Executive Secretary's Summary of Decisions
2016 Post-Season Meeting
January 11-15, 2016; Portland, Oregon

The Pacific Salmon Commission held its 2016 Post-Season Meeting from January 11-15, 2016 at the Embassy Suites Downtown Hotel in Portland, Oregon, and discussed a number of topics (see attached agenda).

The Commission AGREED:

1. The minutes of the October 2015 Fall Meeting are approved as edited.
2. For the 2016 Annual Meeting, the Executive Secretary shall coordinate with the Data Sharing Committee and develop a proposal for how the Parties may share comparable online data on their respective enhancement activities.
3. The August 2015 summary report from the Committee on Scientific Cooperation (CSC) regarding Parentage Based Tagging and Radio Frequency Identification tags shall be posted on the PSC website.
4. By the 2016 Annual Meeting, the CSC shall collaborate with appropriate experts and develop a proposal for annual collation of data on the environment, run size, fish condition, and other metrics that may reveal anomalies in salmon survival.
5. The list of 2016 Very High Priority Chinook Projects is modified to remove projects 5, 7, and 8 due to alternative funding identified by the United States.
6. The Parties shall strive to consider any financial needs identified to implement a revised Fraser River Chapter (Annex IV, Chapter 4) on the same timeline as other needs identified in Annex IV amendment.
7. The Chinook Interface Group shall complete its draft plan for transitioning the Commission to a new Chinook model, and present this plan in February 2016.
8. The revised schedule dated January 12, 2016 for Panel and Committee meetings occurring after February 2016 is approved.
9. The 2016 Fall Meeting will occur October 3-7, 2016 in Vancouver.

Note: Following the Post-Season Meeting, the Chair and Vice-Chair met and agreed to jointly develop two proposals for further consideration at the 2016 Annual Meeting. The first is a proposal for guidance from the Commission to the Southern and Northern Endowment Funds on the process for Very High Priority Chinook Projects for 2017-2018. The second proposal is on a process for future Commission management of the Larry Rutter Memorial Award.

ATTENDANCE

PACIFIC SALMON COMMISSION
POST SEASON MEETING
JANUARY 11-15, 2016
EMBASSY SUITES DOWNTOWN
PORTLAND, OREGON

COMMISSIONERS

UNITED STATES

P. Anderson (Chair)
W.R. Allen
W. Auger
M. Clark
R. Klumph
M. Oatman
C. Swanton
B. Turner

CANADA

S. Farlinger (Vice Chair)
J. McCulloch
M. Ned
R. Reid
B. Riddell
P. Sprout

Draft Agenda
Post-Season Meeting
January 11-15, 2016
Embassy Suites Downtown; Portland, Oregon

1. Adoption of Agenda
2. Approval of minutes from October 2015 Fall Meeting
3. Executive Secretary's Report
4. Action Items Pending
    a. Chinook
        i. Perspectives on renewal of Chapter 3 (based on exchange of issue lists in October 2015)
        ii. Model improvement tasks (from October 2015 Commission direction to the CTC)
            1. Final report on maturation rates and environmental variable analyses and recommendations.
            2. Progress on Chapter 3 performance evaluation
            3. Progress on Phase 2 base period calibration
        iii. CIG action plan regarding transition to new Chinook model
        iv. Very High Priority Chinook Projects
            1. Update on review of 2016 high priority chinook proposals
            2. 2017-2018 process discussion
    b. Update from Fraser Strategic Review Committee
    c. National perspectives on enhancement activities reporting (follow up from October 2015 discussions)
    d. Submission of 2015 post-season reports
5. Reports from Panels and Committees
    a. Standing Committee on Finance and Administration
    b. Commission direction on meeting requests beyond February
    c. Progress reports on work plans from Panels and Technical Committees – as needed
        i. Update from Fraser River Panel on Fraser chapter renegotiation timeline
    d. CSC overview of Parentage Based Genetic Tagging report (to be confirmed)
6. Other Business

Discussion paper

Larry Rutter Memorial Award for

Pacific Salmon Conservation

Prepared by the Executive Secretary

December 22, 2015

Background

Larry Rutter was a fixture in Pacific salmon conservation and management for more than three decades until his untimely death in 2014. It is difficult to describe fully the impact Larry's work had on the institutions and people involved with this valuable resource. From the early 1970's until 1997, he worked for and with the Treaty Indian Tribes of the U.S. Pacific Northwest to advance their interests and ideas as salmon co-managers. From 1997 until his passing, Larry worked for the U.S. National Marine Fisheries Service/NOAA Fisheries on salmon issues ranging from Endangered Species Act listings to Pacific Salmon Treaty negotiations. He served the last 12 years of that career as the U.S. Federal Commissioner to the Pacific Salmon Commission (PSC), as well as a "founding member" of the Southern Boundary Restoration and Enhancement Fund (SEF) Committee. Near the end of his career, Larry was convinced that substantial, multi-year funding was needed to study early marine survival of salmon stocks utilizing the Salish Sea. His foresight and dedication led to a $5 million, five-year SEF commitment for the bilateral Salish Sea Marine Survival Project. It is safe to say that Larry was a leading influence in how the Tribes, the United States, and Canada approached salmon management and research during the turn of the 21st century.

The Northern Boundary and Transboundary Rivers Restoration and Enhancement Fund Committee and the Southern Boundary Restoration and Enhancement Fund Committee (together, the Joint Fund Committee or JFC) wish to help memorialize Larry's lifetime of work including his leadership in the PSC, the Southern Fund Committee, and beyond. Accordingly, the JFC has established the Larry Rutter Memorial Award in Pacific Salmon Conservation and has already sought nominations for a 2016 recipient. The award will go to an individual or organization that has:

1. Significantly advanced U.S./Canadian understanding of salmon biology or ecology;
2. Made notable contributions to resolving U.S./Canadian issues or disputes regarding salmon management;

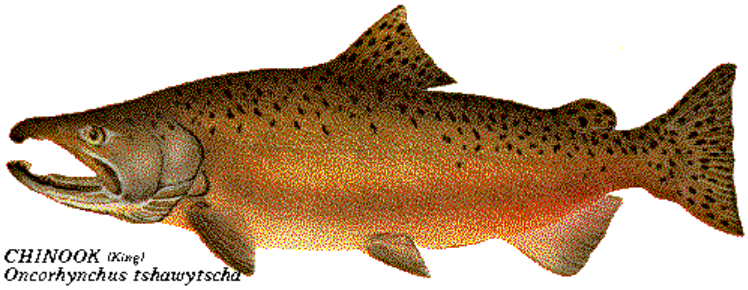
3. Increased public awareness of salmon conservation, the Pacific Salmon Treaty, the PSC, and related initiatives; or
4. Otherwise helped ensure a sustainable and resilient Pacific salmon resource for the people of Canada and the United States.

Proposal

As the Joint Fund Committee launched this process for 2016, members noted it could become more distinguished as a Pacific Salmon Commission initiative in the future. Therefore, they seek an expression of interest from the Commission for participating in future annual award selections after 2016. The Joint Fund Committee will continue and conclude its 2016 selection process on its original schedule (with the recipient getting their award at a Committee reception during the February 2016 meeting)

The Secretariat proposes:

a. The Commission considers the concept at its January 2016 Post-Season meeting
b. If interested, name a modest number of delegates from each Section to serve on a small committee to review nominations once each year.
c. Details of the rating/selection process currently in use by the Joint Fund Committee could be modified in the future by the selection committee, as needed.



PSC Chinook Technical Committee

TO: PSC Commissioners

FROM: John Carlile, Robert Kope and Gayle Brown (CTC co-chairs)

DATE: December 26, 2015

SUBJECT: Maturation Rates and Environmental Variables Used in the PSC Chinook Model

During the October 2015 Pacific Salmon Commission (PSC) Executive Session held in Suquamish, Washington the following assignment was given to the Chinook Technical Committee (CTC) by the PSC Commissioners:

The PSC Chinook Model performance over the last several years has been highly variable based on the wide swings in estimated abundance as expressed within the model calibration abundance indices. The amount of technical debate that has ensued over the last 8 months has been cause for the CTC and AWG to request of the Commission instruction on several aspects of technical work moving forward (Memo to Commissioners from CTC dated September 4, 2015). There were two elements that were transmitted relative to the US Section meeting on June 10, 2015: one was timeliness of release of the preseason abundance index and the other was stability of the model calibration results. There are also several work products that are of immediate and longer term value for the Commission that we request you complete as best possible within the prescribed timelines as depicted below. We have heard discussion and received reasonable correspondence specific to the timing element; however the model stability element has not been adequately addressed.

The Commission is requesting that the AWG embark on investigating both the maturation rates and environmental variables to update and document the analyses performed in 2012 with the last two years of data. The objective is to provide for improved preseason and postseason abundance indices to be generated for the 2016 season and postseason AI's for both the 2014 and 2015 seasons. We understand it is important to start this work soon to inform the current year calibration, and suggest the work completed by December 15, 2015 and no later than January 1, 2016 so that we can be assured that a preseason AI can be generated, evaluated and released for fishery planning purposes.

The CTC-AWG updated the 2012 maturation rate (MR) and environmental variable (EV) analysis, which used results from the 2004 through 2012 calibrations of the PSC Coast Wide Chinook Model with results from the 2013 and 2014 calibrations (see TCCHINOOK(14)-01 V.1, section 3.1.4 for a description of the original work). The new analyses were based on pairings of MR estimates with the EV of the most recently completed brood. This decision was made because the 2012 analysis showed that the estimates of the age-specific MRs used to represent a stock's incomplete brood years had a much greater influence on AIs compared to the EV. In order to determine if the discrepancy between the preseason and post-season Chinook Model AIs could be reduced from the 5-year average (YA) model chosen in the 2012 analysis, the investigation was expanded to include more MR estimates. In addition to the long-term average, stock- and age-specific MR averages ranging from 3 to 11 years from recent completed broods were evaluated. An approach to estimating the MRs for incomplete broods based on a time series exponential smoothing model (ETS) was also explored as a potential alternative to the method based on a simple average of a specified number of completed broods.

Model calibration results based on the above MR estimates were evaluated using four statistics (squared error, percent error, median error and absolute scaled error) which quantify the magnitude and direction of the discrepancy between two AIs. The statistics were calculated for the discrepancy observed between (1) the preseason AI for each AABM fishery and the first post-season AI, (2) the preseason AI and an average of the AIs from calibrations completed three or more years after the preseason, and (3) the first post-season AI and the average AI from calibrations completed three or more years after the preseason calibration. Means (or median) of the error statistics were then computed to show which of the MR estimation models resulted in the greatest reduction in the discrepancy between AIs obtained from the Chinook Model calibrations. These results will be documented and summarized in a future report as well as other data and results considered relevant to or used during these investigations. The main findings of the MR-EV investigation are:

- Based on the composite mean squared error statistic (MSE), the 9 YA emerged as the estimation model that most reduced the discrepancy between the preseason and first post-season AI across Chinook Model calibrations and AABM fisheries (Table 1).
- The sensitivity of the above conclusion to the number of contributing calibrations was examined and the 9 YA again emerged as the best overall estimation model based on the composite MSE statistic (Table 2).
- The 9-year average model (9YA), 3-year average model (3YA), and time series model (ETS) most reduced the discrepancy between the preseason and first postseason AI across Chinook Model calibrations for the SEAK, NBC, and WCVI AABM fisheries respectively. However, further work is warranted since the difference in performance of a number of the models was small.
- The model used to estimate the MRs noticeably affected the time series of preseason and first post-season AIs for each AABM fishery, but the overall effect on the magnitude and direction of errors compared to the original calibration results was relatively small..

The AWG recommends the utilization of the 9 YA for the MRs and 1 year EV as the basis for estimating the stock- and age-specific MRs for the annual Chinook Model calibration (Table 1).

Table 1. Mean squared error between the preseason and first postseason AI assuming a 1 year EV. Each MR model depicts how the assumptions around incomplete brood years are modeled, including 3 to 11 year averages (e.g., 3YA), long-term averages (LTA) or via exponential smoothing (ETS). The composite MSE metric is derived by adding all fisheries' MSEs together. The scenario that minimized the MSE is highlighted dark red and the second best scenario is highlighted light red.

Model	SEAK	NBC	WCVI	Composite
3YA	0.0289	0.0233	0.0161	0.0683
5YA	0.0309	0.0238	0.0157	0.0704
7YA	0.0300	0.0246	0.0132	0.0678
8YA	0.0299	0.0248	0.0134	0.0681
9YA	0.0268	0.0234	0.0125	0.0627
10YA	0.0320	0.0252	0.0125	0.0696
11YA	0.0357	0.0277	0.0131	0.0765
LTA	0.0374	0.0283	0.0180	0.0836
ETS	0.0333	0.0239	0.0122	0.0695

Table 2. Best MR estimation model in response to the number of calibrations included in MSE calculations. The earliest calibration year is 2004 in all cases. The composite is based on the sum of MSE values across fisheries. Abbreviations used in Table 1 are identical to those used in this table as well.

Last Year	# Calibrations	SEAK	NBC	WCVI	Composite
2013	10	9YA	3YA	ETS	9YA
2012	9	9YA	5YA	9YA	9YA
2011	8	9YA	5YA, 9YA	9YA	9YA
2010	7	9YA	9YA	9YA	9YA
2009	6	9YA	9YA	9YA, 10YA	9YA
2008	5	9YA	9YA	9YA	9YA

In summary, this investigation did show that improved performance of the Chinook Model, as measured by a reduction in the across-calibration discrepancy between the preseason and postseason AABM fishery AIs, could be achieved through use of MRs based on a 9 YA from completed broods for each stock and age in the MATAEQ file. No analyses were undertaken to determine why any particular MR model performed better or worse than others.

