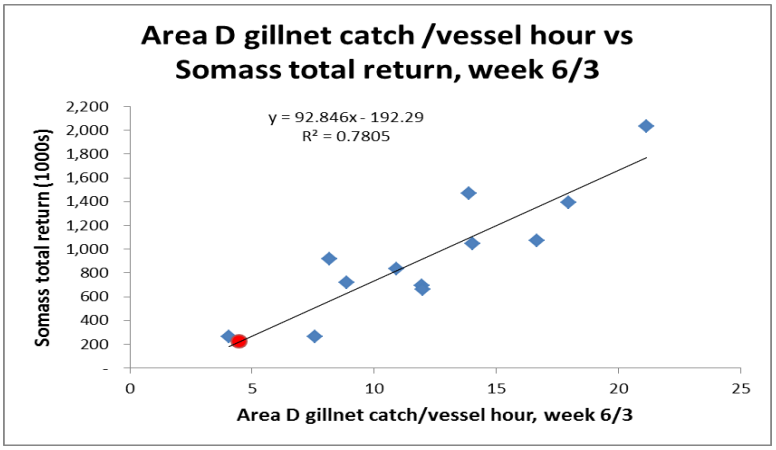


Figure 5. The relationship between Area D gillnet catch /vessel hour and Somass total return in the third week of June.

Run Reforecast:

TOTAL EXPECTED IF					
Timing	50% date	% of run to date	**GCL re-forecast**	**Sproat re-forecast**	**Somass re-forecast**
EARLY	28-Jun	48.9%	57,229	308,708	365,937
AVG	01-Jul	40.0%	69,940	377,275	447,215
LATE	06-Jul	31.8%	87,848	473,877	561,725

GCL Escapement under different run timing		
		Max possible esc (minus catch to date)
EARLY	28-Jun	47,711
AVG	01-Jul	60,422
LATE	06-Jul	78,330

Considerations:

- Management forecasts are based on the range of indicators, including the preseason forecast of 21% GCL, the June Area D fishery prediction of 224,000 Somass aggregate, the test fishery indicator of low proportion GCL between 23% and 35%, and the DNA information showing an average of 17% GCL in the early fisheries.
- Until we see the peak of the run we cannot specify which run timing curve is better to use. When consider total accounting of Somass aggregate assuming an early or average run-timing predicts a run-size of 366,000 or 447,000, respectively. A late run-timing predicts a run-size of 562,000.
- At this time our advice is to remain at a 350,000 run size. Management using the Somass aggregate is not recommended due to the current forecast of a low return of GCL stock.
- The preseason agreed minimum escapement for Great Central Lake was about 60,000 sockeye, based on long term WSP biological benchmarks shown below, production-oriented management, and the need to get back to management of Somass as an aggregate.

Stock	Lower WSP benchmark	Upper WSP benchmark
GCL	29,290	91,640
SPL	12,060	65,570

- With early run-timing applied to GCL total accounting to date the total GCL return is predicted to be 57,000, under average run-timing 70,000, or under late run-timing 88,000. All of these predicted GCL returns are below the upper biological benchmark for GCL
- When we account for catch to date of GCL the maximum possible escapement would be 48,000 (assume early run-timing), 60,400 (assume average run-timing) or 78,000 (assume late run-timing).
- The preseason agreed total allowable catch was 70,000 sockeye under 350,000 aggregate run size with a harvest rate below 25%. Catch to date is about 56,000.

Sources of Uncertainty:

There are several sources of uncertainty in the in-season assessment and management process:

One of the key sources of uncertainty is the test fishery assessment of the abundance of fish in Alberni Inlet, which is based on a subjective assessment by an experienced seine captain. Although this index has been reliable over the years, as source of uncertainty it becomes more of an issue when a large portion of the accounting is based on this number relative to more certain catch and escapement numbers. Both the overall accounting and harvest rate estimate rely on this assessment.

In addition to the overall accounting, another source of uncertainty with the in-season forecast is the presumed run timing. The in-season forecast expands the total accounting for the portion of the return that is normally accounted for by the date. However, run timing can vary significantly from year to year depending on factors such as environmental conditions and the age composition of the run. For this reason, the run size is not adjusted until the end of the June when about half the run has normally been accounted for.

