

2017 Fraser River Sockeye and Pink Pre-Season Run Size Forecasts



Fisheries and Oceans
Canada

Pêches et Océans
Canada

B. MacDonald & *S. Grant
Forum on Conservation & Harvest Planning
for Fraser Salmon
March 7 2017

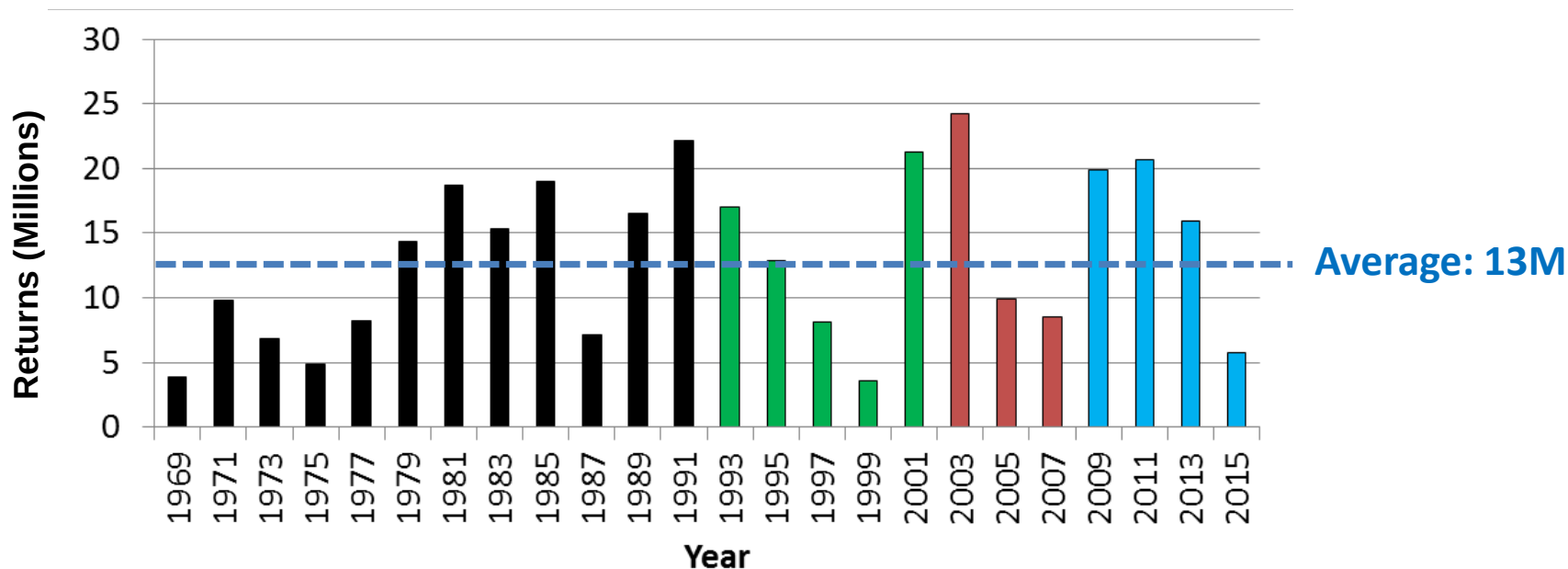
Canadian Science Advisory Secretariat Review: Dec 14 2017
Approved by the DFO Pacific Regional Director of Science: Feb 9 2017
Reviewers:

Name	Affiliation
Mike Lapointe	Pacific Salmon Commission
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Aaron Dufault	Washington Department of Fish and Wildlife
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2017 Fraser Pink Forecast



Fraser River Pinks: Returns



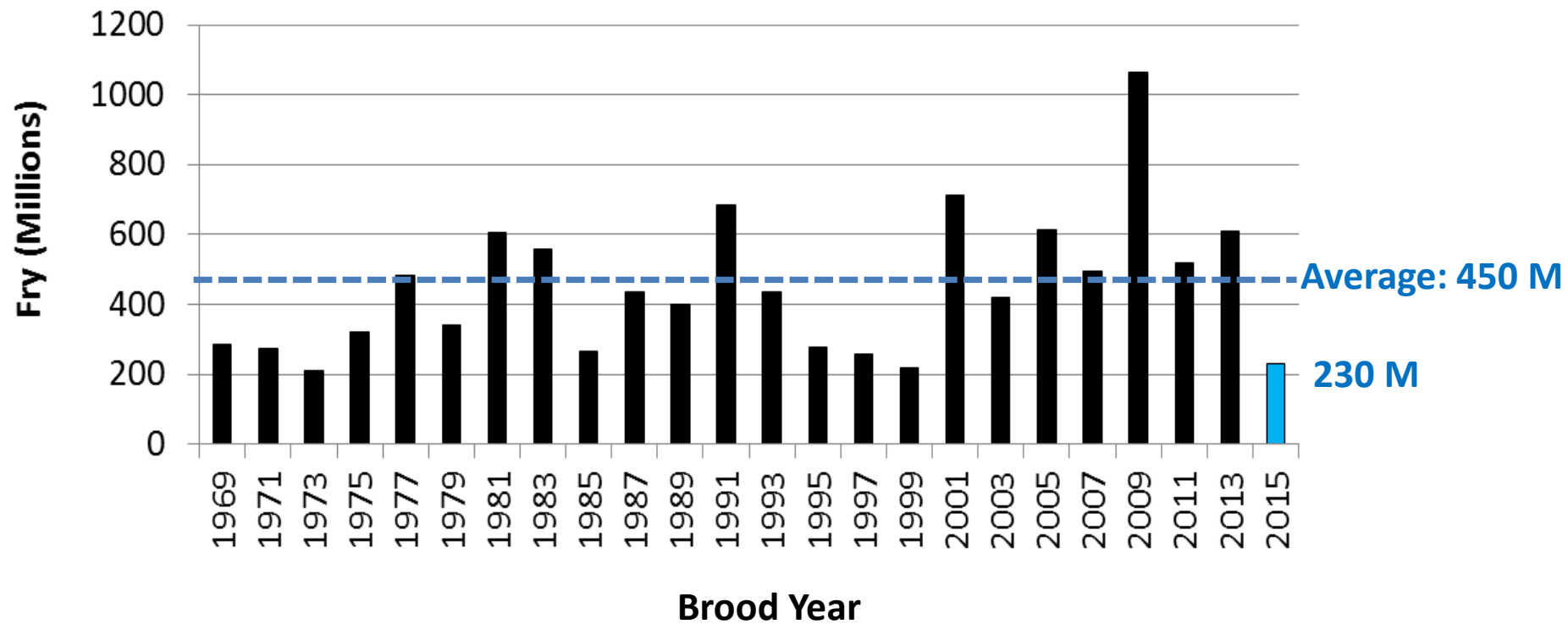
System-Specific Programs

System-Wide MR

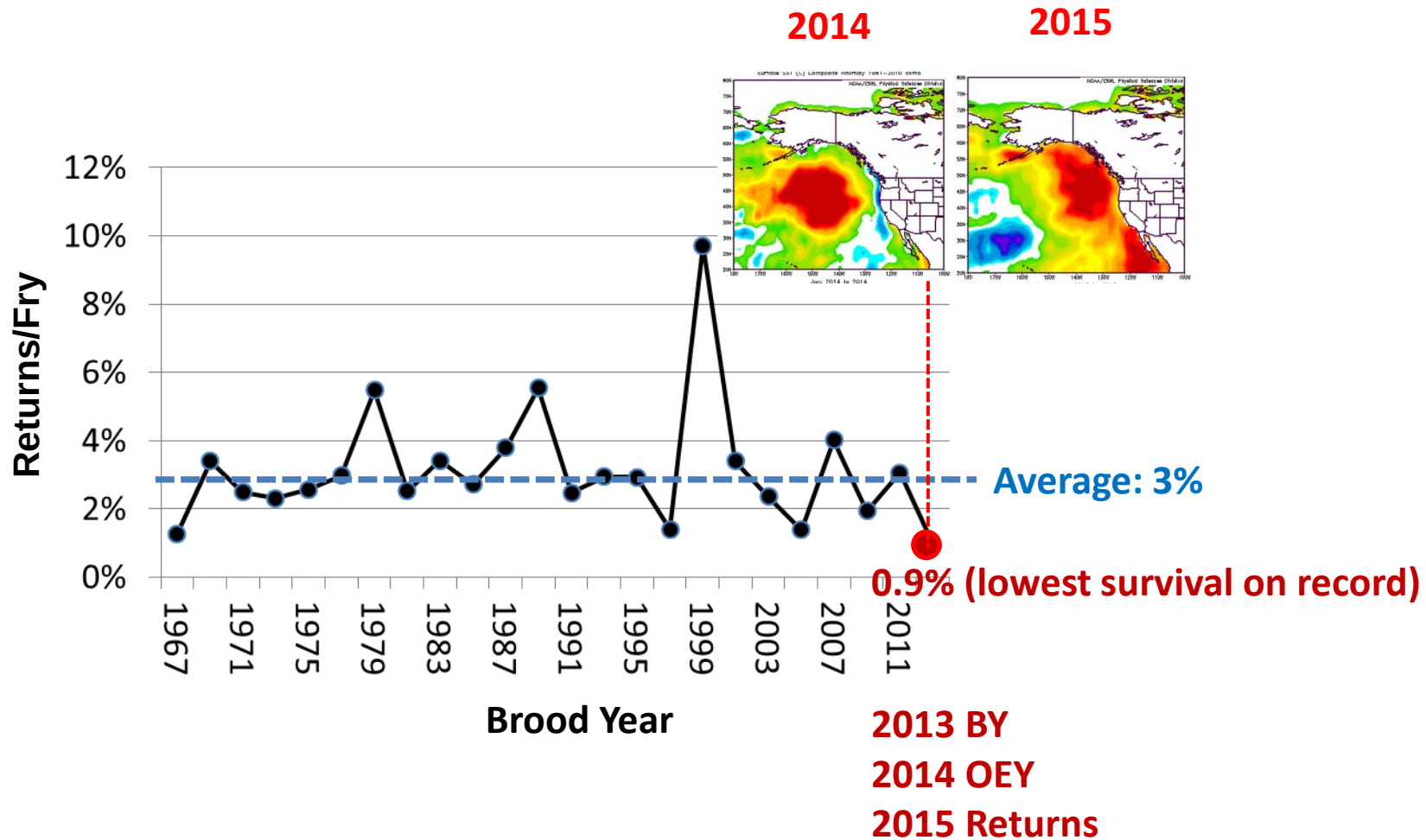
Test fishery

Mission Hydroacoustics

Fraser River Pinks Fry Abundance



Fraser River Pinks Survival

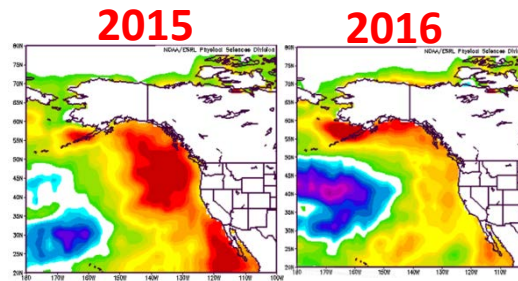


2017 Fraser Pink Forecasts

Fraser River Pink Salmon	Rank	Return Forecast				
		10%	25%	50%	75%	90%
Power (fry)-SSS	1	4,447,000	6,177,000	8,693,000	12,353,000	16,682,000
Power (fry)	3	3,862,000	5,303,000	7,763,000	10,985,000	15,194,000