Future of the Very High Priority Chinook (VHPC) Project Review Process

prepared by the Secretariat

January 7, 2016

Background

In April 2014, the Commission wrote to the Joint Fund Committee (JFC) to:

a) explain the relevance of Chinook assessment programs to Treaty implementation;

b) place Chinook programs in the context of other Treaty needs for other salmon species;

c) acknowledge that funding choices remain the prerogative of the JFC;

d) provide guidance for the JFC's annual funding process in the four years before Chapter 3 expires (2015-2018); and

e) identify nine "very high priority" Chinook (VHPC) projects for possible funding in 2015

In May 2014, the JFC responded to the Commission's guidance by stating that the Committee would consider the Commission's needs within the limits of annual financial limits and priorities for other species. The two bodies agreed to a process for communicating about VHPC projects eligible for funding in 2015. That process led to six VHPC receiving support from the endowment funds that year.

In February 2015, the Commission adopted a timeline and process for communicating 2016 VHPC projects to the Joint Fund Committee (JFC). Affected groups attempted to implement that process, but it led to a lack of consensus on the priority, technical merit, and program design for the nine projects vetted through it. While the JFC considers how to address 2016 VHPC projects, it has asked the Commission to revisit this review process and make adjustments as appropriate.

2017 and 2018 are the final anticipated years for VHPC funding before Annex IV, Chapter 3 expires. The Commission is invited to consider alternative approaches for those two years that are a) responsive to the JFC request, b) increase Commissioner input, c) resolve communication problems that may be identified in the current review process, and d) accommodate rapid changes in national priorities/program funding.

2015 POST SEASON REPORT UNITED STATES SALMON FISHERIES OF RELEVANCE TO THE PACIFIC SALMON TREATY

Report Submitted to the Pacific Salmon Commission
By the United States Section

January 4, 2016

TABLE OF CONTENTS

POST SEASON REPORT

I. PRELIMINARY 2015 SOUTHEAST ALASKA FISHERIES

NORTHERN BOUNDARY AREA FISHERIES

District 104 Purse Seine Fishery

The 2009 Pacific Salmon Treaty (PST) Agreement calls for abundance based management of the District 104 purse seine fishery. The agreement allows the District 104 purse seine fishery to harvest 2.45 percent of the Annual Allowable Harvest (AAH) of Nass and Skeena sockeye salmon prior to Alaska Department of Fish and Game (ADFG) statistical week 31 (referred to as the treaty period). The AAH is calculated as the total run of Nass and Skeena sockeye salmon minus either the escapement requirement of 1.1 million (200,000 Nass and 900,000 Skeena) or the actual in-river escapement, whichever is less.

The District 104 purse seine fishery opens by regulation on the first Sunday in July. In 2015, the initial opening was July 5 (week 28). The pre-week 31 fishing plan for District 104 was based on the preseason Canadian Department of Fisheries and Oceans (DFO) forecast returns of approximately 4,227,000 Nass and Skeena sockeye salmon. Using this forecast, the 2015 pre-week 31 AAH was approximately 76,600 Nass and Skeena sockeye salmon in the District 104 purse seine fishery. In the 2015 Treaty period (Alaska statistical weeks 28-30), 43,873 sockeye were harvested during two 15-hour openings in Week 28; one 15-hour opening in Week 29, and 15 and 10-hour openings in week 30 (Table 1). A total of 98 purse seine vessels fished at some time in the district during the Treaty period. In past years 60% to 80% of Treaty-period sockeye salmon have been of Nass and Skeena origin, therefore we would anticipate between 26,000 and 35,000 Nass and Skeena sockeye may have been harvested in the District 104 purse seine fishery during the 2015 Treaty period. The final number of Nass and Skeena sockeye salmon harvested, and the actual harvest by stock, will not be available until harvest, escapement, and stock composition estimates are finalized for the year.

In 2015, a total of 4,017,996 pink salmon, 494,286 sockeye salmon, 216,741 chum salmon, 66,427 coho salmon, and 8,690 Chinook salmon were harvested in the District 104 purse seine fishery (Table 1). The number of days that the fishery was open was near the treaty period (1985-2014) average (Figure 1), but the number of boats fishing was below average throughout the season (Figure 2). Chinook salmon could not be retained until the second opening in week 31 in the District 104 purse seine fishery, but the total harvest was above average due to strong catches in weeks 31 and 32 (Figure 3). Sockeye salmon harvests were below average early in the season (Figure 4) and the treaty period (week 28-30) harvest of 43,873 was only 43% of the 1985–2014 average. The total sockeye salmon harvest of 494,286 was near the 1985–2014 average of 482,000 fish. Harvests of coho salmon were below average in most weeks (Figures 5) and the overall harvest was only 56% of the long-term average. Pink salmon harvests were also below average throughout the season and the overall harvest was only 46% of the long-term average (Figure 6). Chum salmon harvests were below average early and late in the season, but were near average from weeks 30 to 32 (Figure 7).

Since the Pacific Salmon Treaty was signed in 1985, the number of hours open, boats fishing and boat-days fished in the pre-Week 31 annex period in District 104 are down 55%, 61% and 84% respectively compared to the averages in the pre-treaty 1980-1984 period (Table 2). The total pre-week 31 Treaty-period sockeye salmon harvest is also down 47%. The seine fleet moves freely between districts as various species are harvested, so seining opportunities elsewhere affect the effort and catch in District 104.

Table 1.–Catch and effort in the Alaska District 104 purse seine fishery, 2015.

Week/ Opening	Start Date	Chinook	Sockeye	Coho	Pink	Chum	Boats	Hours
28	7/5	0	3,948	2,590	6,451	3,927	11	15
28B	7/9	0	2,439	2,238	6,313	4,475	14	15
29	7/12	0	5,844	5,694	16,170	6,287	11	15
30	7/19	0	15,987	2,668	74,652	7,905	7	15
30B	7/23	0	15,655	4,797	121,628	14,015	33	10
31	7/26	0	46,059	7,051	265,114	16,993	38	15
31B	7/31	2,302	88,391	15,201	782,374	36,993	63	39
32	8/4	1,242	57,736	5,523	579,758	25,142	47	39
32B	8/8	4,167	87,125	8,824	723,298	32,604	59	39
33	8/12	849	50,617	3,723	436,577	17,785	43	39
33B	8/16	46	40,593	2,206	290,342	14,725	45	39
34	8/21	0	49,976	1,891	320,507	16,307	35	39
35	8/24	0	17,511	2,117	246,043	10,200	31	39
35B	8/28	84	12,405	1,904	148,769	9,383	29	39
							Permits Fished	
Weeks 28-30		0	43,873	17,987	225,214	36,609	39	70
Weeks 31-35		8,690	450,413	48,440	3,792,782	180,132	92	327
Total		8,690	494,286	66,427	4,017,996	216,741	98	397

Table 2.–Fishing opportunity, effort, and sockeye salmon harvest prior to week 31 in the District 104 purse seine fishery, 1980–2015.

Year	Hours Fished	Individual Permits Fished	Days Fished (1d=15hrs)	Approximate Boat-Days	Sockeye Harvest	Sockeye Catch per Boat-Day
1980	207	244	13.8	2,877	266,273	93
1981	132	212	8.8	1,108	185,188	167
1982	117	255	7.8	1,435	213,150	149
1983	108	241	7.2	1,211	170,306	141
1984	132	174	8.8	805	103,319	128
1985	84	141	5.6	502	100,590	200
1986	108	194	7.2	968	91,320	94
1987	90	134	6	457	72,385	158
1988	108	210	7.2	994	248,789	250
1989	84	135	5.6	438	157,566	360
1990	42	171	2.8	276	169,943	615
1991	41	134	2.7	243	98,583	406
1992	29	108	1.9	142	79,643	561
1993	45	171	3	343	163,189	476
1994	55	84	3.7	202	158,524	783
1995	58	109	3.9	218	71,376	328
1996	31	113	2.1	128	215,144	1,684
1997	56	159	3.7	409	572,942	1,402
1998	32	78	2.1	89	17,394	196
1999	30	38	2	44	7,664	174
2000	81	66	5.4	192	48,969	255
2001	50	95	3.3	182	203,090	1,115
2002	72	44	4.8	124	26,554	215
2003	52	40	3.5	97	84,742	875
2004	107	24	7.1	102	30,758	302
2005	68	38	4.5	93	35,690	382
2006	95	39	6.3	117	89,615	766
2007	50	68	3.3	136	112,135	824
2008	33	17	2.2	22	6,262	281
2009	72	38	4.8	95	15,971	168
2010	55	21	3.7	39	4,617	118
2011	84	29	5.6	77	25,280	329
2012	75	30	5.0	93	18,300	196
2013	46	36	3.1	59	13,102	222
2014	60	101	4	260	115,015	442
2015	70	39	4.7	100	43,873	439
Avg. 80-84	139	225	9	1,487	187,647	136
Avg. 85-15	63	87	4	234	99,969	472
% Change	-55%	-61%	-55%	-84%	-47%	248%

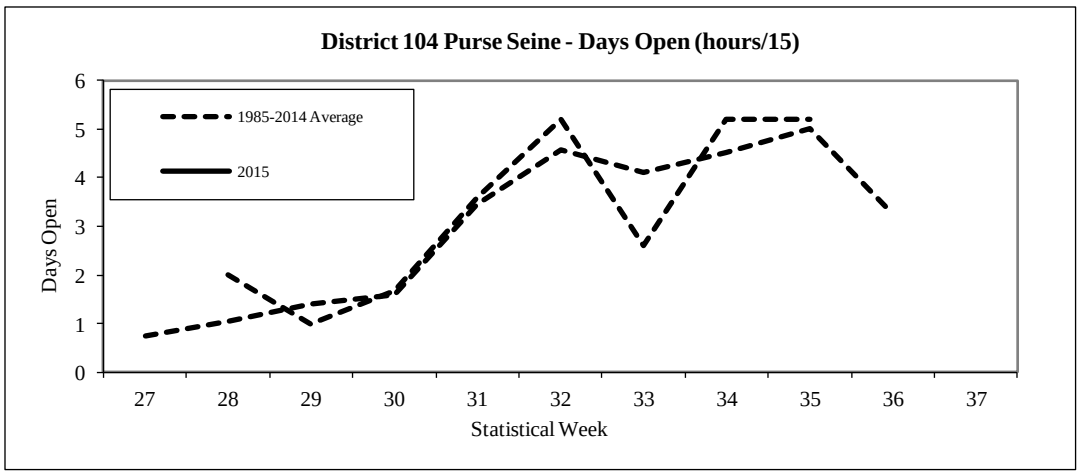


Figure 1.–Days open by week in the District 104 purse seine fishery, 2015.

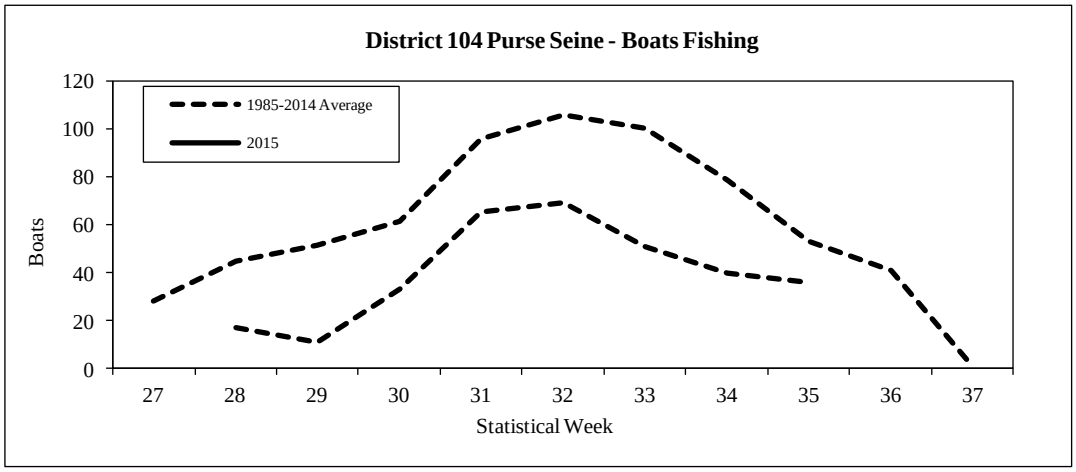


Figure 2.–Number of boats fishing by week in the District 104 purse seine fishery, 2015.