Another source of uncertainty is the effect of adverse environmental conditions on spawners. The escapement is assessed at the Sproat and Stamp fishways prior to spawning. However, fish that hold in Alberni Inlet for prolonged periods and/or are subject to very high temperatures during their river migration may not spawn successfully.

BACKGROUND INFORMATION

RUN SIZE EXPECTATIONS:

Somass sockeye:

For fishery management purposes, the recommended management forecast for 2018 is precautionary and in the "low" zone for early season harvest management; corresponding to an expected return of between 350,000 to 500,000 adult fish. The forecast is revised in-season (see above). An expected run-size of 350,000 results in a TAC for Somass sockeye of 82,500.

The expected Somass sockeye stock composition is about 21% Great Central and 79% Sproat Sockeye. The expected Somass sockeye age composition is about 81%, 15%, 3%, and 1% of age 4_2, 5_2, 5_3 and 6_3 adults, respectively.

Model forecasts for the 2018 Somass sockeye return are: 130,000 (SStM); 575,000 (SSM), 234,000 (SEPB), 600,000 (CLI), and 494,000 (Sibling). The predicted Somass sockeye returns from each forecast model are further broken down into stock-specific forecasts.

The age of return for sockeye to Sproat and Great Central lakes ranges from 3 to 6 years with age 4 and 5 fish predominant. Sockeye produced from brood years 2012 to 2015 will return in 2018, with 2013 and 2014 being the main contributing brood years. There are two key points to consider for these contributing brood years.

Point 1: Low returns from the 2013 brood year (age 3 and age 4 returns so far), results in expected low returns of 5 year olds in 2018.

Point 2: The returns so far from both the 2013 and 2014 brood years had a low proportion of Great Central Lake stock (23%, and 8%, respectively).

Henderson sockeye:

Statistical forecast models for Henderson sockeye are currently not generated due to data limitations. An outlook is produced based on spawner and smolt abundance for the contributing brood years and trends in indicators related to marine survival rate. Based on these observations, we recommend a management outlook for Henderson sockeye in the "very low zone" for harvest management, corresponding to an expected return of less than 15,000 adult fish.

For planning purpose, a management forecast of **15,000** results in a TAC for Henderson sockeye of **2250**. This TAC may be revised in-season.

IN-SEASON ASSESSMENT:

Test Fishery:

The purpose of the test fishery is to estimate abundance of sockeye in the Alberni Canal, to collect biological specimens for assessment (age and stock composition and parasite load) and to provide observations of fish behavior and condition. The test fishery uses a combination of hydro-acoustic soundings and seine sets to determine the abundance of sockeye in Alberni Inlet. The boat follows a systematic route sounding throughout the canal by zigzagging in transects from one side to another. Choice of set location is dependent on either identifiable sockeye schools or typical holding areas. For both the area 'inside' 10-mile point and for the area 'outside' 10-mile point, an average catch per set is determined. These numbers are then expanded to total abundance for each area given scalars to account for the quality of sets/fishing conditions and also a scalar approximating the number of similar sets that are required to fish the entire area. There is considerable judgment and subjectivity involved in the determination of the abundance estimate; however over the years this information has been an important component of the in-season re-forecast method.

Catch Monitoring:

All harvesters in the Maanulth First Nation, Tsu-ma-uss Economic Opportunity, Area B Seine and Area D Gillnet fisheries are required to report catch and total catch is estimated from the sum of reports. Verification programs are in place for the Maanulth, Tsu-mas-uss Economic Opportunity and Area D

fisheries. All Area B catch is validated. Validation and verification information may be used to revise catch estimates generated from individual harvester reports. The recreational catch is monitored and estimated through the WCVI Creel Survey program. Catch is estimated from the average catch-per-unit-effort (CPUE) and effort (boat-days).