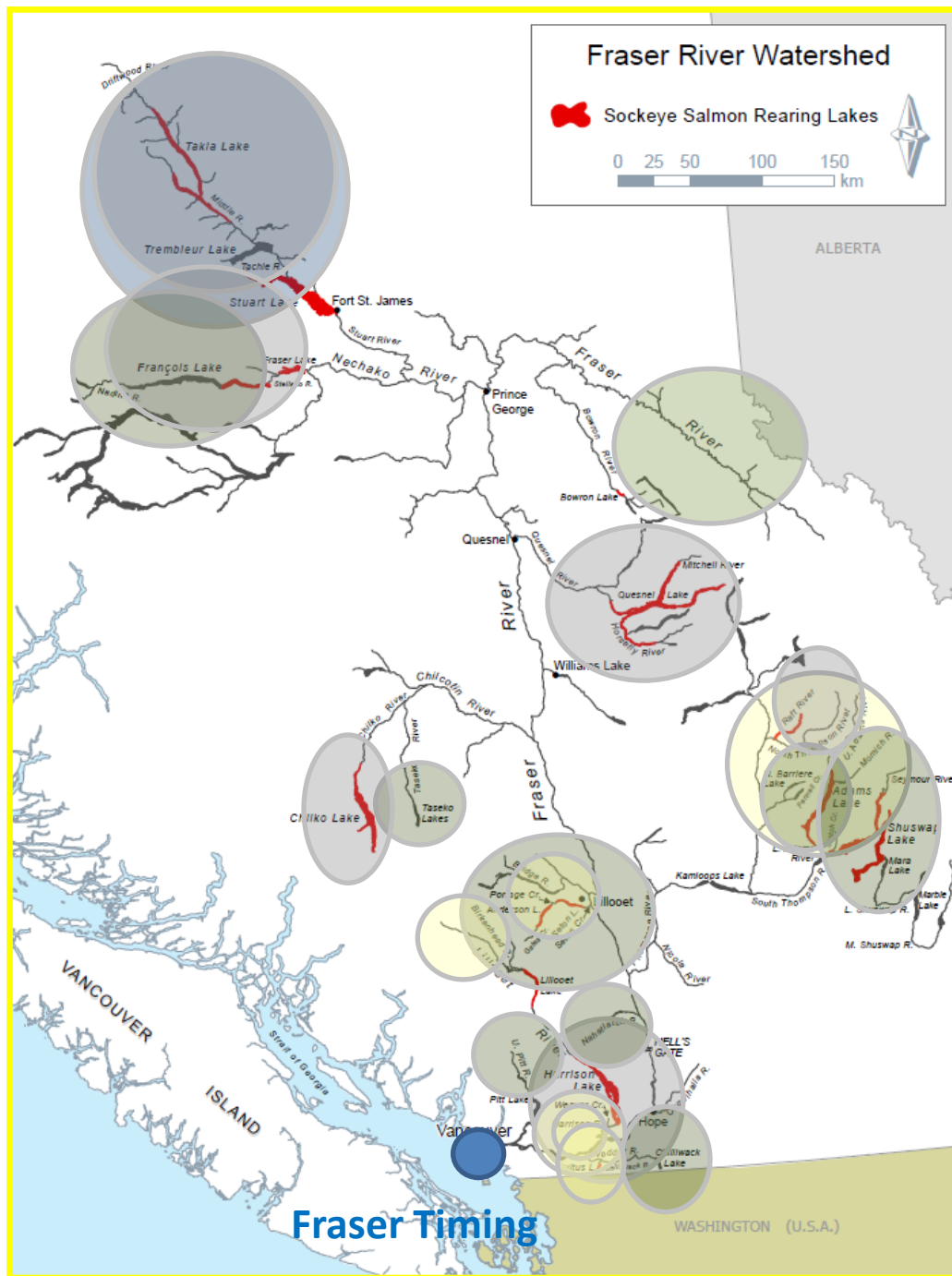
Average: 12.4M

Power (fry)-SSS: 3.8% (Average: 3%)



2017 Fraser Sockeye Forecast





Early Stuart Early Stuart

Late –June
to Early-July

Early Summer

Bowron
Fennell
Gates
Nadina
Pitt
Scotch
Seymour
Early Shuswap Miscellaneous
Taseko Miscellaneous**
Chilliwack miscellaneous
Nahatlach miscellaneous

Late-July to
Early-Aug

Summer

Chilko
Late Stuart
Quesnel
Stellako
Raft
Harrison
North Thompson River Miscellaneous
North Thompson Tributaries Miscellaneous
Widgeon miscellaneous

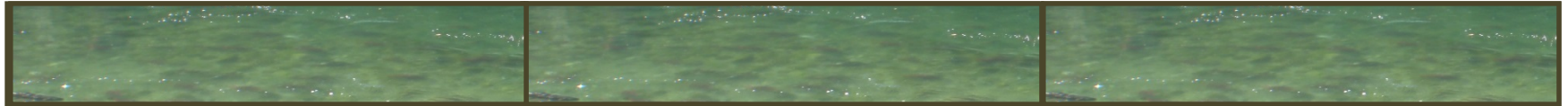
Early-to-
Mid-Aug.

Late Cultus

Late Shuswap (Adams River)
Portage
Weaver
Birkenhead
Non-Shuswap miscellaneous

Mid-Aug.

Factors influencing total returns



Brood Year Escapement



Age of Maturity

Most Fraser Sockeye Mature as Four Year Olds

**Marine
2 Winters**

May-June 2015



June-October 2015



First Winter 2016



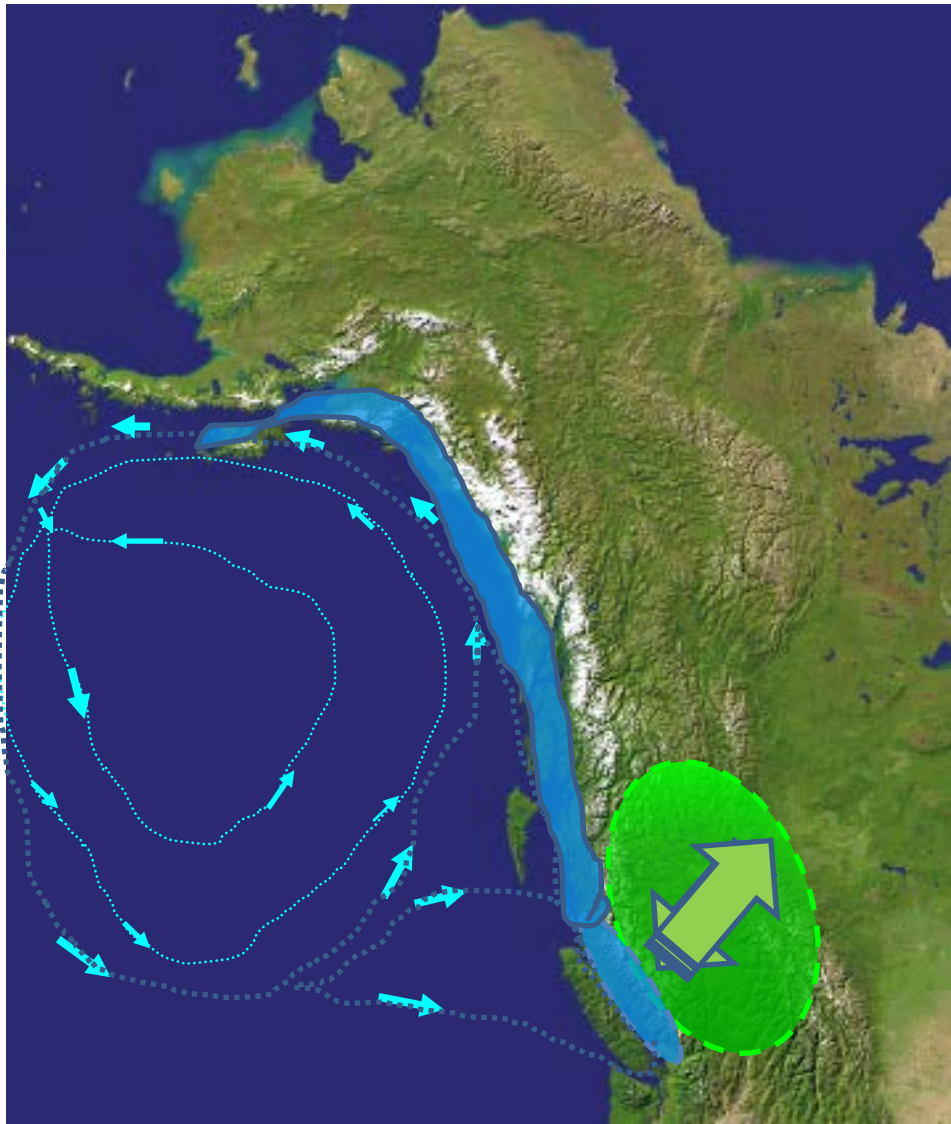
Second Winter 2017



July-Oct 2017



Return: 4 yrs



**Freshwater
2 Winters**

**Brood Year
July-Oct 2013**



April-May 2014



April-May 2015



Brood Year Escapement: Index of the Number of Eggs



Below average 2013 contributors (cycle average)
Small FIVE year old brood year EFS
Early Stuart (10%) 3%
Old Bowron