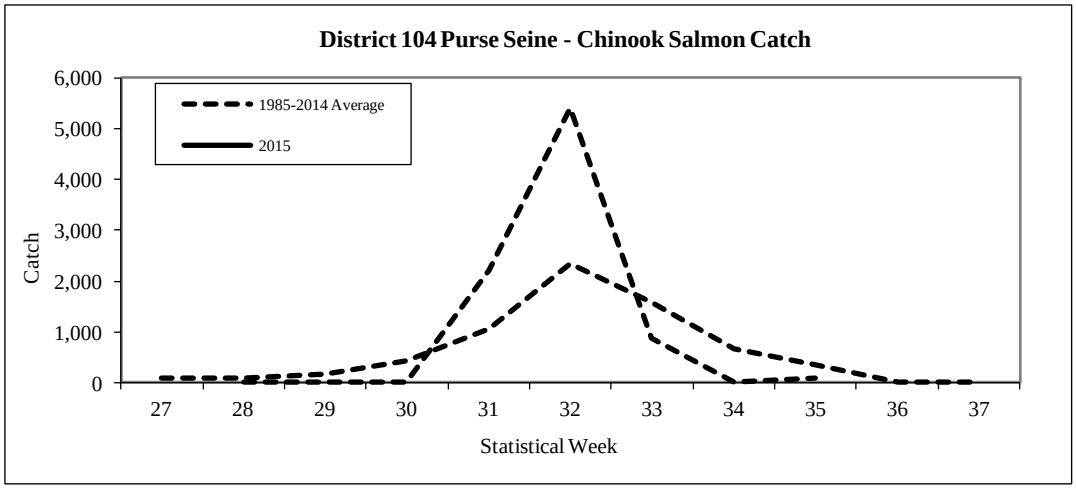


Figure 3.–Chinook salmon harvest by week in the District 104 purse seine fishery, 2015.

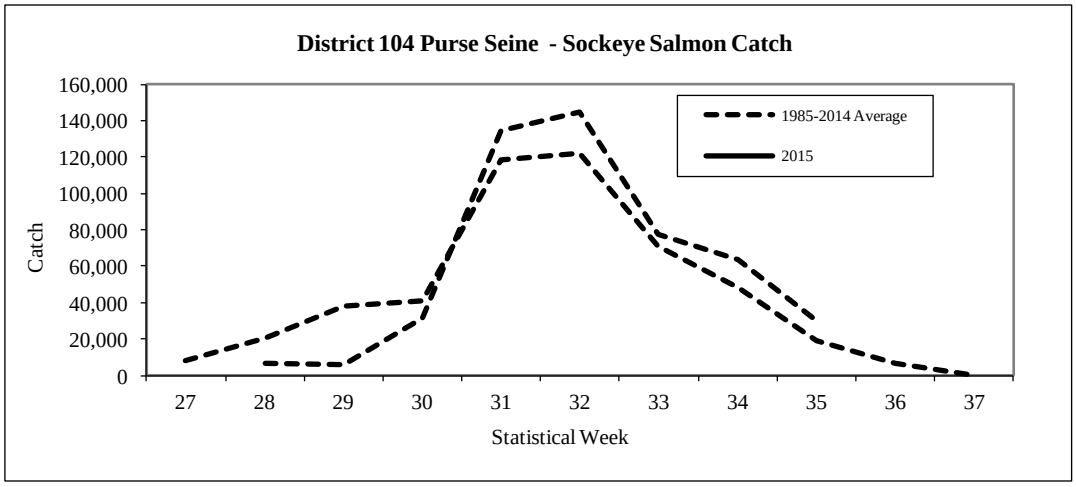


Figure 4.–Sockeye salmon harvest by week in the District 104 purse seine fishery, 2015.

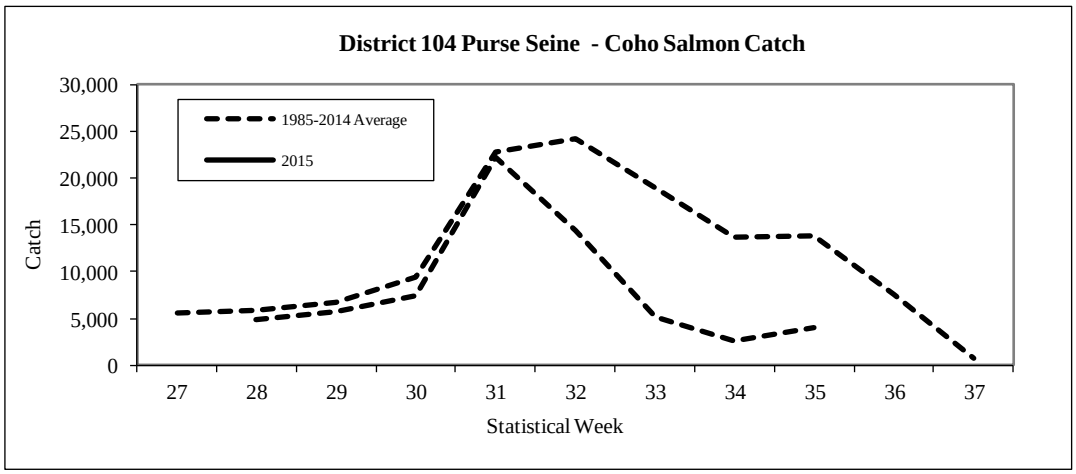


Figure 5.–Coho salmon harvest by week in the District 104 purse seine fishery, 2015.

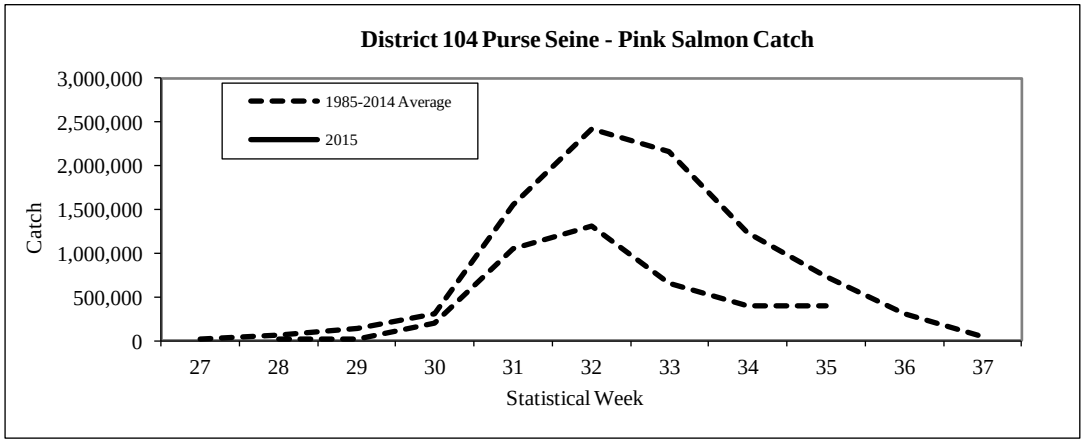


Figure 6.–Pink salmon harvest by week in the District 104 purse seine fishery, 2015.

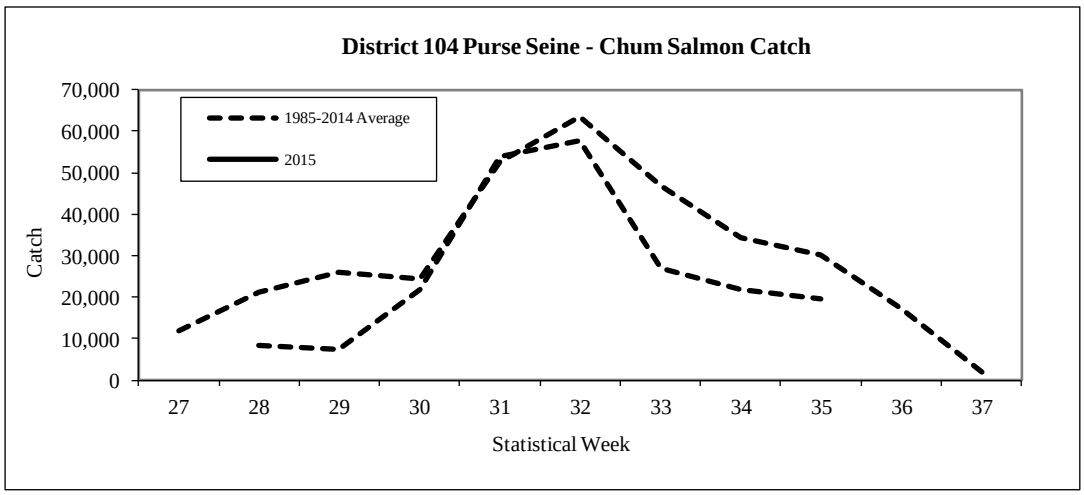


Figure 7.–Chum salmon harvest by week in the District 104 purse seine fishery, 2015.

District 101 Drift Gillnet Fishery

The 2009 PST agreement calls for abundance based management of the District 101 (Tree Point) drift gillnet fishery. The agreement specifies a harvest of 13.8 percent of the AAH of the Nass River sockeye run. The AAH is calculated as the total run of Nass sockeye salmon minus either the escapement requirement of 200,000 or the actual in-river escapement, whichever is less. The return of Nass sockeye salmon was forecast at 727,000 in 2015 which, minus an escapement goal of 200,000, would result in an AAH of about 527,000. Using this forecast, the 2015 allowable harvest in the District 101 drift gillnet fishery was approximately 72,700 Nass River sockeye salmon.

The District 101 drift gillnet fishery opens by regulation on the third Sunday in June, which was June 21 in 2015. During the early weeks of the fishery, management is based on the run strength of Alaska wild stock chum and sockeye salmon and on the run strength of Nass River sockeye salmon. Beginning in the third week of July, when pink salmon stocks begin to enter the fishery in large numbers, management emphasis shifts by regulation to that species. By regulation, the District 101 Pink Salmon Management Plan begins the third Sunday in July and sets gillnet fishing time in this district in relation to the District 101 purse seine fishing time. Beginning in Week 35 (August 23) management was based on the strength of wild stock fall chum and coho salmon.

The District 101 drift gillnet fishery opened Sunday June 21 (week 26) in 2015. The number of days the fishery was open was near average all season (Figure 8), but the number of boats fishing during weekly openings was below average throughout the season (Figure 9). The total number of individual boats fishing during the season was 71, which was 65% of the 1985-2014 average of 110 boats. A total of 28,155 sockeye salmon were harvested, which was only 23% of the 1985-2014 average of 123,017 fish and was the lowest harvest since the inception of the Pacific Salmon Treaty (Table 3). Harvests of sockeye salmon were below treaty period averages throughout the entire season (Figure 10). The cumulative sockeye salmon harvest prior to the initiation of the PSMP in Week 30 was 13,225 fish, or about 47% of the season's total sockeye salmon harvest. The final number of Nass River sockeye harvested at Tree Point will not be available until catch, escapement, and stock composition estimates are finalized for the 2015

season. In past years approximately 65% of the District 101 gillnet sockeye harvest has been of Nass River origin, therefore we would anticipate that approximately 18,000 Nass River sockeye may have been harvested in the District 101 gillnet fishery in 2015.

Coho salmon harvests were below average for most weeks of the season and the total harvest of 39,768 fish was 80% of the treaty period average (Figure 11). Pink salmon harvests were poor all season and the total harvest of 148,141 fish was only 28% of average (Figure 12). Chum salmon harvests were above average in most weeks of the fishery and the total harvest of 452,759 fish was 151% of average (Figure 13). Chinook salmon harvests were near average throughout the season (Figure 14).

Table 3.–Weekly harvest and effort in the Alaska District 101 commercial drift gillnet fishery, 2015.

Week	Start Date	Chinook	Sockeye	Coho	Pink	Chum	Boats	Hours
26	6/21	623	3,472	1,290	2,975	13,076	40	96
27	6/28	275	5,504	505	6,469	17,299	41	96
28	7/5	112	2,684	392	11,271	33,465	36	96
29	7/12	74	1,565	855	10,371	52,738	38	96
30	7/19	58	2,222	1,866	26,665	73,798	44	96
31	7/26	51	2,960	1,204	20,862	78,493	49	96
32	8/2	29	2,783	1,869	26,157	36,819	45	96
33	8/9	42	4,395	2,233	20,378	22,538	38	96
34	8/16	3	831	1,137	9,814	9,011	21	48
35	8/23	6	949	2,725	10,007	30,234	33	96
36	8/30	8	514	4,341	2,533	37,705	41	96
37	9/6	7	192	6,646	606	27,151	40	96
38	9/13	1	64	6,947	32	12,830	36	96
39	9/20	1	18	6,224	1	6,588	20	96
40	9/27	0	2	1,534	0	1,014	14	96
Total		1,290	28,155	39,768	148,141	452,759	73	1,392
1985-2014 Avg.		1,490	123,017	49,907	520,493	300,082	111	1,363

Table 4.–Sockeye salmon harvest in the Alaska District 101 gillnet fishery, 1985 to 2015, and comparison of harvest and effort (boats, hours, and boat-hours) between weeks 26 and 35 when sockeye salmon are most abundant in this district.