Escapement Monitoring:

Video monitoring systems were installed at the Sproat fishway and Stamp Falls fishway in late April. Fish passing through both fishways are recorded 24 hours a day (i.e., tunnels are lit up at night) using a video monitoring system. Trained and experienced observers review a subsample of the video from both sites in order to generate estimates of escapement to each system. Biological samples of sockeye salmon are collected 2-3 times/week from fish at both counting sites to estimate the age and sex composition of escapement. The age results from biosampling are applied to total escapement numbers in order to estimate daily adult and jack escapement numbers. Escapement estimates reported here are preliminary as not all video has been sampled and reviewed.

Escapement for Henderson Lake sockeye will be estimated through a mark-resight program conducted on Clemens Creek spawning ground s in September and October. The Uchucklesaht First Nation is working on developing an in-season monitoring program at the outlet to Henderson Lake.

Biological Monitoring:

Fish are sampled for age composition from all fisheries and escapement. Fish are sampled for stock composition (estimated through DNA analysis) from the test fishery and commercial fisheries.

Environmental Monitoring:

Other information is considered such as river or Inlet conditions that may impact run and escapement timing. River temperature, discharge and barometric pressure are monitored remotely at Stamp Falls and the Sproat fishway. As river temperatures increase, the migration rate from Alberni Inlet to the Somass River system slows down resulting in lower daily escapement rates and often higher “catchability” of fish in Alberni Inlet fisheries.

Fishery Indices:

In addition to information gathered through the test fishery and catch and escapement monitoring, there is a strong relationship between the commercial gillnet CPUE in *late* June and final run size. One objective of the “standardized early season fishing regime” developed in 2012 is to plan more consistent early-season fisheries to gain assessment information. Additional monitoring data (e.g. effort, average CPUE) gathered through verification programs will support this initiative.

Run Size Estimation:

In order to forecast the return of Somass sockeye in-season the two most pertinent questions are: What is the abundance accounted for to date? Is the run on-time, early or late? In the simplest form, the run reforecast is the total abundance accounted for divided by the portion expecting to return by the reforecast date. However, when considering these questions, uncertainty in the data must be accounted for. If most of the abundance is accounted for in either catch or escapement, then the data are fairly certain. On the other hand, if the bulk of the abundance is associated with test fishery estimates the data are more uncertain. In the latter case, a more precautionary approach is warranted before major upgrades or downgrades in the forecast. The observed age and stock composition of the return provides an indication of run timing and abundance; particularly when compared to pre-season expectations and long-term average observations. As well, environmental conditions that may affect “catchability” need to be considered. For example, extended holding of fish in Alberni Inlet due to inhospitable river conditions may create the impression of abundance when in fact new migration is insignificant.

Attachment 1. Somass management table.