Fennell
 Scotch
 *Seymour
 Taseko

Large FIVE year old brood year EFS
Chilliwick

Chilko (14%) **50%**
Late Stuart (20%) 6%
Quesnel (42%) 8%
 *Quesnel

Three Year Olds
Harrison

*Late Shuswap
 Late Shuswap (1%) **7%**
 Portage
 *Weaver
 *Birkenhead

smolts →

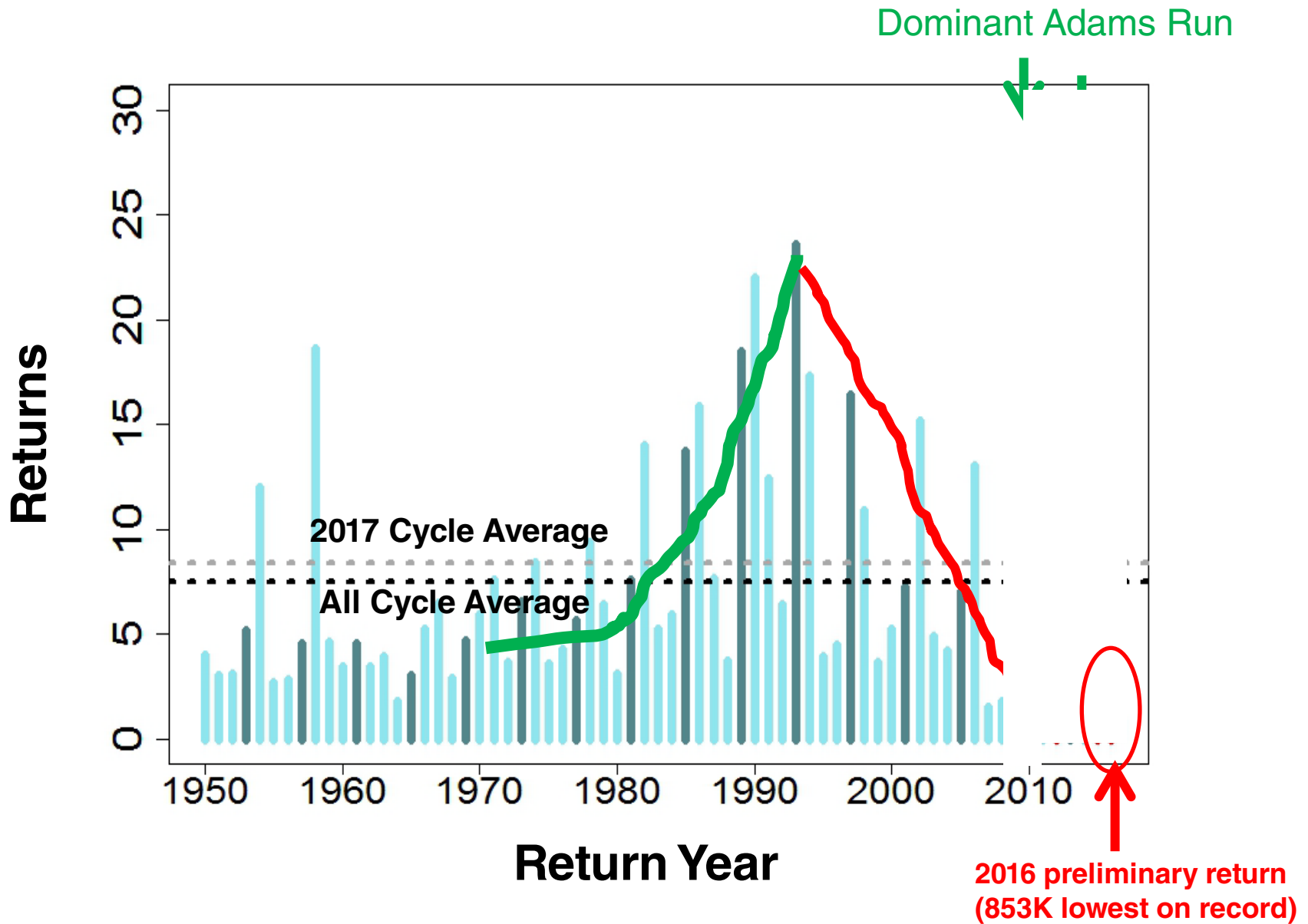


Run timing group Stocks	2013 Brood Year (Age-4)	2012 Brood Year (Age-5)
Early Stuart	39,700	6,800
Early Summer		
Bowron	1,900	30
Fennell	2,000	700
Gates	23,100	6,900
Nadina	7,100	16,800
Pitt	35,900	41,400
Scotch	11,000	700
Seymour	13,900	300
Misc (Early Shuswap)	5,000	200
Misc. (Taseko)	70	40
Misc. (Chilliwick)	5,000	78,800
Misc. (Nahatlatch)	800	1,200
Summer		
Chilko ^j	204,000	127,367
Late Stuart	70,900	90,800
Quesnel	96,100	100
Stellako	54,100	50,600
Raft	9,000	1,700
Harrison	78,000	238,400
Misc. (N. Thomp. Tribs.)	1,400	200
Misc. (N. Thomp. River)	8,500	30
Misc. (Widgeon)	700	200
Late		
Cultus	110,000	50,000
Late Shuswap	15,500	10
Portage	4,200	10
Weaver	15,500	400
Birkenhead	46,800	2,500
Misc. non-Shuswap	4,300	1,100