Year	Total Sockeye Harvest	Catch and Effort between Weeks 26-35			
		Sockeye Harvest	Individual Permits Fished	Total Hours Open	Boat-Hours[1]
1985	173,100	159,021	155	1,032	106,209
1986	145,699	143,286	201	960	109,490
1987	107,503	106,638	178	615	64,104
1988	116,115	115,888	192	756	93,072
1989	144,936	130,024	178	1,023	117,465
1990	85,691	78,131	159	840	70,421
1991	131,492	123,508	136	984	80,064
1992	244,649	243,878	118	1,080	94,159
1993	394,098	390,299	149	1,032	102,814
1994	100,377	98,725	144	984	74,408
1995	164,294	151,131	140	1,008	82,512
1996	212,403	175,569	130	1,104	86,108
1997	169,474	152,662	138	1,008	81,672
1998	160,506	159,307	124	1,044	87,358
1999	160,028	158,268	118	1,032	80,424
2000	94,651	94,399	95	912	49,488
2001	80,041	62,129	76	1,020	46,874
2002	120,353	106,360	76	1,008	42,528
2003	105,263	96,921	71	1,104	44,008
2004	142,357	141,395	61	1,104	42,400
2005	79,725	75,875	70	1,104	40,864
2006	62,770	53,048	48	840	28,265
2007	66,822	50,642	56	1,032	33,713
2008	34,113	30,672	54	936	31,961
2009	69,859	69,325	65	1,080	43,432
2010	62,680	61,987	68	1,008	45,135
2011	88,618	87,744	87	840	47,627
2012	62,506	40,518	85	1,008	43,695
2013	54,575	45,413	92	1,104	59,437
2014	55,828	49,722	73	1,095	44,551
2015	28,155	27,365	71	912	35,946
Average 1985-2014	123,017	115,083	110	987	64,845

[1]Boat-hours equals the sum of all weekly estimates of boat-hours: boats fished multiplied by open hours. Boat-hours does not equal individual permits fished multiplied by total open hours.

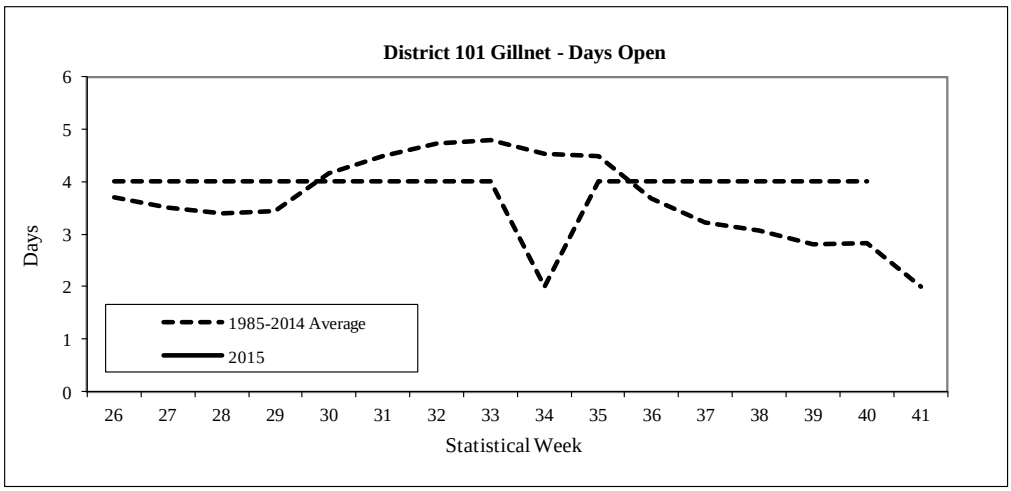


Figure 8.–Days open by week in the District 101 drift gillnet fishery, 2015.

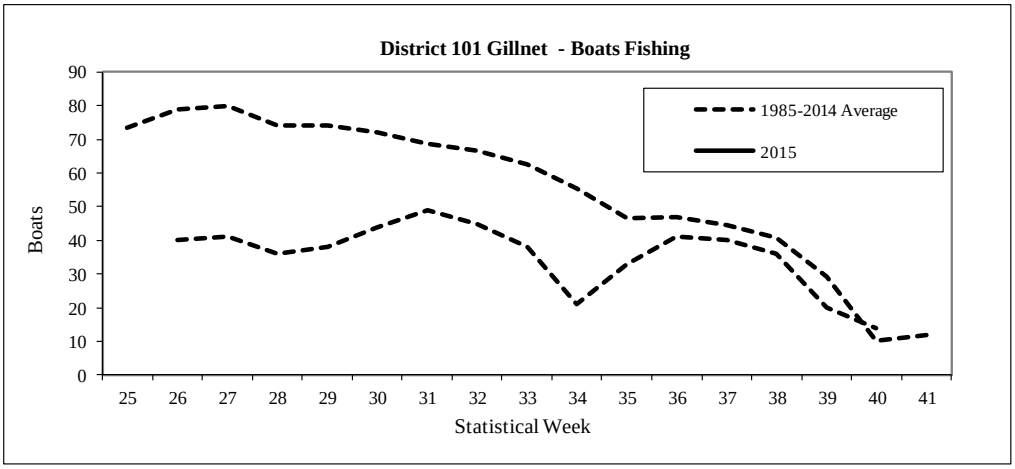


Figure 9.–Number of boats fishing by week in the District 101 drift gillnet fishery, 2015.

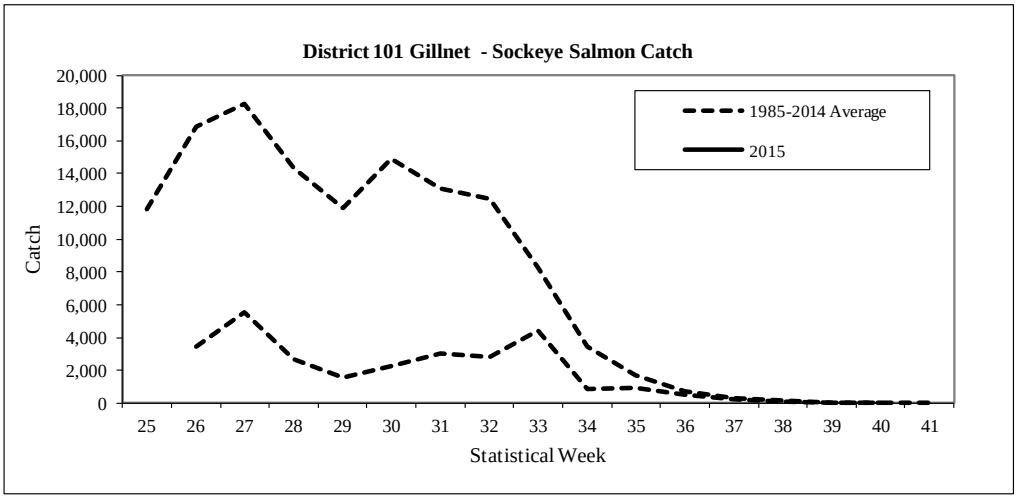


Figure 10.–Sockeye salmon harvest by week in the District 101 drift gillnet fishery, 2015.

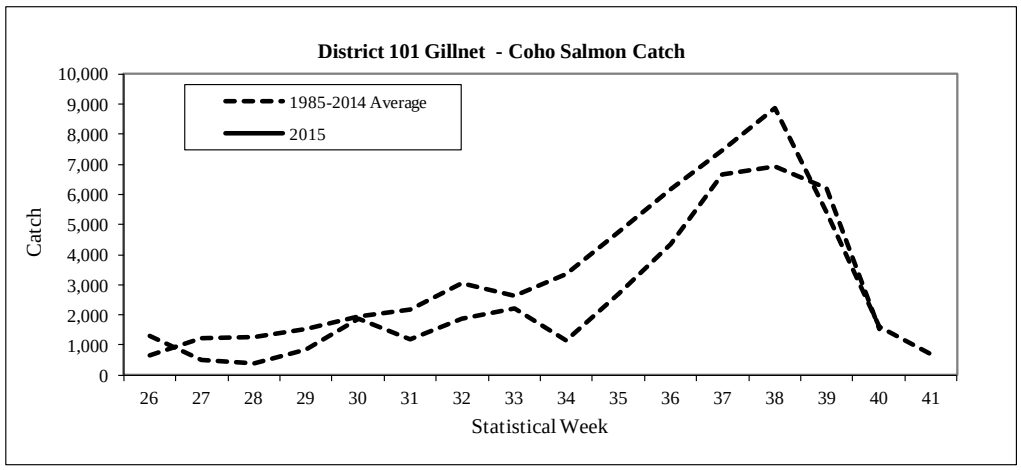


Figure 11.–Coho salmon harvest by week in the District 101 drift gillnet fishery, 2015.

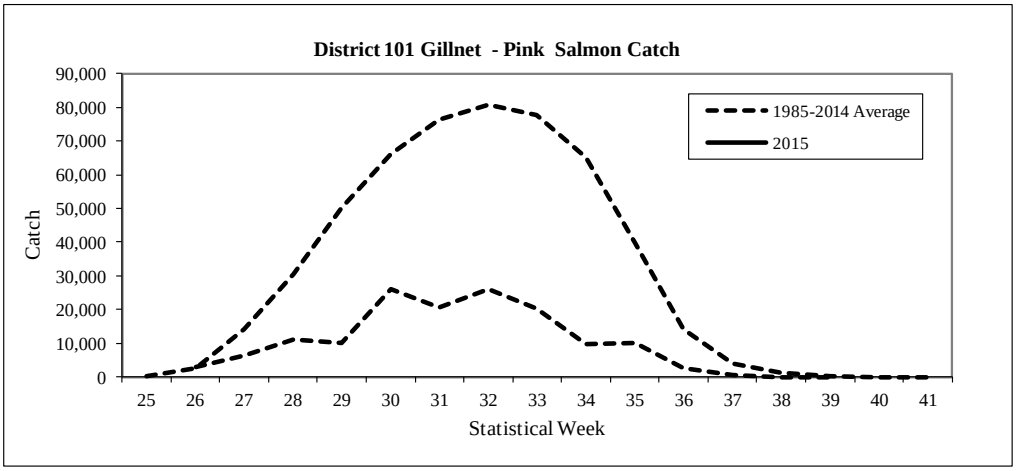


Figure 12.–Pink salmon harvest by week in the District 101 drift gillnet fishery, 2015.

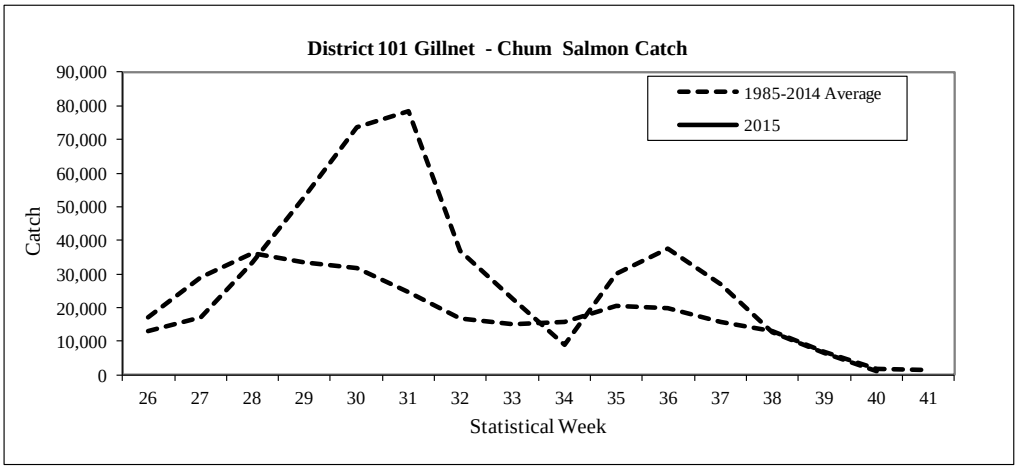


Figure 13.–Chum salmon harvest by week in the District 101 drift gillnet fishery, 2015.

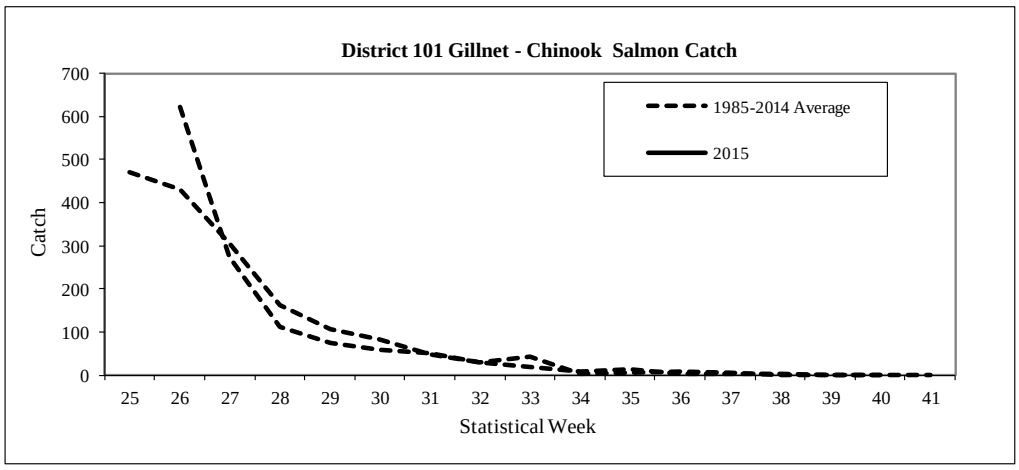


Figure 14.–Chinook salmon harvest by week in the District 101 drift gillnet fishery, 2015.

Pink, Sockeye, and Chum Salmon Escapements

Escapements of pink salmon were generally very strong throughout northern Southeast Alaska, but were below average throughout much of southern Southeast Alaska. The total 2015 Southeast Alaska pink salmon escapement index of 12.39 million index fish ranked 18th since 1960. Biological escapement goals were met in the Southern Southeast and Northern Southeast Inside subregions, and exceeded in the Northern Southeast Outside Subregion in 2015 (Table 5). On a finer scale, escapements met or exceeded management targets for all 15 districts in the region and for 42 of the 46 pink salmon stock groups in Southeast Alaska. The Southern Southeast Subregion includes all of the area from Sumner Strait south to Dixon Entrance (Districts 101–108). The escapement index value of 4.3 million was within the escapement goal range of 3.0 to 8.0 million index fish, but was the lowest index since 1988 and the lowest odd-year escapement index since 1979. The pink salmon harvest of 12.5 million in the Southern Southeast Subregion was only 53% of the recent 10-year average. The overall Southeast Alaska pink salmon harvest of 35.1 million fish was below the 2005–2014 average of 40.6 million, and was the lowest odd-year harvest since 1997.