Somass Run Size	Escapement Goal	Harvest Rate	Test Fish	Total TAC	Maanulth Treaty	Recreational (expected)	Commercial TAC	Comm Stewardship	Tsumass TAC	Area B Seine	Area D Gillnet
200,000	170,000	15%	5,000	25,000	5,000	4,000	16,000		12,800	-	3,200
250,000	200,000	20%	5,000	45,000	9,000	10,000	26,000		20,800	-	5,200
300,000	235,000	22%	5,000	60,000	11,000	15,000	34,000		27,200	-	6,800
350,000	262,500	25%	5,000	82,500	13,250	21,000	48,250		28,950	11,580	7,720
400,000	283,333	29%	8,000	108,667	14,179	28,000	66,487		33,244	19,946	13,297
450,000	304,167	32%	8,000	137,833	15,016	36,000	86,817		41,672	27,087	18,058
500,000	325,000	35%	8,000	167,000	15,853	45,000	106,147	5,000	45,516	33,378	22,252
550,000	331,250	40%	8,000	210,750	17,109	49,500	144,141	10,000	60,363	44,267	29,511
600,000	337,500	44%	8,000	254,500	18,365	54,000	182,135	10,000	65,411	64,034	42,690
650,000	343,750	47%	8,000	298,250	19,620	58,500	220,130	10,000	79,849	78,168	52,112
700,000	350,000	50%	8,000	342,000	20,876	63,000	258,124	10,000	81,881	99,746	66,497
750,000	358,333	52%	8,000	383,667	22,072	67,500	294,095	10,000	93,751	114,206	76,137
800,000	366,667	54%	8,000	425,333	22,886	72,000	330,447	10,000	105,748	128,820	85,880
850,000	375,000	56%	8,000	467,000	22,886	76,500	367,614	10,000	118,013	143,761	95,841
900,000	383,333	57%	8,000	508,667	22,886	81,000	404,781	10,000	130,278	158,702	105,801
950,000	391,667	59%	8,000	550,333	22,886	85,500	441,947	10,000	142,543	173,643	115,762
1,000,000	400,000	60%	8,000	592,000	22,886	90,000	479,114	10,000	145,425	194,213	129,475
1,050,000	400,833	62%	8,000	641,167	22,886	94,500	523,781	15,000	147,546	216,741	144,494
1,100,000	401,667	63%	8,000	690,333	22,886	99,000	568,447	15,000	149,431	242,410	161,607
1,150,000	402,500	65%	8,000	739,500	22,886	100,000	616,614	15,000	162,436	263,507	175,671
1,200,000	409,286	66%	8,000	782,714	22,886	100,000	659,828	15,000	174,104	282,435	188,290
1,250,000	416,071	67%	8,000	825,929	22,886	100,000	703,043	15,000	185,771	301,363	200,908
1,300,000	422,857	67%	8,000	869,143	22,886	100,000	746,257	15,000	197,439	320,291	213,527
1,350,000	429,643	68%	8,000	912,357	22,886	100,000	789,471	15,000	209,107	339,218	226,146
1,400,000	436,429	69%	8,000	955,571	22,886	100,000	832,685	15,000	220,775	358,146	238,764
1,450,000	443,214	69%	8,000	998,786	22,886	100,000	875,900	15,000	232,443	377,074	251,383
1,500,000	450,000	70%	8,000	1,042,000	22,886	100,000	919,114	15,000	244,111	396,002	264,001
1,550,000	465,000	70%	8,000	1,077,000	22,886	100,000	954,114	15,000	253,561	411,332	274,221
1,600,000	480,000	70%	8,000	1,112,000	22,886	100,000	989,114	15,000	263,011	426,662	284,441
1,650,000	495,000	70%	8,000	1,147,000	22,886	100,000	1,024,114	15,000	272,461	441,992	294,661
1,700,000	510,000	70%	8,000	1,182,000	22,886	100,000	1,059,114	15,000	281,911	457,322	304,881
1,750,000	525,000	70%	8,000	1,217,000	22,886	100,000	1,094,114	15,000	291,361	472,652	315,101
1,800,000	540,000	70%	8,000	1,252,000	22,886	100,000	1,129,114	15,000	300,811	487,982	325,321

Attachment 2. Henderson Management Table

Henderson Run Size	Escapement Goal	Harvest Rate	Total TAC	Maanulth Treaty	Remaining TAC	Other Fisheries	Maanulth Harvest Agreement
5,000	4,250	15%	750	201	549	439	110
10,000	8,500	15%	1,500	403	1,097	878	219
15,000	12,750	15%	2,250	604	1,646	1,317	329
20,000	16,375	18%	3,625	973	2,652	2,121	530
25,000	20,000	20%	5,000	1,343	3,658	2,926	732
35,000	25,750	26%	9,250	2,484	6,766	5,413	1,353
45,000	31,500	30%	13,500	3,625	9,875	7,900	1,975
52,500	33,750	36%	18,750	5,034	13,716	10,973	2,743
60,000	36,000	40%	24,000	6,444	17,556	14,045	3,511
67,500	36,750	46%	30,750	8,256	22,494	17,995	4,499
75,000	37,500	50%	37,500	10,069	27,431	21,945	5,486
90,000	45,000	50%	45,000	12,083	32,918	26,334	6,584
105,000	52,500	50%	52,500	14,096	38,404	30,723	7,681
120,000	60,000	50%	60,000	16,110	43,890	35,112	8,778
135,000	67,500	50%	67,500	18,124	49,376	39,501	9,875
150,000	75,000	50%	75,000	20,138	54,863	43,890	10,973

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