Survival



Fraser Sockeye Returns

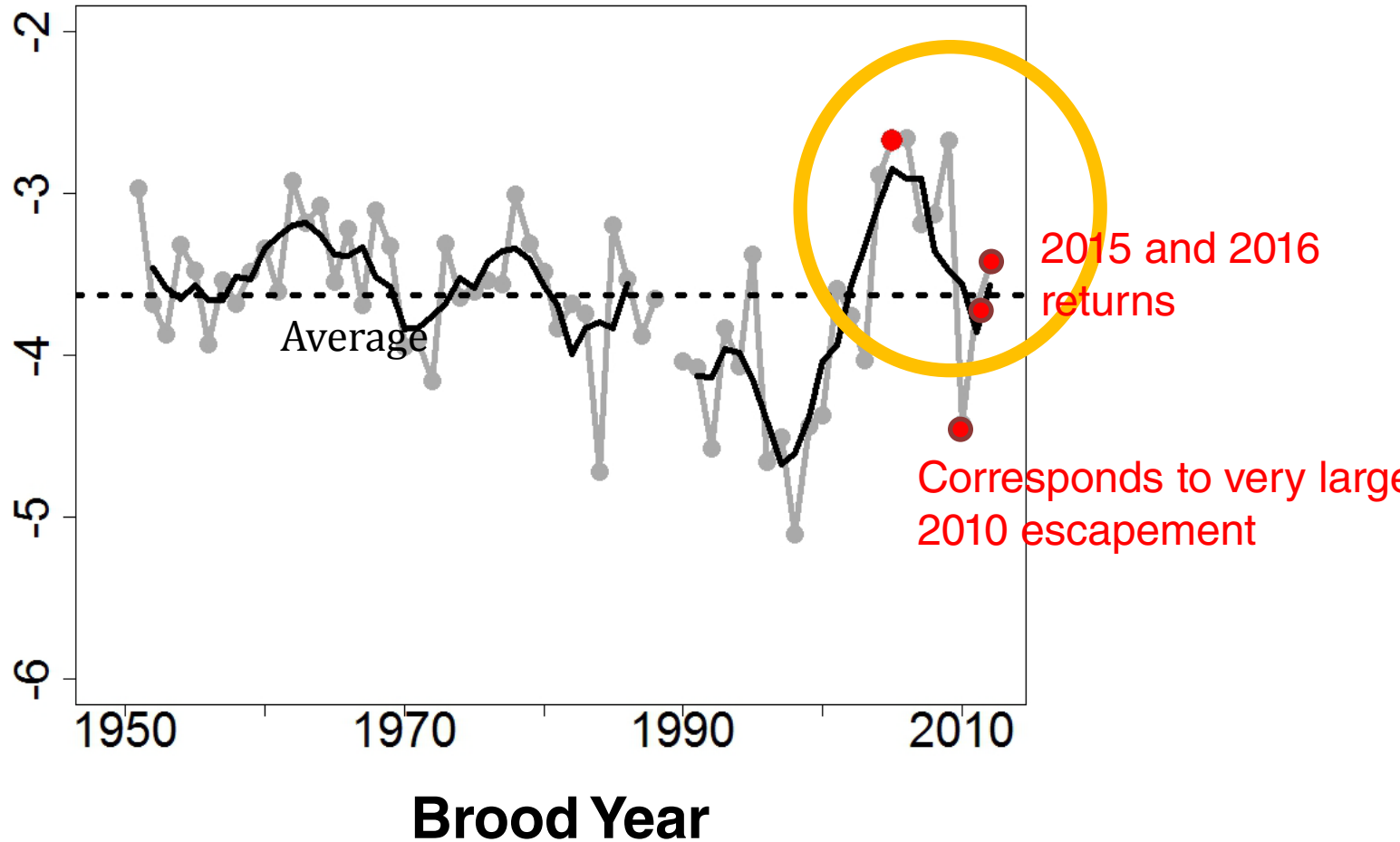


Chilko Sockeye



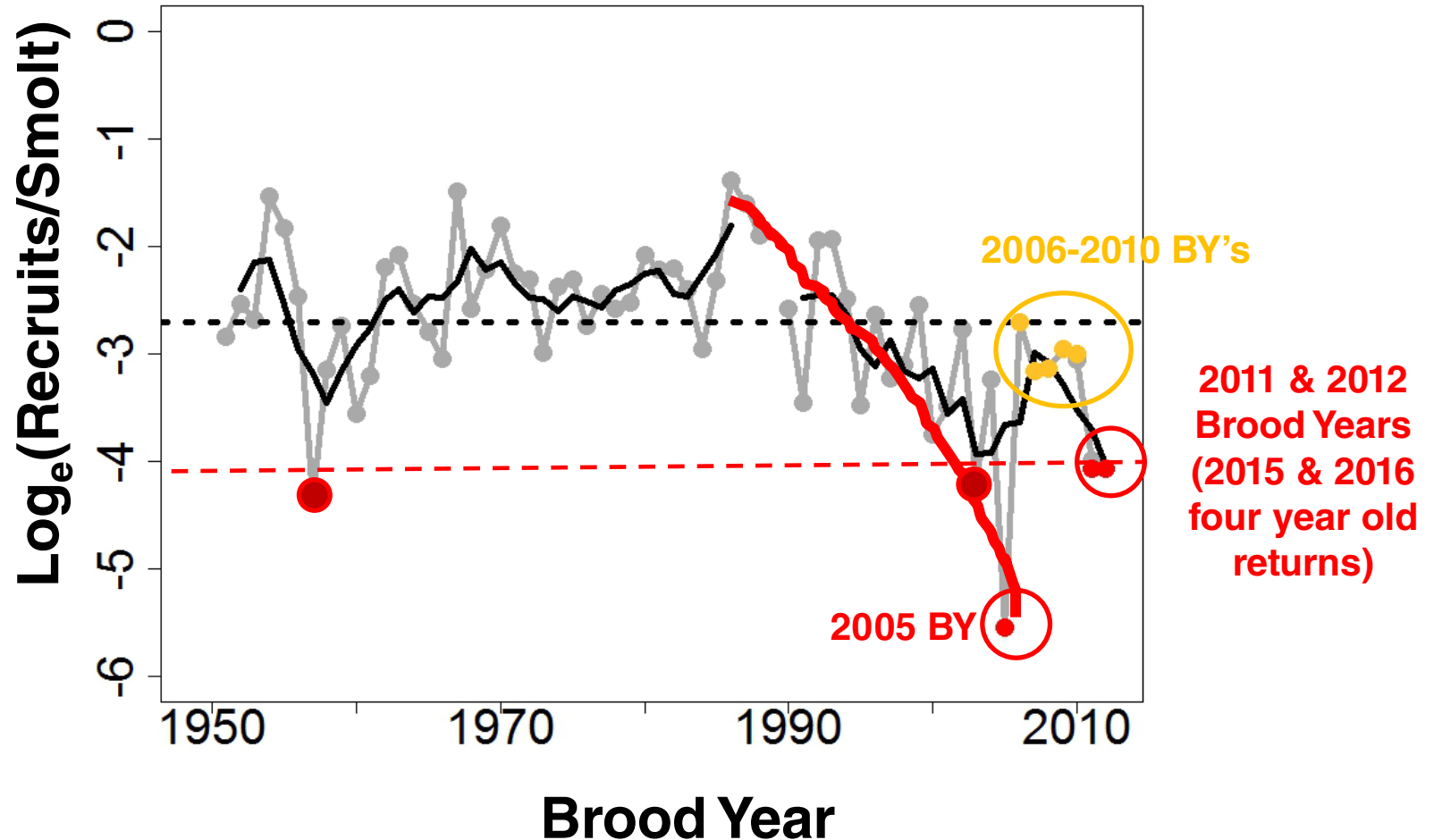
Chilko Freshwater Survival

$\text{Log}_e(\text{Smolts/Effective Females})$



Chilko Marine Survival

(includes downstream migration after the weir)



Survival and Fraser Sockeye Forecasts

	poor	average	good		
Run timing group	Probability that Return will be at/or Below Specified Run Size ^a				
Stocks	10%	25%	50%	75%	90%
Early Stuart	13,000	22,000	36,000	59,000	89,000
Early Summer	120,000	217,000	447,000	1,003,000	2,703,000
Bowron	1,000	2,000	4,000	8,000	13,000
Fennell	6,000	9,000	14,000	23,000	39,000
Gates	24,000	40,000	76,000	138,000	231,000
Nadina	24,000	45,000	90,000	179,000	331,000
Pitt	42,000	60,000	90,000	147,000	212,000
Scotch	300	2,000	12,000	89,000	698,000
Seymour	0	100	400	1,000	3,000
Misc (Early Shuswap) ^e	2,000	4,000	8,000	13,000	24,000
Misc (Taseko) ^e	100	400	1,000	1,000	2,000
Misc (Chilliwack)	17,000	46,000	138,000	378,000	1,101,000
Misc (Nahatlatch) ^f	4,000	8,000	14,000	26,000	49,000
Summer	647,000	1,004,000	1,695,000	2,984,000	5,031,000
Chilko ^g	459,000	658,000	1,002,000	1,573,000	2,283,000
Quesnel	6,000	9,000	15,000	25,000	40,000
Late Stuart	42,000	86,000	192,000	427,000	880,000
Stellako	86,000	144,000	256,000	454,000	761,000
Misc (Harrison) ^{h & i}	40,000	85,000	194,000	447,000	965,000
Raft ^h	11,000	16,000	26,000	38,000	62,000
Misc (N. Thomp. Tribs) ^{h & j}	600	1,000	2,000	4,000	9,000
Misc (N. Thomp River) ^{h & j}	1,000	3,000	4,000	9,000	19,000
Misc (Widgeon) ^k	1,000	2,000	4,000	7,000	12,000
Late	41,000	65,000	111,000	205,000	368,000
Cultus ^g	1,000	2,000	4,000	9,000	17,000
**Late Shuswap	0	100	4,000	25,000	76,000
Portage	0	200	400	1,000	2,000
Weaver	2,000	4,000	8,000	17,000	31,000
^{xx} Birkenhead	30,000	45,000	68,000	105,000	158,000
Misc non-Shuswap ^k	8,000	14,000	27,000	48,000	84,000
TOTAL SOCKEYE SALMON	821,000	1,308,000	2,289,000	4,251,000	8,191,000

2015 FORECAST

Run timing group Stocks	Forecast Model ^b	Probability that Return will be at/or Below Specified Run Size ^a				
		10%	25%	50%	75%	90%
Early Stuart	<i>Ricker (Ei)</i>	8,000	16,000	30,000	58,000	108,000
Early Summer		236,000	424,000	837,000	1,603,000	2,963,000
(total excluding miscellaneous)		192,000	325,000	624,000	1,256,000	2,342,000
Bowron	<i>MRS</i>	6,000	11,000	21,000	40,000	72,000
Fennell	<i>power</i>	10,000	16,000	27,000	47,000	78,000
**Gates	<i>Larkin</i>	46,000	79,000	141,000	280,000	502,000
Nadina	<i>MRJ</i>	8,000	15,000	31,000	65,000	126,000
Pitt	<i>Larkin</i>	33,000	51,000	79,000	120,000	190,000
*Scotch	<i>Ricker</i>	48,000	85,000	185,000	430,000	845,000
*Seymour	<i>Ricker</i>	41,000	68,000	140,000	274,000	529,000
Misc (EShu) ^c	<i>RS (Scotch/Seymour)</i>	33,000	74,000	164,000	258,000	459,000
Misc (Taseko) ^d	<i>R/S (Chilko)</i>	1,000	2,000	4,000	7,000	9,000
Misc (Chilliwack) ^e	<i>RS (Esum)</i>	4,000	9,000	18,000	33,000	61,000
Misc (Nahatlatch) ^e	<i>RS (Esum)</i>	6,000	14,000	27,000	49,000	92,000
Summer		1,701,000	2,681,000	4,675,000	8,764,000	16,511,000
(total excluding miscellaneous)		1,693,000	2,666,000	4,648,000	8,710,000	16,406,000
Chilko	<i>power (juv) (Fi)</i>	1,117,000	1,587,000	2,387,000	3,813,000	5,972,000
Late Stuart	<i>power</i>	12,000	25,000	54,000	118,000	245,000
Quesnel	<i>Ricker-cyc</i>	108,000	197,000	367,000	684,000	1,421,000
Stellako	<i>Larkin</i>	186,000	261,000	390,000	552,000	823,000
Raft ^f	<i>Ricker (PDO)</i>	15,000	23,000	36,000	56,000	87,000
***Harrison ^f	<i>Adjusted RS1</i>	255,000	573,000	1,414,000	3,487,000	7,058,000
Misc (N. Thomp. Tribs) ^{f & g}	<i>R/S (Raft/Fennell)</i>	1,000	2,000	3,000	7,000	11,000
Misc (N. Thomp River) ^{f & g}	<i>R/S (Raft/Fennell)</i>	5,000	10,000	18,000	37,000	74,000
Misc (Widgeon) ^{f & h}	<i>R/S (Birkenhead)</i>	2,000	3,000	6,000	10,000	17,000
Late		419,000	703,000	1,236,000	2,210,000	3,998,000
(total excluding miscellaneous)		400,000	671,000	1,176,000	2,103,000	3,809,000
Cultus	<i>MRJ</i>	1,000	3,000	6,000	12,000	22,000
*Late Shuswap	<i>Ricker-cyc</i>	168,000	293,000	517,000	924,000	1,758,000
*Portage	<i>Larkin</i>	1,000	3,000	8,000	19,000	55,000
Weaver	<i>MRS</i>	110,000	189,000	346,000	635,000	1,095,000
Birkenhead	<i>Ricker (Ei)+Sittingling</i>	120,000	183,000	299,000	513,000	879,000
Misc. non-Shuswap ⁱ	<i>R/S (Birkenhead)</i>	19,000	32,000	60,000	107,000	189,000
TOTAL SOCKEYE SALMON		2,364,000	3,824,000	6,778,000	12,635,000	23,580,000
(TOTAL excluding miscellaneous)		2,293,000	3,678,000	6,478,000	12,127,000	22,665,000