Table 5.–Southeast Alaska 2015 pink salmon escapement indices and biological escapement goals by subregion (in millions).

Subregion	2015 Pink Salmon Index	Biological Escapement Goal Lower Bound	Biological Escapement Goal Upper Bound
Southern Southeast	4.30	3.0	8.0
Northern Southeast Inside	5.25	2.5	6.0
Northern Southeast Outside	2.84	0.75	2.50
Total	12.39		

Sockeye salmon returns throughout Southeast Alaska were generally strong in 2015, and escapement targets were met for 12 of the 13 sockeye salmon systems with formal escapement goals. The Hugh Smith Lake adult sockeye salmon escapement was 21,300, which was above the optimal escapement goal range of 8,000 to 18,000 adult sockeye salmon. Based on the expanded peak foot survey count, the escapement of sockeye salmon into McDonald Lake was estimated to be 70,200 fish, which was within the sustainable escapement goal range of 55,000 to 120,000.

For summer-run chum salmon, lower bound sustainable escapement goals were met for all three subregions in Southeast Alaska. In Southeast Alaska, runs are broken into summer and fall runs. The Southern Southeast summer-run chum salmon stock group is composed of an aggregate of 15 summer-run chum salmon streams on the inner islands and mainland of southern Southeast Alaska, from Sumner Strait south to Dixon entrance, with a sustainable escapement goal of 62,000 index spawners (based on the aggregate peak survey to all 15 streams). Summer chum salmon escapements were excellent at most index streams in southern Southeast Alaska, and the index of 115,000 in 2015 was well above goal (Figure 15).

Cholmondeley Sound is the only area in southern Southeast Alaska with a formal escapement goal for fall chum salmon. Fall chum salmon runs are monitored in Cholmondeley Sound through aerial surveys at Disappearance and Lagoon creeks. The escapement index of 73,000 was well above the upper bound of the sustainable escapement goal range of 30,000 to 48,000 index spawners (based on the aggregate peak survey to both streams; Figure 16).

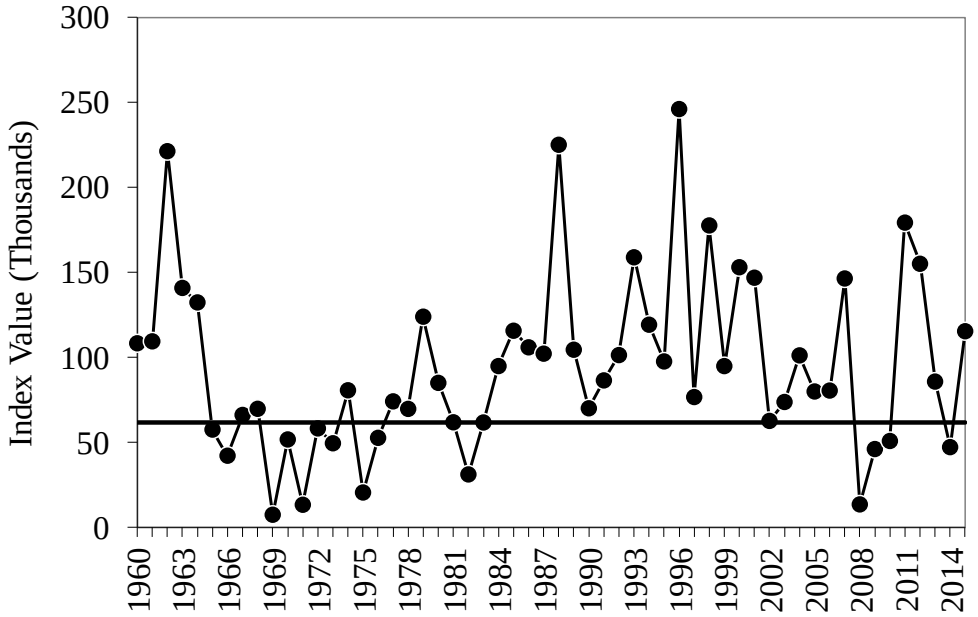


Figure 15.–Observed escapement index value by year (solid circles) and the sustainable escapement goal threshold of 62,000 index spawners (horizontal line) for wild summer-run chum salmon in the Southern Southeast Subregion, 1980–2015.

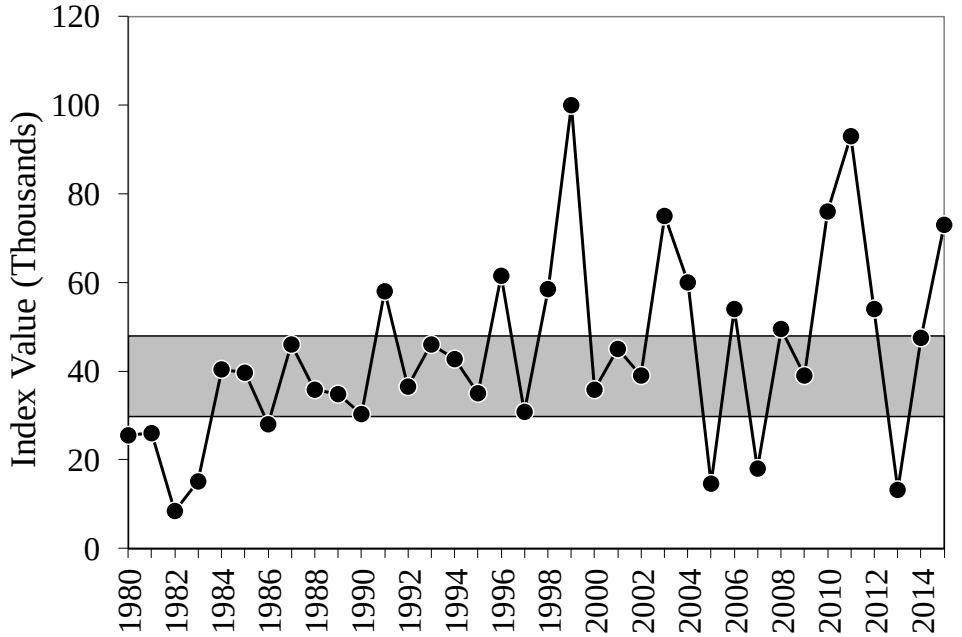


Figure 16.–Observed escapement index value by year (solid circles) and the sustainable escapement goal range of 30,000 to 48,000 index spawners (shaded area) for Cholmondeley Sound fall-run chum salmon, 1980–2015.

TRANSBOUNDARY AREA FISHERIES

Stikine River Area Fisheries

Commercial troll and drift gillnet fisheries directed at harvesting Stikine River Chinook salmon did not occur in 2015. The initial preseason forecast for large Chinook salmon returning to the Stikine River was approximately 30,200 fish, which was not large enough to allow for directed Chinook salmon fisheries in District 108. Since terminal Chinook salmon run projections were not available early in the season due to river conditions that negatively affected the stock assessment program, the management of District 108 commercial fisheries was based on the preseason forecast. The preliminary postseason run reconstruction for large Chinook salmon returning to the Stikine River was 27,000 fish, with an escapement of 21,300 fish; within the goal range of 14,000 to 28,000 fish.

The 2015 preseason forecast for sockeye salmon returning to the Stikine River was 171,200 fish, which was below the recent 10-year average of 179,300 fish. The 2015 forecast included approximately 50,400 wild Tahltan (29%), 31,100 enhanced Tahltan (18%), 34,000 enhanced Tuya (20%), and 55,700 mainstem (33%) sockeye salmon. Due to the near identical return timing of the Tahltan Lake and Tuya Lake stocks, any open fishing periods in District 108, and to a lesser extent in District 106, are determined by the inseason abundance estimate of the Tahltan Lake return. Typically, the Tahltan Lake and Tuya Lake sockeye salmon run timing peaks in statistical week 27 (June 30–July 6) through the Districts 106 and 108 fisheries. During an average Tahltan Lake run significant numbers of sockeye salmon could be present as early as statistical week 24 (June 9–15) and as late as statistical week 31 (July 28–August 3). The 2015 returns of local area sockeye salmon stocks were expected to be average.

The District 106 and 108 drift gillnet fisheries opened for an initial two-day period on Monday, June 15 (week 25). Surveys of the gillnet fleet did not indicate an abundance of sockeye salmon significantly above the preseason forecast and no additional fishing time occurred. The fisheries opened for three days on June 21 (week 26). Surveys of the fleet indicated near average catch rates and very low effort, therefore a 24-hour extension occurred. In week 27, the fisheries opened for an initial four–day period, but no additional time was granted due to uncertainty over sockeye salmon abundance. In week 28 the fisheries opened for an initial three-day period. The inseason abundance estimate for Stikine River sockeye salmon was 123,400 fish, which was below the preseason forecast, but above the prior week's estimate. Combined with below average effort and above average sockeye salmon abundance observed in the fisheries there was a 24-hour extension. Sockeye salmon abundance estimates continued to increase through the remainder of the season and the Districts 106 and 108 drift gillnet fisheries continued to open for at least three days weekly through mid-August (Figures 17 and 24). The final inseason assessment for Stikine River sockeye salmon was 189,000 fish and included 40,100 wild Tahltan, 31,800 enhanced Tahltan, 51,800Tuya, and 65,500 Mainstem sockeye salmon.

Districts 106 and 108 were managed based on pink salmon abundance during the month of August. Three day openings occurred in weeks 32 through 34 and the final opening for pink salmon management was for two days in week 35 (Figures 17 and 24). In early September, management focus switched to coho salmon and the fisheries continued to be open for two or three days weekly through the remainder of the fisheries. The number of boats participating in the District 106 fishery was below average early in the season, above average from mid-July to

mid-August (weeks 30–33), and below average through the end of the season (Figure 18). The number of boats participating in the District 108 fishery followed a similar pattern to District 106 (Figure 25).

During the 2015 season, 224,816 pink salmon, 121,921 sockeye salmon, 232,390 chum salmon, 112,561 coho salmon, and 2,723 Chinook salmon were harvested in the District 106 drift gillnet fishery (Table 6). Chinook salmon harvests were generally above average from late June through mid-July (Figure 19) and were comprised of 64% Alaska hatchery origin fish. Sockeye salmon harvests were below average in the first two weeks of the season, but then increased to above average in most weeks through the end of August (Figure 20). The total sockeye salmon harvest of 121,921 fish was 144% of the recent 10-year average and 14,000 were estimated to be of Stikine River origin. Harvests of coho salmon were above average in most weeks through early August, but were well below average for the remainder of the season. The overall harvest of 112,561 coho salmon was 78% of the recent 10-year average of 144,000 fish (Figure 21). Pink salmon harvests were also below average in many weeks (Figure 22), and the overall harvest of 224,816 fish was 78% of the recent 10-year average. Chum salmon harvests were above average primarily due to very strong harvests from mid-July to early August (Figure 23).

During the 2015 season, 35,926 pink salmon, 22,896 sockeye salmon, 166,009 chum salmon, 30,153 coho salmon, and 13,845 Chinook salmon were harvested in the District 108 drift gillnet fishery (Table 7). Although there were no directed Chinook salmon fisheries early in the season, harvest was above average from late June to late July and was comprised of 94% Alaska hatchery origin fish (Figure 26). An estimated 1,438 Stikine River large Chinook salmon were harvested in District 108 from weeks 18 through 29 by subsistence, sport, troll, and drift gillnet fisheries. Primarily due to very few boats targeting sockeye salmon in District 108, sockeye salmon catches were well below average during the peak weeks of the season (Figure 27) and the total sockeye salmon harvest of 22,896 fish was only 51% of the recent 10-year average. An estimated 16,100 fish, or 70% of the harvest, were estimated to be Stikine River sockeye salmon. The overall coho salmon harvest of 30,153 was very close to the recent 10-year average of 31,929 fish (Table 7, Figure 28). Pink salmon harvests were below average most of the season and the overall harvest was 67% of the recent 10-year average (Figure 29). Chum salmon harvests were below average early in the season, but above average after mid-July and the overall harvest of 166,009 fish was just over the recent 10-year average (Figure 30).

Table 6.–Weekly salmon harvest in the Alaskan District 106 commercial drift gillnet fisheries, 2015. Harvests do not include Blind Slough terminal area harvests.

Week	Start Date	Chinook	Sockeye	Coho	Pink	Chum	Boats	Days	Boat Days
25	15-Jun	202	1,686	1,245	168	2,580	35	2	70
26	21-Jun	409	7,279	5,875	4,111	9,689	42	4	168
27	28-Jun	480	12,016	11,268	13,156	6,833	58	4	232
28	5-Jul	606	20,220	11,311	13,217	19,242	51	4	204
29	12-Jul	398	11,913	11,768	14,303	26,716	58	3	174
30	19-Jul	364	18,151	9,567	46,124	34,928	61	3	183
31	26-Jul	89	15,550	7,838	43,296	46,651	62	3	186
32	2-Aug	104	15,986	7,717	47,432	32,016	80	3	240
33	9-Aug	26	9,009	5,127	22,513	15,215	63	3	189
34	16-Aug	12	5,466	3,103	9,991	6,282	34	3	102
35	23-Aug	2	2,626	3,378	6,846	8,943	38	2	76
36	30-Aug	2	1,064	4,556	2,538	6,242	35	2	70
37	6-Sep	15	784	11,554	889	7,992	61	3	183
38	13-Sep	8	161	14,448	222	7,617	70	3	210
39	20-Sep	3	9	3,248	10	1,331	33	3	99
40	27-Sep	3	1	558	0	113	8	2	16
Total		2,723	121,921	112,561	224,816	232,390	130	47	2,401
2005-2014 Average		2,105	84,881	143,698	289,481	171,604	153	49	2,748
2015 as % of Average		129%	144%	78%	78%	135%	85%	96%	87%

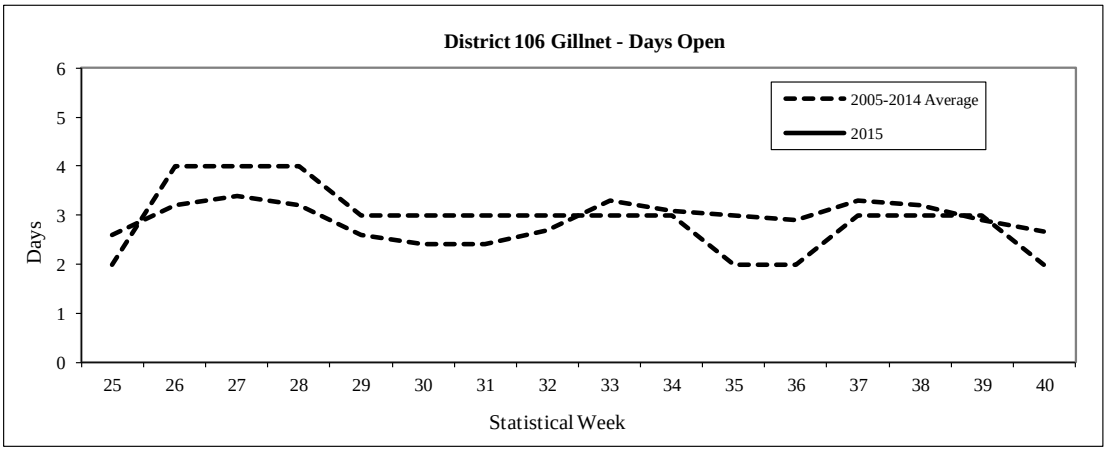


Figure 17.– Days open by week in the District 106 drift gillnet fishery, 2015.

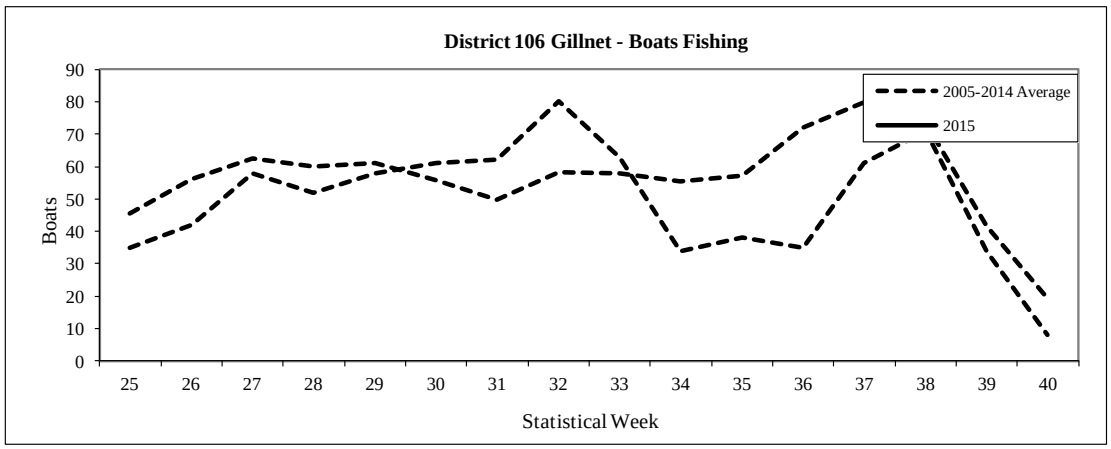


Figure 18.–Number of boats fishing by week in the District 106 drift gillnet fishery, 2015.

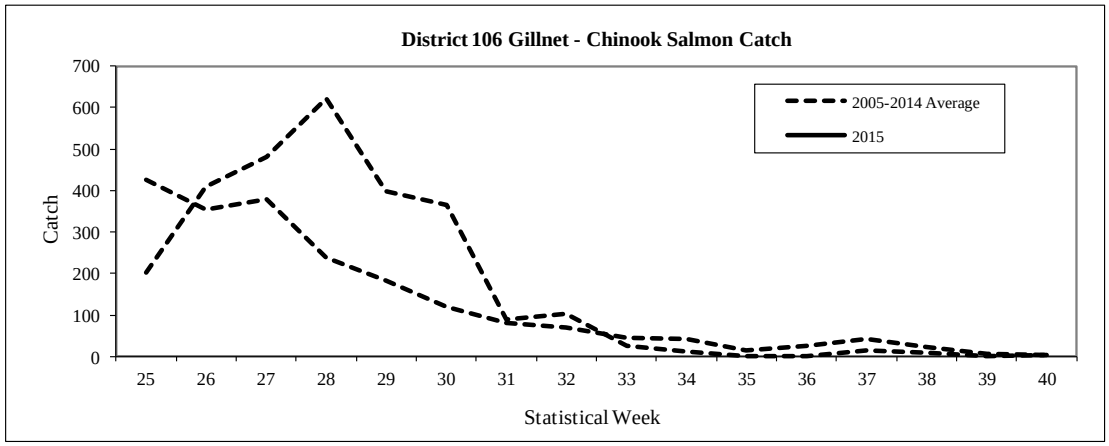


Figure 19.–Chinook salmon harvest by week in the District 106 drift gillnet fishery, 2015.

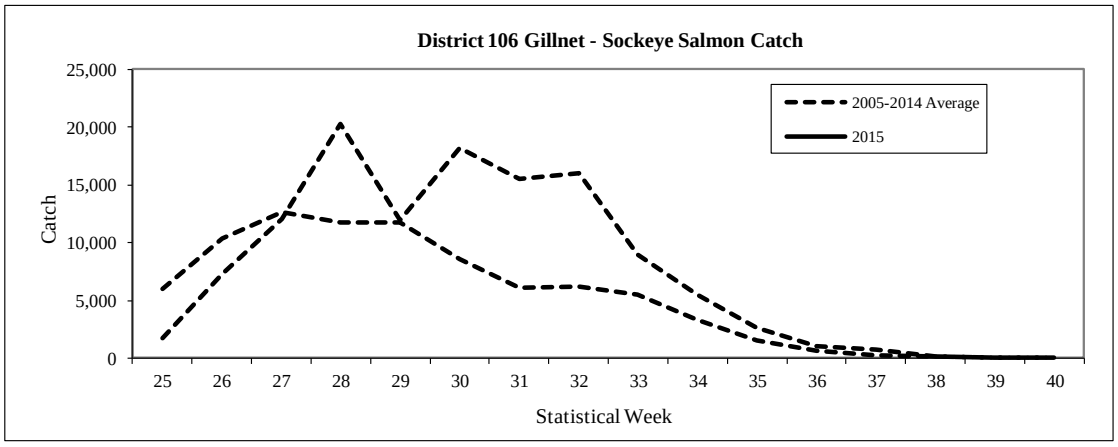


Figure 20.–Sockeye salmon harvest by week in the District 106 drift gillnet fishery, 2015.

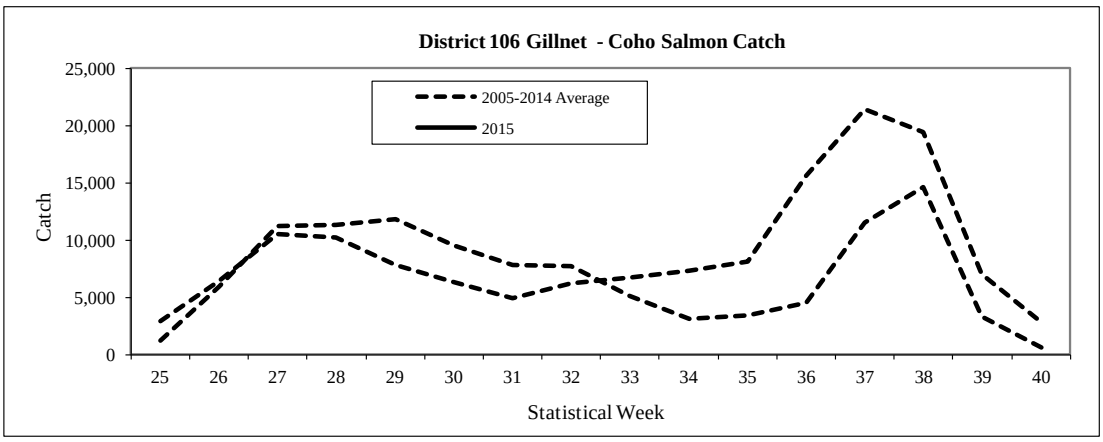


Figure 21.–Coho salmon harvest by week in the District 106 drift gillnet fishery, 2015.

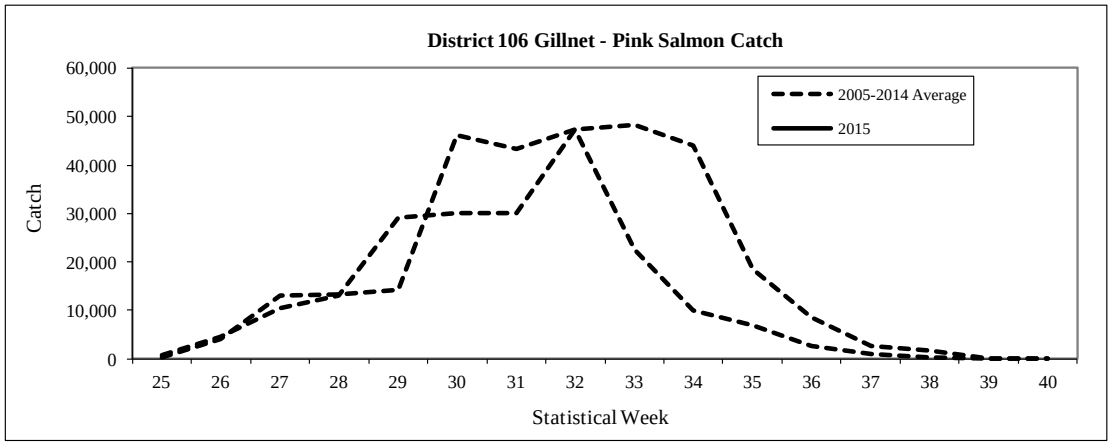


Figure 22.–Pink salmon harvest by week in the District 106 drift gillnet fishery, 2015.

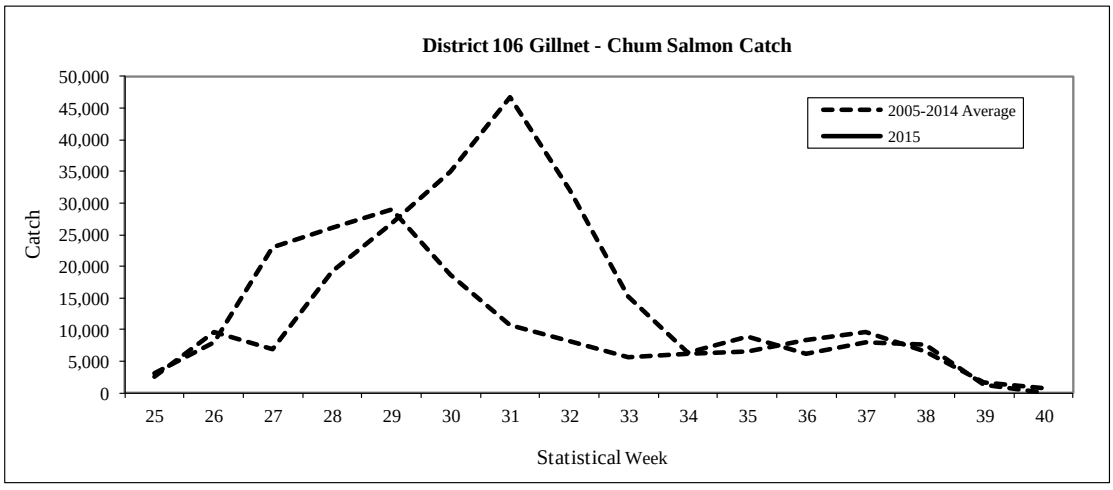


Figure 23.–Chum salmon harvest by week in the District 106 drift gillnet fishery, 2015.

Table 7.–Weekly salmon harvest and effort in the Alaskan District 108 traditional commercial drift gillnet fishery, 2015[a].