} Freshwater

68% Summer

} Freshwater

2016 FORECAST

Run timing group	Forecast Model	Probability that Return will be at/or Below Specified Run Size ^a				
		10%	25%	50%	75%	90%
Stocks						
Early Stuart	<i>Ricker (Ei)</i>	13,000	22,000	36,000	59,000	89,000
Early Summer		120,000	217,000	447,000	1,003,000	2,703,000
Bowron	<i>MRS</i>	1,000	2,000	4,000	8,000	13,000
Fennell	<i>power</i>	6,000	9,000	14,000	23,000	39,000
Gates	<i>Larkin</i>	24,000	40,000	76,000	138,000	231,000
Nadina	<i>MRJ</i>	24,000	45,000	90,000	179,000	331,000
Pitt	<i>Larkin</i>	42,000	60,000	90,000	147,000	212,000
Scotch	<i>Larkin</i>	300	2,000	12,000	89,000	698,000
Seymour	<i>Larkin</i>	0	100	400	1,000	3,000
Misc (Early Shuswap) ^e	<i>R/S</i>	2,000	4,000	8,000	13,000	24,000
Misc (Taseko) ^e	<i>R/S</i>	100	400	1,000	1,000	2,000
Misc (Chilliwack)	<i>Ricker</i>	17,000	46,000	138,000	378,000	1,101,000
Misc (Nahatlatch) ^f	<i>R/S</i>	4,000	8,000	14,000	26,000	49,000
Summer		640,000	992,000	1,677,000	2,962,000	5,023,000
Chilko ^g	<i>power (juv) (Pi)</i>	459,000	658,000	1,002,000	1,573,000	2,283,000
Quesnel	<i>4-Ricker-cyc; 5-sibling</i>	6,000	9,000	15,000	25,000	40,000
Late Stuart	<i>R1C</i>	42,000	86,000	192,000	427,000	880,000
Stellako	<i>R2C</i>	86,000	144,000	256,000	454,000	761,000
Harrison ^{h & i}	<i>3-Ricker(Ei); 4-sibling</i>	33,000	73,000	176,000	425,000	957,000
Raft ^h	<i>Ricker (PDO)</i>	11,000	16,000	26,000	38,000	62,000
Misc (N. Thomp. Tribs) ^{h & j}	<i>R/S</i>	600	1,000	2,000	4,000	9,000
Misc (N. Thomp River) ^{h & j}	<i>R/S</i>	1,000	3,000	4,000	9,000	19,000
Misc (Widgeon) ^k	<i>R/S</i>	1,000	2,000	4,000	7,000	12,000
Late		41,000	65,000	111,000	203,000	366,000
(total excluding miscellaneous)		33,000	51,000	84,000	155,000	282,000
Cultus ^g	<i>MRJ</i>	1,000	2,000	4,000	9,000	17,000
**Late Shuswap	<i>Larkin</i>	0	100	4,000	25,000	76,000
Portage	<i>Larkin</i>	0	200	400	1,000	2,000
Weaver	<i>4-MRS; 5-sibling</i>	2,000	4,000	8,000	15,000	29,000
^{xx} Birkenhead	<i>4-Ricker (Ei); 5-sibling</i>	30,000	45,000	68,000	105,000	158,000
Misc non-Shuswap ^k	<i>R/S</i>	8,000	14,000	27,000	48,000	84,000
TOTAL SOCKEYE SALMON		814,000	1,296,000	2,271,000	4,227,000	8,181,000

74% Summer

Environmental Conditions



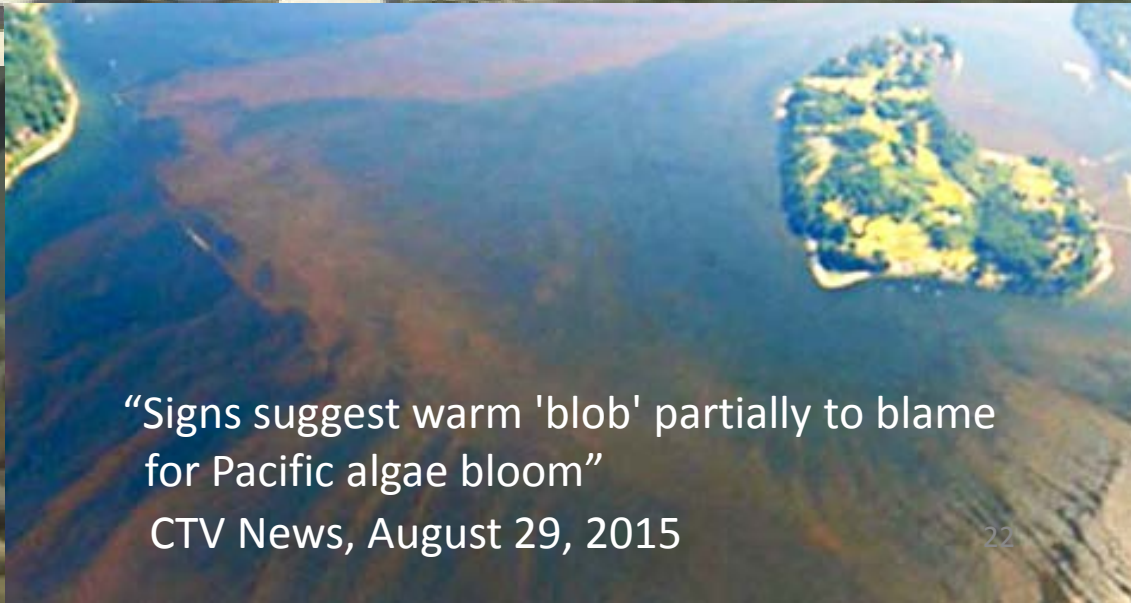
“B.C. restricts fishing amid drought, heat”

Global News, July 21, 2015



“Warm ocean waters affecting BC salmon returns”

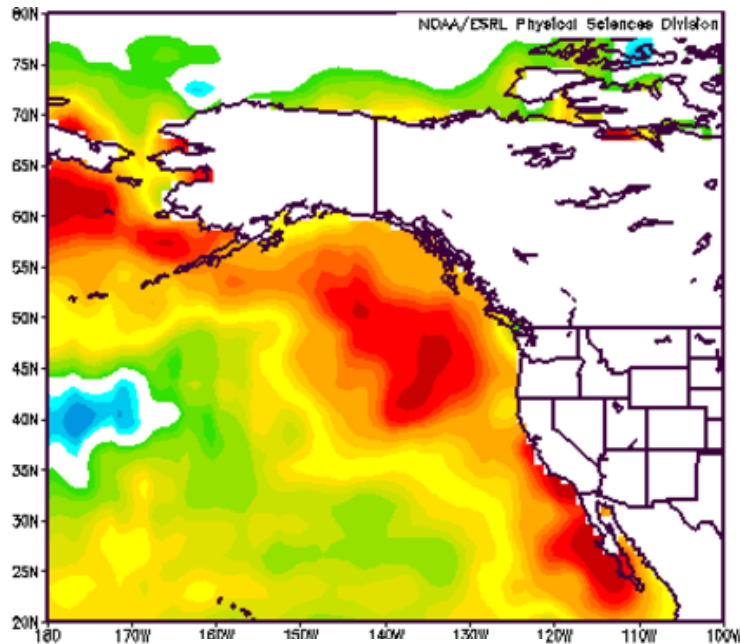
CHEK News, June 20, 2016



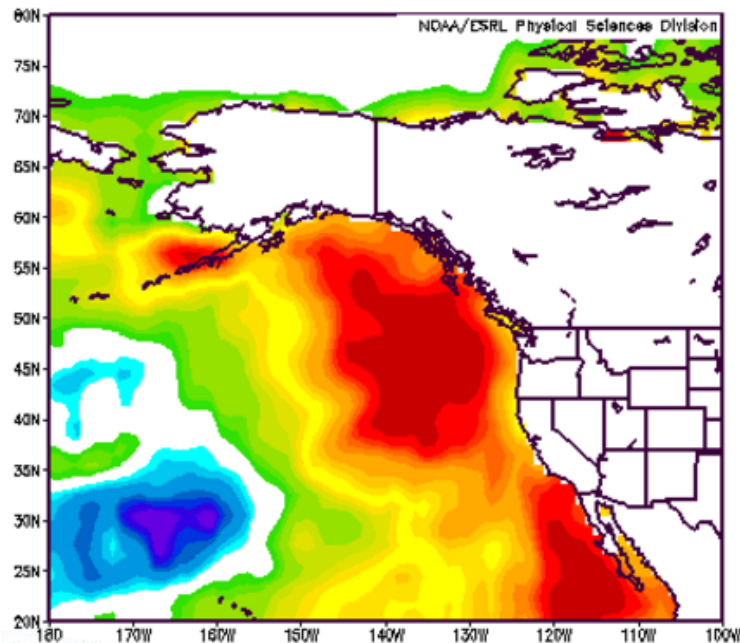
“Signs suggest warm 'blob' partially to blame for Pacific algae bloom”

CTV News, August 29, 2015

2014 (June-Dec)



2015 (Jan-June)



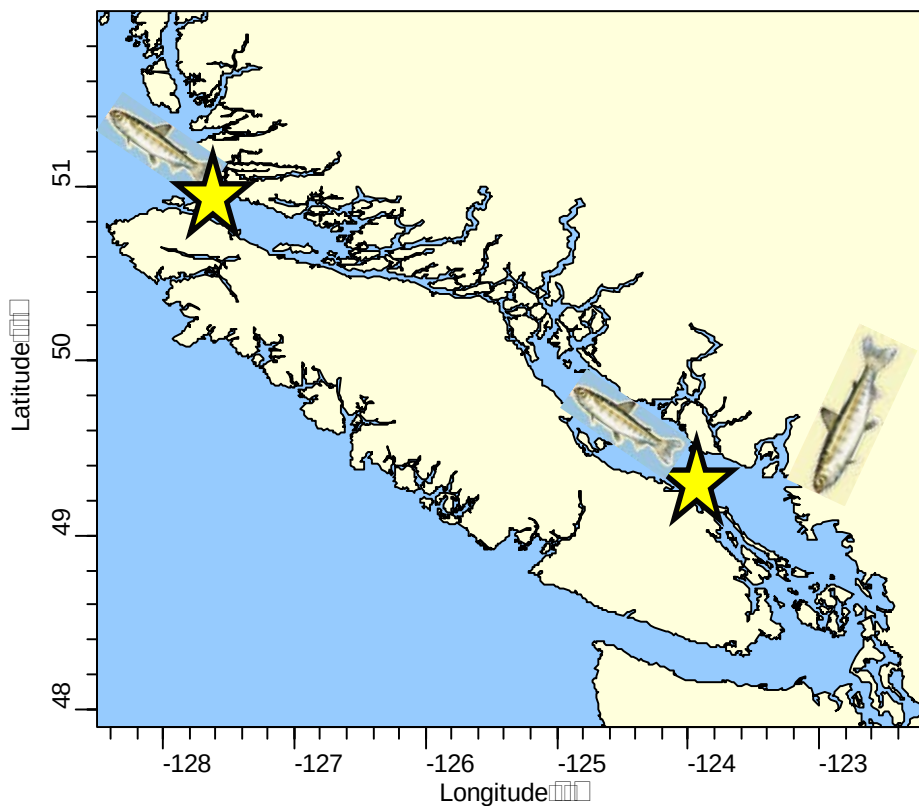
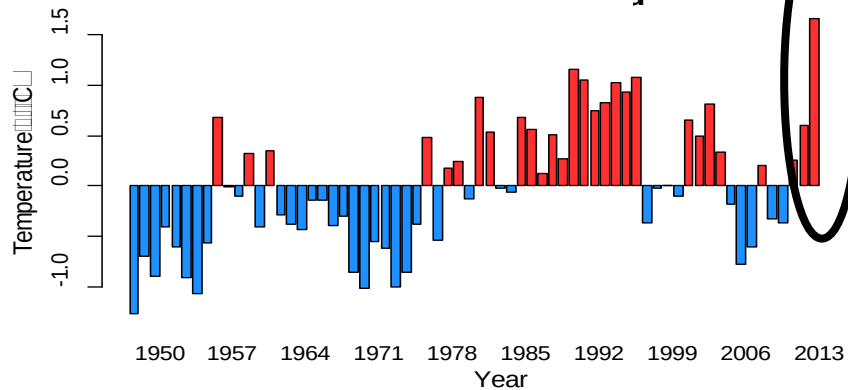
“Survival rates of sockeye and pink salmon were negatively correlated with coastal SST in British Columbia and northern Washington, suggesting that warmer coastal temperatures in these regions were associated with decreased survival rates.”