Week	Start Date	Chinook	Sockeye	Coho	Pink	Chum	Boats	Days	Boat Days
25	15-Jun	2,014	133	1	1	155	45	2	90
26	21-Jun	3,824	1293	43	48	903	43	4	172
27	28-Jun	2,983	2,796	257	566	2,141	34	4	136
28	5-Jul	2,498	4,149	635	2,336	9,755	37	4	148
29	12-Jul	1,341	4,156	1,264	3,360	14,410	47	4	134
30	19-Jul	719	3,829	1,076	8,505	43,841	70	4	211
31	26-Jul	273	1,976	1,376	8,978	45,196	76	4	232
32	2-Aug	111	1,477	1,100	5,753	26,435	54	3	162
33	9-Aug	42	1,173	1,625	3,337	13,529	58	3	174
34	16-Aug	24	705	1,491	1,150	6,060	39	3	117
35	23-Aug	4	782	1,897	1,677	1,334	28	2	56
36	30-Aug	2	228	1,359	93	606	23	2	46
37	6-Sep	4	157	6,099	115	752	42	3	126
38	13-Sep	1	34	6,859	6	513	28	3	87
39	20-Sep	1	8	4,359	1	360	27	3	81
40	27-Sep	4	0	712	0	19	9	2	20
Total		13,845	22,896	30,153	35,926	166,009	124	50	1,992
2005-2014 Average		12,644	45,033	31,929	53,805	156,611	145	55	2,499
2015 as % of Average		109%	51%	94%	67%	106%	86%	91%	80%

[a] The 2015 District 108 drift gillnet harvest and effort, as well as the 2005–2014 averages, are for the traditional fishery only (directed sockeye salmon portion) fishery. There was no directed Chinook salmon fishery in 2015.
[b] Total boats equals the number of individual permits fished for the year.

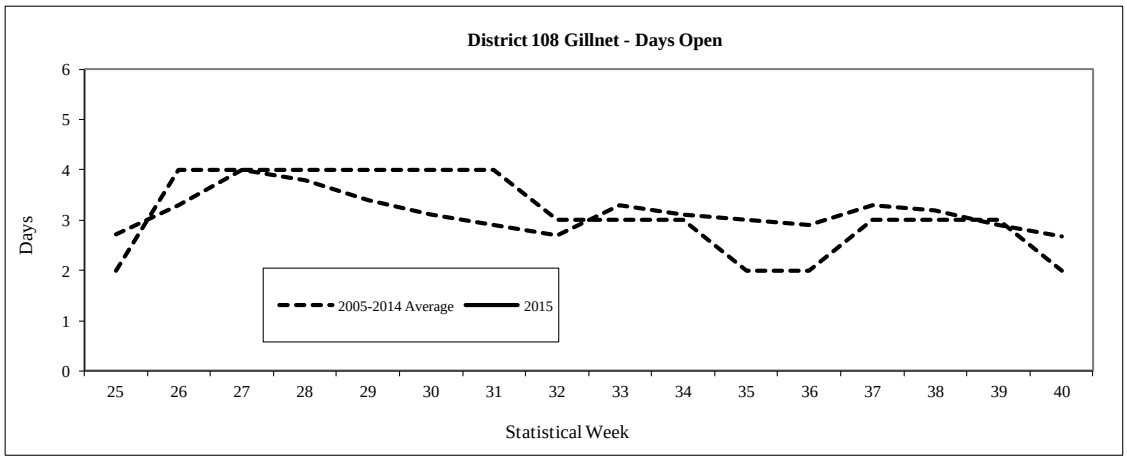


Figure 24.–Days open by week in the District 108 drift gillnet fishery, 2015.

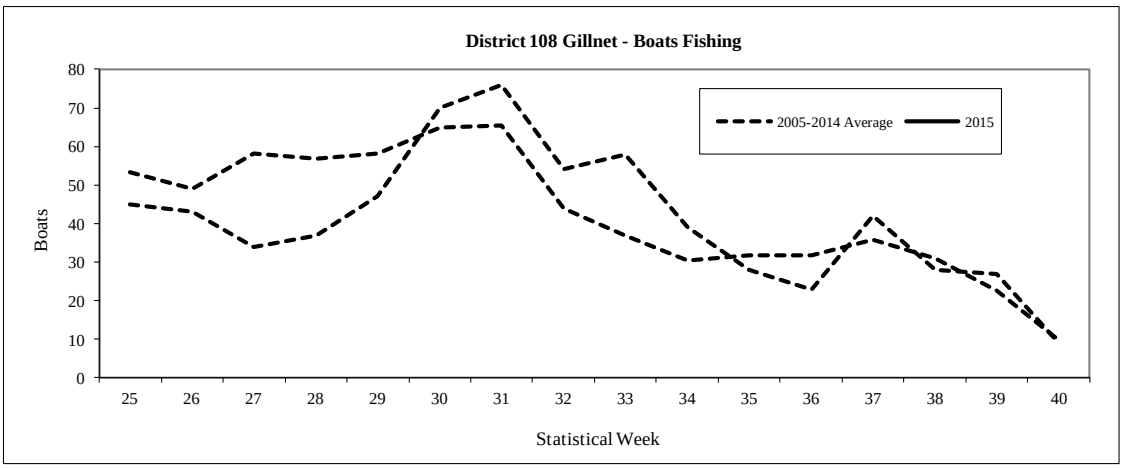


Figure 25.–Number of boats fishing by week in the District 108 drift gillnet fishery, 2015.

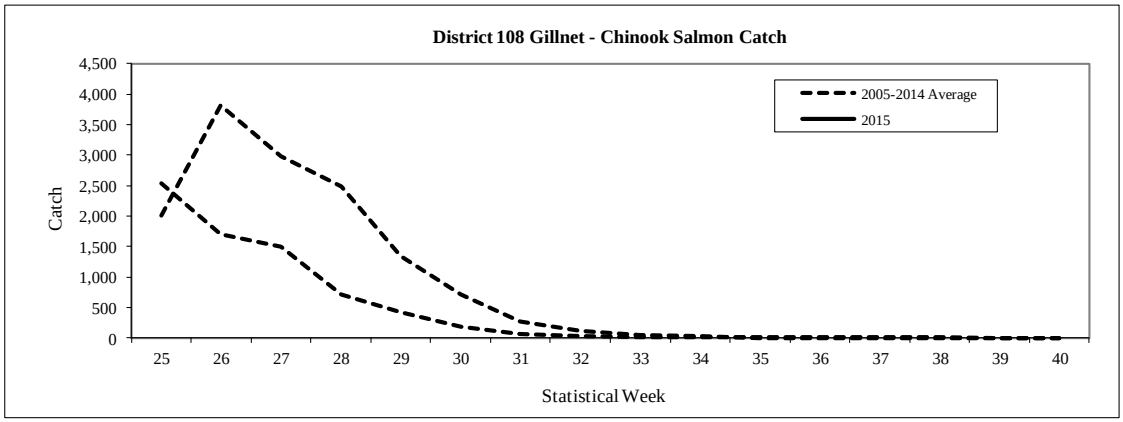


Figure 26.–Chinook salmon harvest by week in the District 108 drift gillnet fishery, 2015.

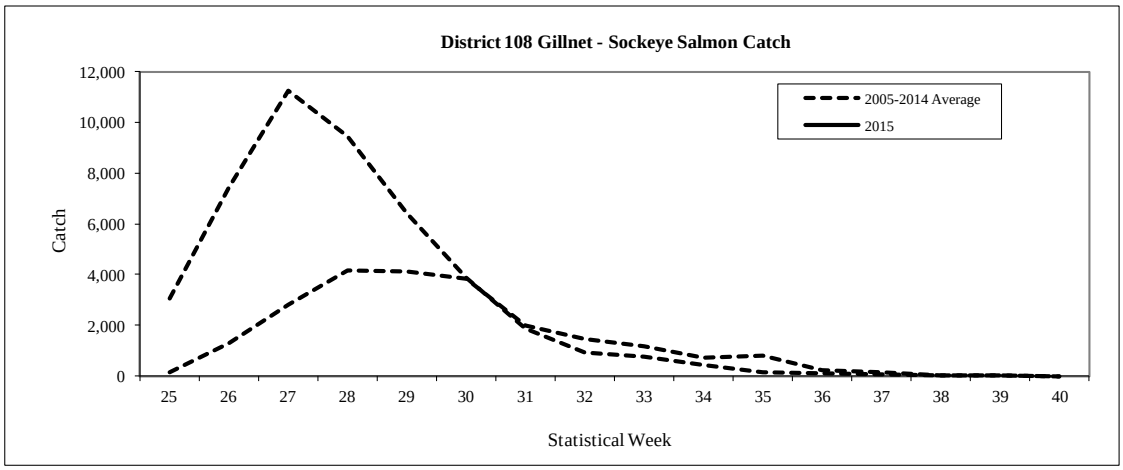


Figure 27.–Sockeye salmon harvest by week in the District 108 drift gillnet fishery, 2015.

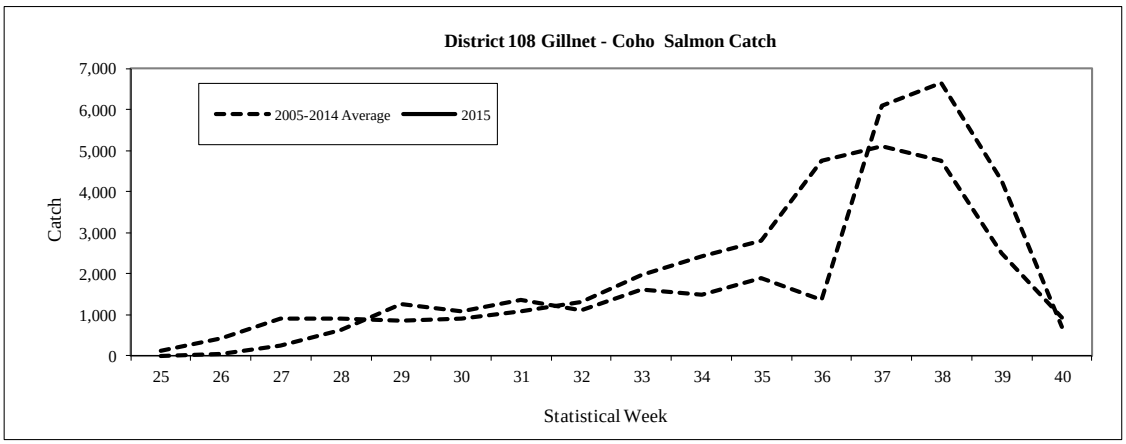


Figure 28.–Coho salmon harvest by week in the District 108 drift gillnet fishery, 2015.

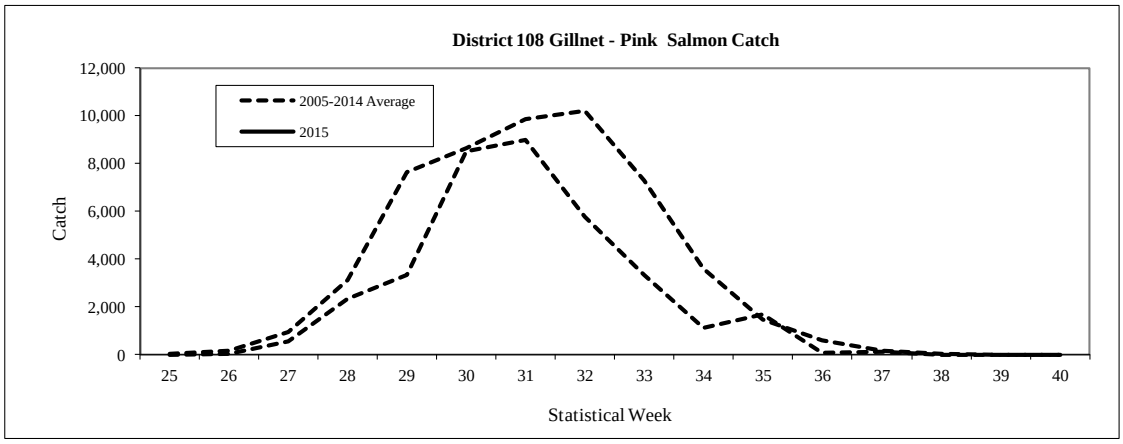


Figure 29.–Pink salmon harvest by week in the District 108 drift gillnet fishery, 2015.

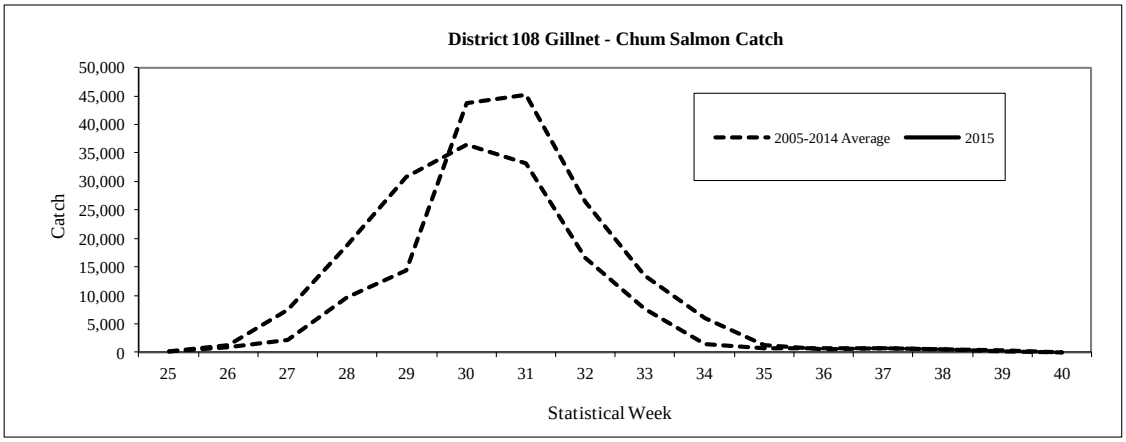


Figure 30.–Chum salmon harvest by week in the District 108 drift gillnet fishery, 2015.