– Mueter et al. 2005

Pine Island

(April – July)

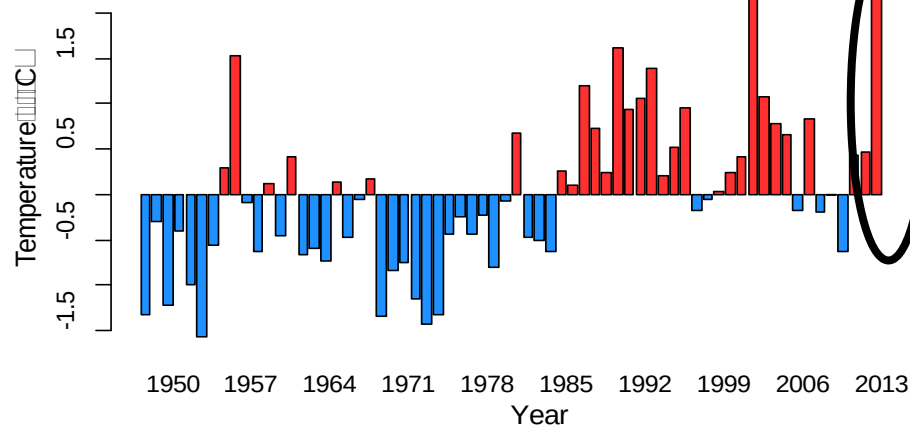
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Entrance Island SST

(April – June)

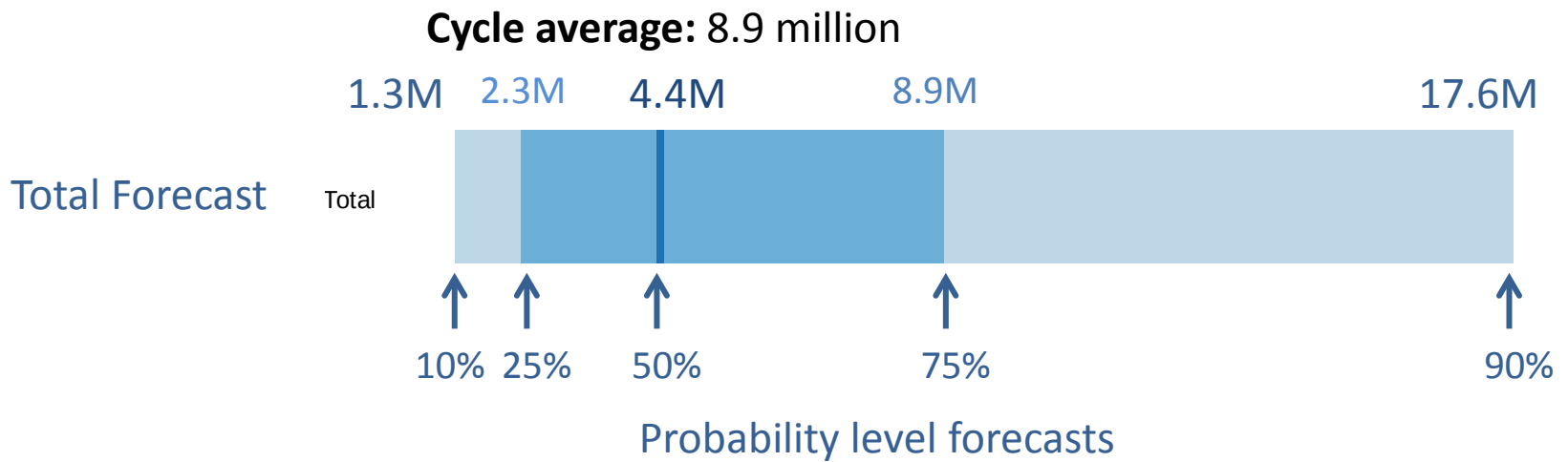
land



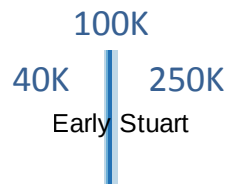
EARLY STUART	Rank	Return Forecast		50%	75%	90%
		10%	25%			
Ricker (Ei)	1	42,000	64,000	99,000	158,000	253,000
Ricker (Pi)	1	44,000	62,000	98,000	158,000	239,000
Ricker	3	101,000	155,000	252,000	458,000	723,000
Ricker (PDO)	3	63,000	101,000	171,000	287,000	458,000
BOWRON		10%	25%	50%	75%	90%
MRS	1	4,000	6,000	12,000	23,000	40,000
Ricker (Pi)	2	2,000	4,000	7,000	12,000	21,000
Ricker (Ei)	3	3,000	4,000	8,000	13,000	22,000
Ricker	11	4,000	8,000	14,000	25,000	43,000
QUESNEL		10%	25%	50%	75%	90%
Ricker-cyc	3	260,000	541,000	1,164,000	2,551,000	4,866,000
Larkin	4	345,000	566,000	1,059,000	2,058,000	3,501,000
Ricker (Ei)	5	45,000	91,000	192,000	466,000	951,000
Ricker	6	190,000	400,000	823,000	1,815,000	3,575,000
RAFT		10%	25%	50%	75%	90%
Ricker (PDO)	1	14,000	21,000	33,000	57,000	88,000
power	2	16,000	24,000	36,000	59,000	99,000
Ricker	7	18,000	27,000	46,000	75,000	116,000
WEAVER		10%	25%	50%	75%	90%
RJC	3	36,000	90,000	254,000	713,000	1,809,000
power (juv) (FrD-peak)	6	60,000	112,000	236,000	499,000	1,029,000
power (juv) (Ei)	8	43,000	84,000	186,000	398,000	880,000
power(juv)	12	53,000	105,000	235,000	511,000	1,058,000
CULTUS		10%	25%	50%	75%	90%
MRJ	1	1,000	2,000	4,000	9,000	17,000
Power (juv) (FrD-peak)	2	1,000	2,000	4,000	8,000	16,000
Power (juv) (Pi)	3	1,000	1,000	3,000	6,000	13,000
power(juv)		1,000	2,000	4,000	7,000	13,000
BIRKENHEAD		10%	25%	50%	75%	90%
Ricker (Ei)	1	42,000	71,000	143,000	257,000	514,000
Ricker	2	66,000	116,000	216,000	384,000	675,000
RAC	2	47,000	108,000	269,000	672,000	1,531,000
Ricker (Pi)	4	50,000	85,000	162,000	321,000	612,000
TSA	4	56,000	129,000	322,000	806,000	1,841,000

Fraser Sockeye Forecasts



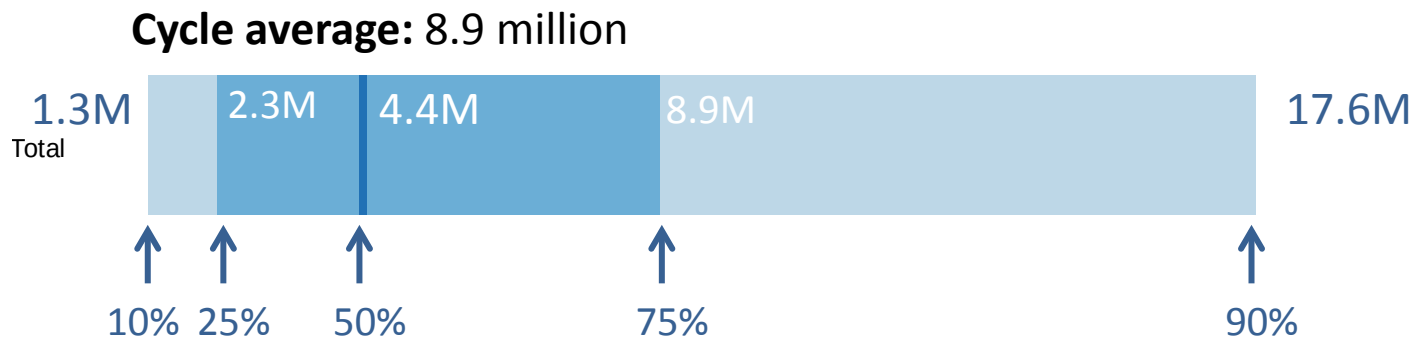


Early Stuart

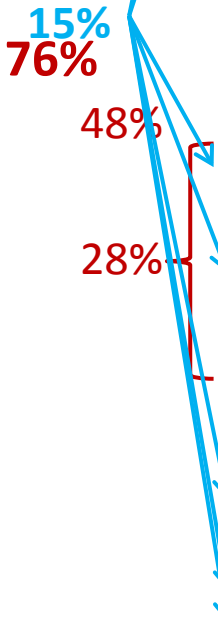


2%

Total Forecast



Probability level forecasts



A		B		F	G	H	I	J	K	L
Run timing group		Forecast Model ^b	Mean Run Size		Probability that Return will be at/or Below Specified Run Size ^a					
Stocks			all cycles ^c	2017 cycle ^d	10%	25%	50%	75%	90%	
Early Stuart	Ricker (Ei) *	298,000	754,000	42,000	64,000	99,000	158,000	253,000		
Early Summer		--	--	95,000	166,000	343,000	792,000	1,971,000		
(total excluding miscellaneous)		523,000	272,000	78,000	132,000	250,000	563,000	1,444,000		
Bowron	Ricker (Pi) *	37,000	23,000	2,000	4,000	7,000	12,000	21,000		
Fennell	power	24,000	12,000	5,000	8,000	14,000	25,000	43,000		
Gates	Larkin	56,000	46,000	15,000	25,000	49,000	96,000	197,000		
Nadina	MRJ	75,000	67,000	19,000	35,000	67,000	129,000	232,000		
Pitt	Larkin	71,000	74,000	35,000	52,000	84,000	140,000	227,000		
Scotch	Larkin	116,000	22,000	0	1,000	9,000	90,000	533,000		
Seymour	Larkin	144,000	28,000	2,000	7,000	20,000	71,000	191,000		
Misc (Early Shuswap) ^e	R/S	--	--	1,000	2,000	7,000	24,000	71,000		
Misc (Taseko) ^e	R/S	--	--	100	300	500	900	1,000		
Misc (Chilliwack)	Ricker	--	--	14,000	28,000	78,000	191,000	431,000		
Misc (Nahatlatch) ^f	R/S	--	--	2,000	4,000	7,000	13,000	24,000		
Summer		--	--	1,065,000	1,861,000	3,407,000	6,631,000	12,560,000		
(total excluding miscellaneous)		3,873,000	6,546,000	1,048,000	1,826,000	3,348,000	6,508,000	12,312,000		
Chilko	Larkin	1,415,000	881,000	663,000	1,168,000	2,142,000	4,090,000	7,588,000		
Late Stuart	power	527,000	1,564,000	100,000	190,000	375,000	789,000	1,561,000		
Quesnel	Ricker (Ei) *	1,304,000	3,726,000	45,000	91,000	192,000	466,000	951,000		
Stellako	Larkin	466,000	241,000	174,000	247,000	355,000	503,000	734,000		
Harrison ^{ii & i}	3-Ricker; 4-sibling	130,000	108,000	52,000	109,000	251,000	603,000	1,390,000		
Raft ^h	Ricker (PDO)*	31,000	26,000	14,000	21,000	33,000	57,000	88,000		
Misc (N. Thomp. Tribs) ^{h & j}	R/S	--	--	2,000	5,000	8,000	17,000	34,000		
Misc (N. Thomp River) ^{h & j}	R/S	--	--	14,000	28,000	47,000	98,000	199,000		
Misc (Widgeon) ^k	R/S	--	--	1,000	2,000	4,000	8,000	15,000		
Late		--	--	113,000	247,000	583,000	1,292,000	2,849,000		
(total exlcuding miscellaneous)		3,171,000	837,000	106,000	234,000	557,000	1,244,000	2,765,000		
Cultus ^g	Power (juv) (Pi)*	37,000	14,000	1,000	1,000	3,000	6,000	13,000		
**Late Shuswap	Larkin	2,409,000	200,000	12,000	58,000	174,000	444,000	1,027,000		
Portage	Larkin	41,000	45,000	8,000	20,000	51,000	139,000	331,000		
Weaver	power (juv) (Ei)*	332,000	282,000	43,000	84,000	186,000	398,000	880,000		
^{xx} Birkenhead	Ricker (Ei)*	352,000	296,000	42,000	71,000	143,000	257,000	514,000		
Misc non-Shuswap ^k	R/S	--	--	7,000	13,000	26,000	48,000	84,000		
TOTAL SOCKEYE SALMON		--	--	1,315,000	2,338,000	4,432,000	8,873,000	17,633,000		
(TOTAL excluding miscellaneous)		7,865,000	8,409,000	1,274,000	2,256,000	4,254,000	8,473,000	16,774,000		
PINK SALMON	Power (fry)-SSS	12,400,000		4,447,000	6,177,000	8,693,000	12,353,000	16,682,000		

2015 FORECAST

68% Summer

Summer		1,701,000	2,681,000	4,675,000	8,764,000	16,511,000
(total excluding miscellaneous)		1,693,000	2,666,000	4,648,000	8,710,000	16,406,000
Chilko	power (juv) (Pi)	1,117,000	1,587,000	2,387,000	3,813,000	5,972,000
Late Stuart	power	12,000	25,000	54,000	118,000	245,000
Quesnel	Ricker-cyc	108,000	197,000	367,000	684,000	1,421,000
Stellako	Larkin	186,000	261,000	390,000	552,000	823,000

2016 FORECAST

74% Summer

Summer		640,000	992,000	1,677,000	2,962,000	5,023,000
Chilko ⁹	power (juv) (Pi)	459,000	658,000	1,002,000	1,573,000	2,283,000
Quesnel	4-Ricker-cyc; 5-sibling	6,000	9,000	15,000	25,000	40,000
Late Stuart	R1C	42,000	86,000	192,000	427,000	880,000
Stellako	R2C	86,000	144,000	256,000	454,000	761,000

2017 FORECAST

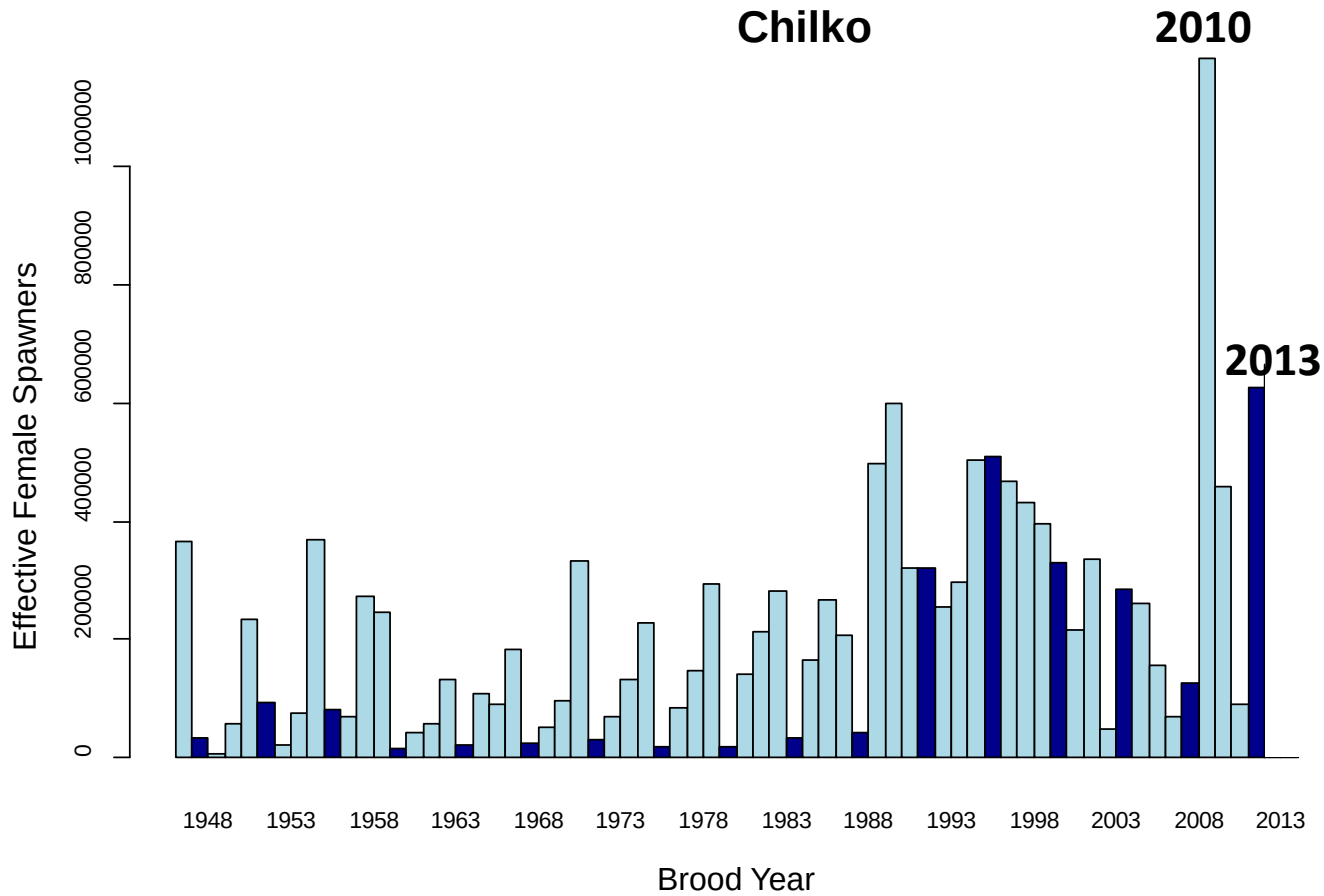
77% Summer

Summer		--	--	1,065,000	1,861,000	3,407,000	6,631,000	12,560,000
(total excluding miscellaneous)		3,873,000	6,546,000	1,048,000	1,826,000	3,348,000	6,508,000	12,312,000
Chilko	Larkin	1,415,000	881,000	663,000	1,168,000	2,142,000	4,090,000	7,588,000
Late Stuart	power	527,000	1,564,000	100,000	190,000	375,000	789,000	1,561,000
Quesnel	Ricker (Ei)	1,304,000	3,726,000	45,000	91,000	192,000	466,000	951,000
Stellako	Larkin	466,000	241,000	174,000	247,000	355,000	503,000	734,000

Chilko Sockeye

48% of the total forecast

No smolt estimate for the 2015 outmigration (2013 brood year)

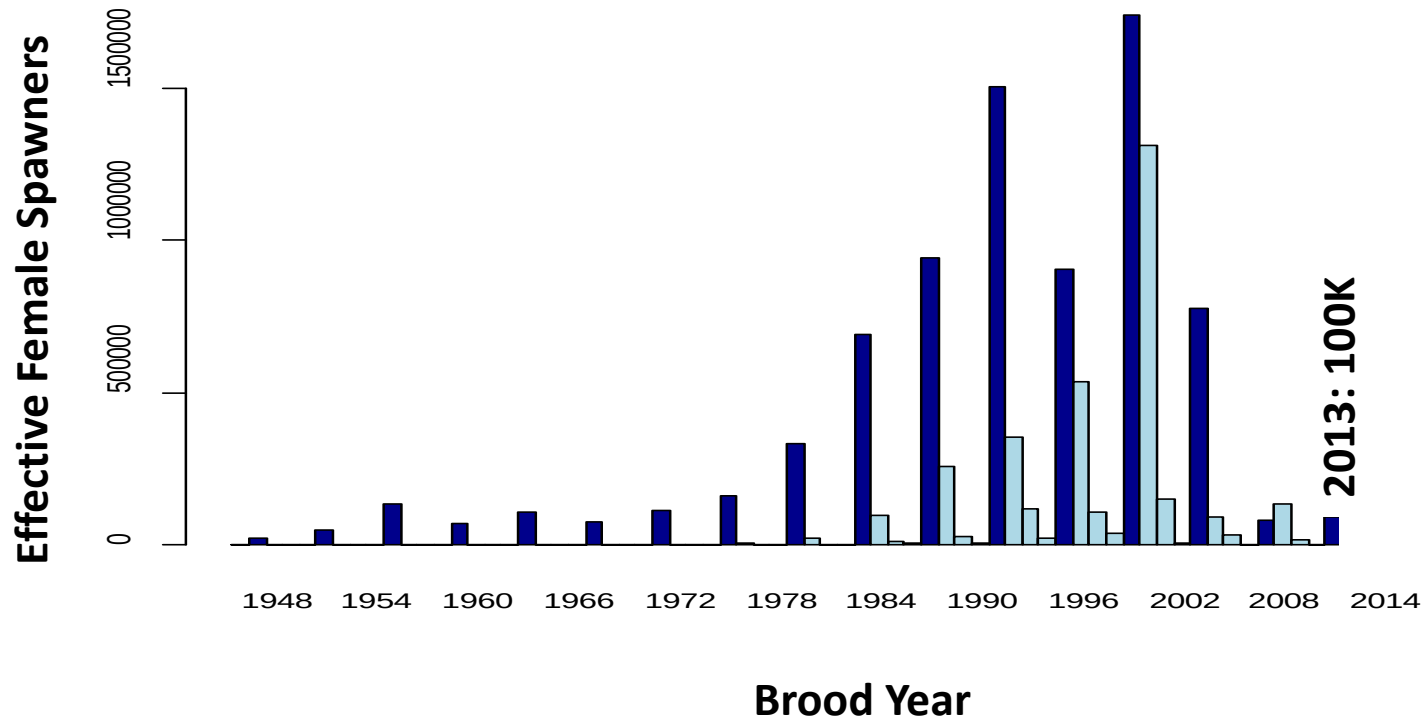


CHILKO	Rank	Return Forecast				
		10%	25%	50%	75%	90%
power (juv) (Pi)	1					
Larkin	1	663,000	1,168,000	2,142,000	4,090,000	7,588,000
power (juv)	3					
power (juv) (FrD-peak)	4					
power (juv) (PDO)	5					
MRJ	6					
Ricker-cyc	7	277,000	466,000	890,000	1,810,000	3,763,000
power (juv) (FrD-mean)	8					
RJC	9					
Ricker (FrD-mean)	10	614,000	915,000	1,531,000	2,523,000	3,982,000
power (juv) (Ei)	11					
RJ2	12					
Ricker	12	585,000	888,000	1,508,000	2,604,000	3,998,000

Quesnel Sockeye

4% of the total forecast

QUESNEL

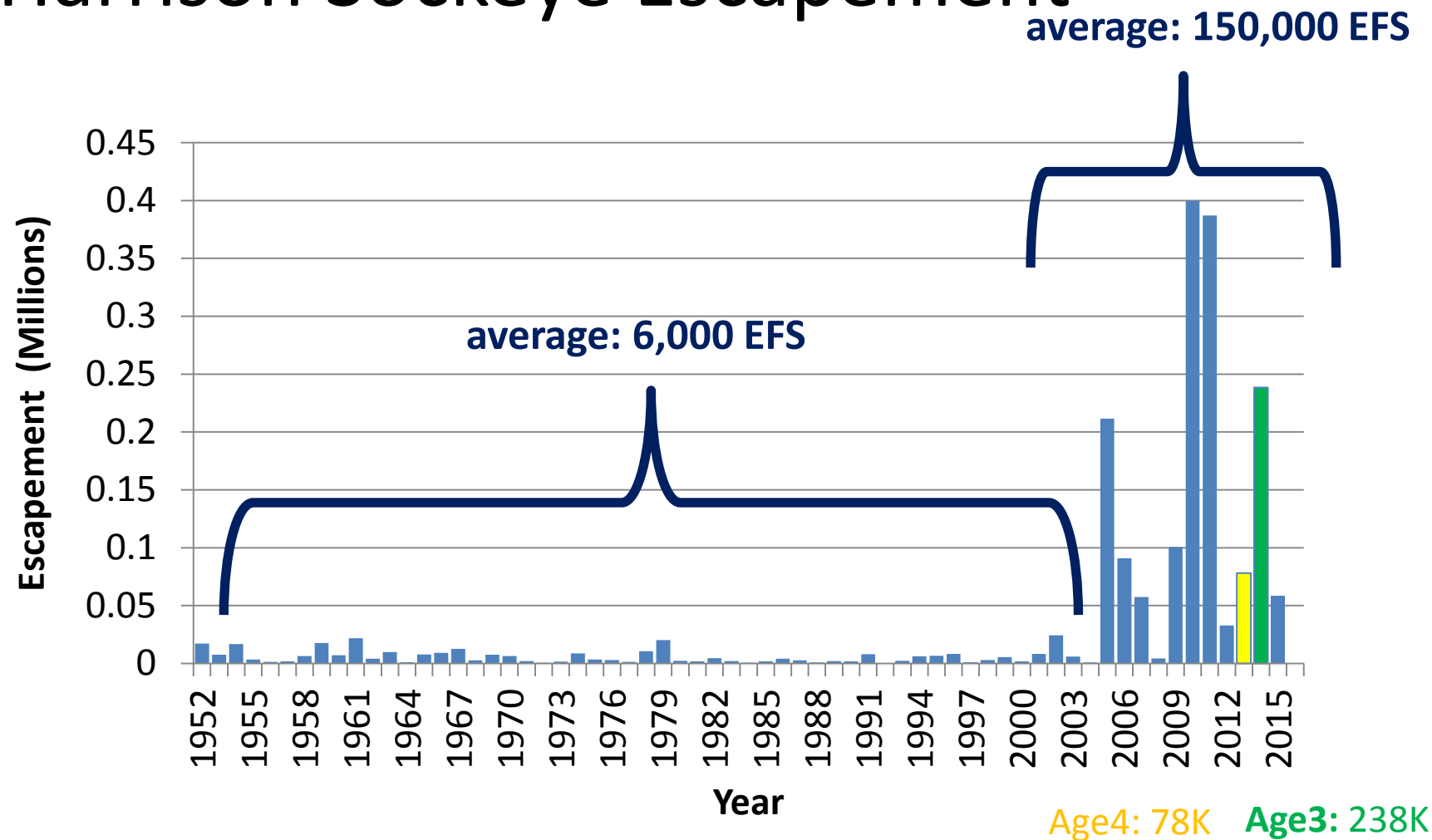


QUESNEL		10%	25%	50%	75%	90%
R1C	1	66,000	134,000	293,000	641,000	1,296,000
R2C	2	45,000	101,000	249,000	614,000	1,387,000
Ricker-cyc	3	260,000	541,000	1,164,000	2,551,000	4,866,000
Larkin	4	345,000	566,000	1,059,000	2,058,000	3,501,000
Ricker (Ei)	5	45,000	91,000	192,000	466,000	951,000
Ricker	6	190,000	400,000	823,000	1,815,000	3,575,000

Harrison Sockeye

6% of the total forecast

Harrison Sockeye Escapement



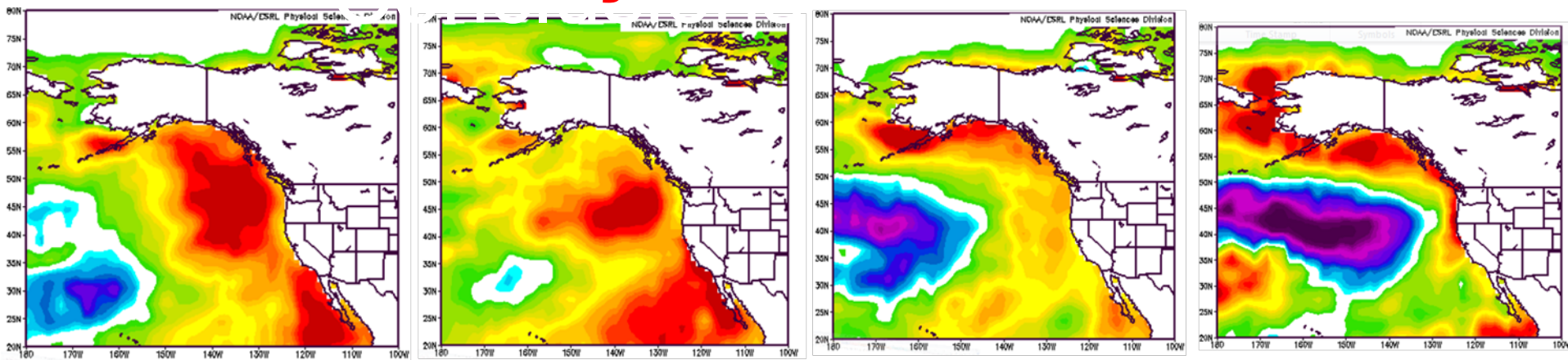
HARRISON		Return Forecast				
		10%	25%	50%	75%	90%
Ricker	NA	144,000	306,000	681,000	1,428,000	2,923,000

Fraser Sockeye Conclusions



- **Low numbers of Sockeye are expected in 2017 (p50 forecast: 4.5 M compared to cycle average: 8.4 M)**
- **Returns have not exceeded p50 in last 12 years (exl. 2010)**
- **Chilko forecast (48% of total at p50) has greater uncertainty due to large escapement in 2013 and 2010**

Fraser Sockeye Conclusions



- **Northeast Pacific has been extremely warm:** 2014 moved coastal
- **Warm conditions** incorporated into some forecasts indicate reduced survival; accounts for only 15% of the total forecast
- Very low survival of Summer-run stocks (76% of total) in 2015 (OEY 2013) and 2016 (OEY 2014)
- **Emphasis on the 25% probability level recommended,** particularly for Summer-run stocks

Acknowledgments

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Fisheries Management
Salmonid Enhancement Program

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Upper Fraser Fisheries Conservation Alliance
Tsilhqot'in National Government
N'Quatqua Fisheries
Lil'wat First Nations
Little Shuswap Indian Band
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Commission
Instream Fisheries Research Inc.

Pacific Salmon Commission (PSC)
PSC, Southern Boundary Restoration and Enhancement Fund