Taku River Area Fisheries

The traditional drift gillnet fishery in District 111 targets salmon stocks bound for the trans-boundary Taku River. This fishery is managed for Chinook salmon from week 18 to week 25 when there are sufficient fish surplus to escapement to provide for a fishery. From week 26 to week 33 the fishery is managed for Taku River sockeye salmon, and from week 34 to week 42 for Taku River coho salmon. Also harvested in this fishery are salmon bound for Stephens Passage and Port Snettisham streams as well as enhanced Chinook, sockeye, coho and chum salmon from Douglas Island Pink and Chum, Inc. (DIPAC) hatchery releases. The traditional fishery does not include harvests from the Speel Arm Special Harvest Area (SHA) inside Port Snettisham.

The escapement goal range for Taku River large Chinook salmon is 19,000 to 36,000 fish with a point goal of 25,500 fish. In years of high abundance, directed Chinook salmon fisheries can be implemented to harvest runs in excess of escapement needs. The 2015 preseason terminal run forecast for the Taku River of 26,100 large Chinook salmon did not allow for any directed Chinook salmon fisheries in District 111.

The escapement goal range for Taku River sockeye salmon is 71,000 to 80,000 fish, with a point goal of 75,000 fish. The 2015 Taku River sockeye salmon forecast was for an above average 216,000 fish, based on the average of Canadian stock-recruit and sibling forecasts. DIPAC forecast 214,000 enhanced sockeye salmon returning through District 111 waters to Port Snettisham.

An escapement goal range of 50,000 to 90,000 Taku River coho salmon with a point goal of 70,000 fish was adopted in early 2015. The U.S. management intent in 2015 was to pass a minimum of 75,000 coho salmon above the border, providing for escapement and a 5,000 fish Canadian assessment fishery. The preseason forecast was for an average inriver run of 99,000 coho salmon in the Taku River, and DIPAC forecast a return of 72,000 enhanced coho salmon from releases in Gastineau Channel. For 2015, DIPAC forecast returns totaling 755,000 enhanced chum salmon to Gastineau Channel and Limestone Inlet, which was below the recent average.

The traditional drift gillnet fishery in District 111 began on Sunday, June 21, 2015 (week 26). The initial drift gillnet opening of the season in District 111 was for three days, due to improved Taku River Chinook salmon abundance and an above average sockeye salmon forecast. Effort for the opening was 72 boats, which was above the ten-year average of 49 boats. The sockeye salmon harvest was well below the recent ten-year average, but the chum salmon harvest of 80,765 fish was nearly four times the recent ten-year average and was the largest chum salmon harvest ever for the week (Table 8; Figures 34 and 37). A total of 541 Chinook salmon were harvested, which was above average for the week (Figure 33).

From early July through mid-August (weeks 27–33) effort in the District 111 drift gillnet fishery was generally below average, with a peak of 93 boats fishing in week 29 (Figure 32). Harvests of sockeye salmon were below average through late July, but improved to near average by early August (Figure 34). Following the record harvest in week 26, weekly chum salmon catches were slightly below average and approximately 472,000 fish were harvested from late June to early

August (Figure 37). Most of the summer-run chum salmon harvest in District 111 consists of DIPAC hatchery fish returning to release sites in Gastineau Channel and Limestone Inlet. Chinook salmon harvests were below average through the tail end of the run and few fish were caught after mid-July (Figure 33). Pink salmon harvests were well above average through early August (Figure 36).

For the remainder of August and September (weeks 34–40), overall effort in the fishery was below average in most weeks. In August, the fishery was open for four days of fishing most weeks, but the number of days open dropped to only one or two days during the final three weeks of the season due to Taku River coho salmon returning below forecast levels (Figure 31). The number of boats fishing was below average from mid-August through mid-September (Figure 32). Harvests of coho salmon were below average from mid-August to mid-September (Figure 35). Pink salmon harvests declined in mid-August and were below average for the remainder of the season. Chum salmon harvests dropped quickly in August and catches were well below the recent ten-year average in the remaining weeks of the fishery (Figure 37).

A number of Chinook salmon stocks are known to contribute to the Juneau area sport fishery, including those from the Taku, Chilkat, and King Salmon rivers, and local hatchery stocks, but the major contributor of mature wild fish is believed to be the Taku River. Preliminary estimates indicate that approximately 463 of the Chinook salmon harvested in the Juneau sport fishery from weeks 16 through 28 were of Taku River origin (based on genetic stock identification analysis). The preliminary District 111 harvest of Taku River large Chinook salmon during the accounting period was 292 fish in the drift gillnet fishery, 463 in the sport fishery, and an estimated 30 in the personal use fishery, for a total of 785. Harvests of Taku River large Chinook salmon in these fisheries from week 29 onwards were minimal and resulted in a total catch well below the U.S. base level catch of 3,500 fish. The preliminary escapement estimate of Taku River large Chinook salmon is 28,850 fish, which was within the escapement goal range.

The 2015 traditional District 111 sockeye salmon harvest of 55,096 fish was 53% of the recent ten-year average. Peak catches of sockeye salmon occurred in weeks 31 and 32 (late July and early August; Figure 34). The Speel Arm SHA was opened for four or five days weekly from mid-August to early September to harvest enhanced DIPAC sockeye salmon returning to the Snettisham Hatchery. The lower bound of the Speel Lake sustainable escapement goal range of 4,000 to 9,000 fish was reached on August 28 and the final weir count was 4,888 sockeye salmon. The peak harvest in the Speel Arm SHA occurred in week 34, when 35 boats harvested 15,712 sockeye salmon and smaller numbers of other species of salmon. A total of 28,335 sockeye salmon were caught in the SHA in 2015. The preliminary escapement estimate of Taku River sockeye salmon is 132,523 fish, which was above the escapement goal range.

The 2015 traditional District 111 coho salmon harvest of 23,169 fish was only 59% of the recent ten-year average (Figure 35). Approximately 91% of the coho salmon were harvested in Taku Inlet, above the ten-year average of 83%, and 9% were harvested from Stephens Passage and Port Snettisham. Coho salmon stocks harvested in District 111 include runs to the Taku River, Port Snettisham, Stephens Passage, and local Juneau area streams as well as Alaskan hatcheries. This was the first year of full production for DIPAC's revitalized enhanced coho salmon program. DIPAC enhanced coho salmon first appeared in the District 111 harvest in week 35 and

in weeks 39 and 40 comprised 76% and 73% of the harvest respectively. DIPAC enhanced coho salmon contributed 21% of the 2015 District 111 drift gillnet harvest. The preliminary escapement estimate of Taku River coho salmon is 60,200 fish, which was within the escapement goal range.

The 2015 District 111 traditional pink salmon harvest of 288,625 fish was double the ten-year average (Figure 36). The 2015 pink salmon escapement to the Taku River was unknown; however, the number of pink salmon passing through the fish wheels at Canyon Island is used as an index of escapement. The 2015 Canyon Island pink salmon fish wheel catch of 24,246 fish was twice the 1995-2013 odd-year average.

The 2015 District 111 traditional fishery chum salmon harvest of 475,181 fish was 86% of the recent ten-year average, and was comprised almost entirely of summer run fish (Figure 37). The summer chum salmon run continues through mid-August (week 33) and is comprised mostly of domestic hatchery fish and small numbers of wild stocks. Chum salmon returning to DIPAC release sites in Gastineau Channel and Limestone Inlet contributed a major portion of the harvest, but quantitative contribution estimates are not available. Approximately 80% of the District 111 chum harvest was taken in Taku Inlet, and 20% in Stephens Passage. The harvest of 553 fall-run chum salmon (i.e. chum salmon caught after week 33) was only 12% of the recent ten-year average. Most of these fall-run chum salmon are probably of wild Taku and Whiting River origin. Chum salmon escapement numbers to the Taku River are unknown; however, the numbers of fall chum passing through the fish wheels at Canyon Island is used as an index of escapement. The Canyon Island fish wheel project ceased operations on October 3, 2015, and the index of 95 chum salmon was well below average for recent years where the fish wheels were operational into early October.

Table 8.–Weekly salmon harvest in the Alaskan District 111 traditional commercial drift gillnet fishery, 2015[a].

Week	Start Date	Chinook	Sockeye	Coho	Pink	Chum	Boats	Days	Boat Days
26	21-Jun	541	2,022	166	4,416	80,765	72	3	216
27	28-Jun	217	2,161	142	15,350	49,566	73	2	146
28	5-Jul	127	3,418	166	29,490	110,354	61	2	122
29	12-Jul	81	1,699	1,187	27,050	93,148	93	2	186
30	19-Jul	44	8,776	2,123	90,735	94,298	91	3	273
31	26-Jul	20	14,396	1,420	58,661	33,165	67	5	335
32	2-Aug	25	11,663	2,519	34,428	10,818	51	4	204
33	9-Aug	5	5,535	891	25,431	2,514	49	4	196
34	17-Aug	11	3,346	455	2,327	100	16	4	64
35	23-Aug	3	1,151	1,394	577	137	18	5	90
36	30-Aug	1	820	4,165	139	196	29	4	116
37	6-Sep	7	104	4,217	12	70	34	3	102
38	13-Sep	0	4	1,511	0	28	21	2	42
39	20-Sep	1	1	2,462	9	22	17	2	34
40	27-Sep	0	0	351	0	0	6	1	6
Total		1,083	55,096	23,169	288,625	475,181	149	46	2,131
2005–2014 Average		1,782	104,858	39,486	142,954	549,606	184	55	2,986
2015 as % of Average		61%	53%	59%	202%	86%	81%	84%	71%

[a] The 2015 District 111 drift gillnet harvest and effort, as well as the 2005-2014 averages, are for the directed sockeye and coho salmon portions of the fishery only. There was no directed fishery for Chinook salmon in District 111 in 2015 due to a low Taku River preseason abundance forecast.

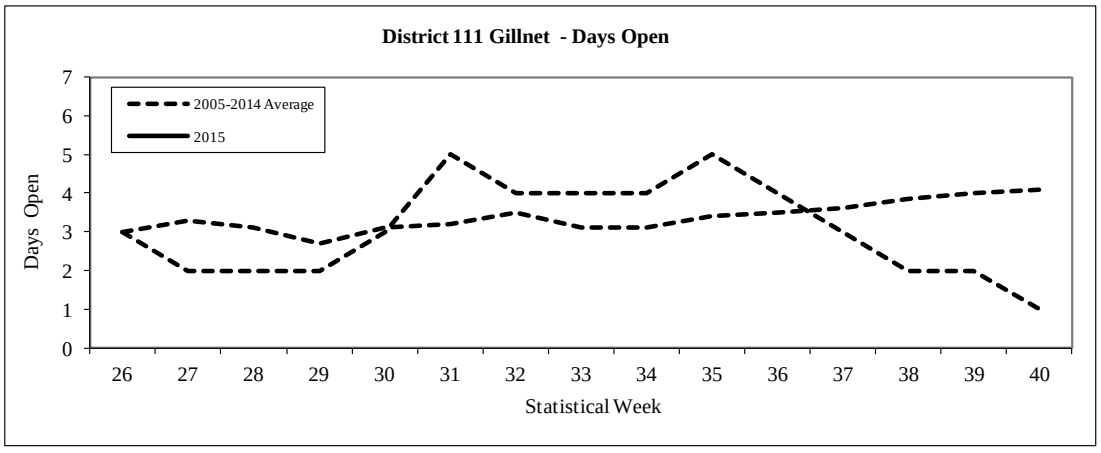


Figure 31.–Days open by week in the District 111 drift gillnet fishery, 2015.

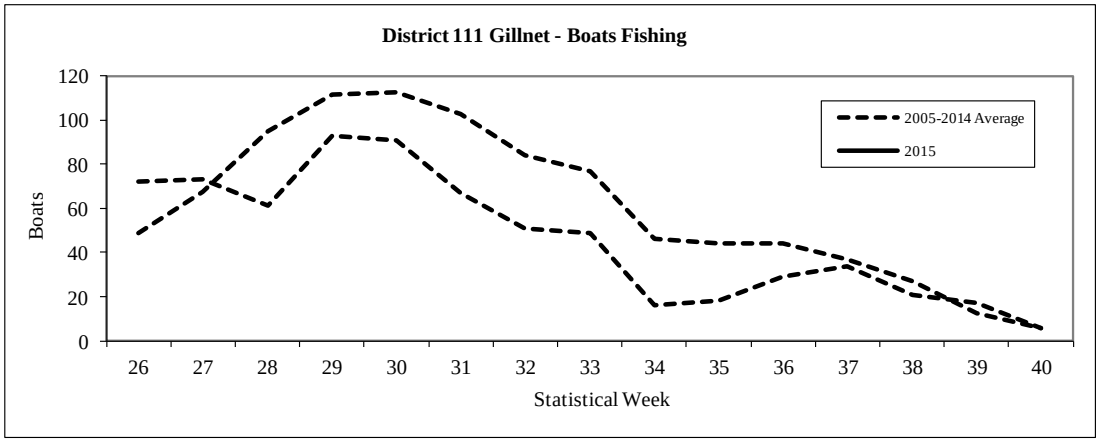


Figure 32.–Number of boats fishing by week in the District 111 drift gillnet fishery, 2015.

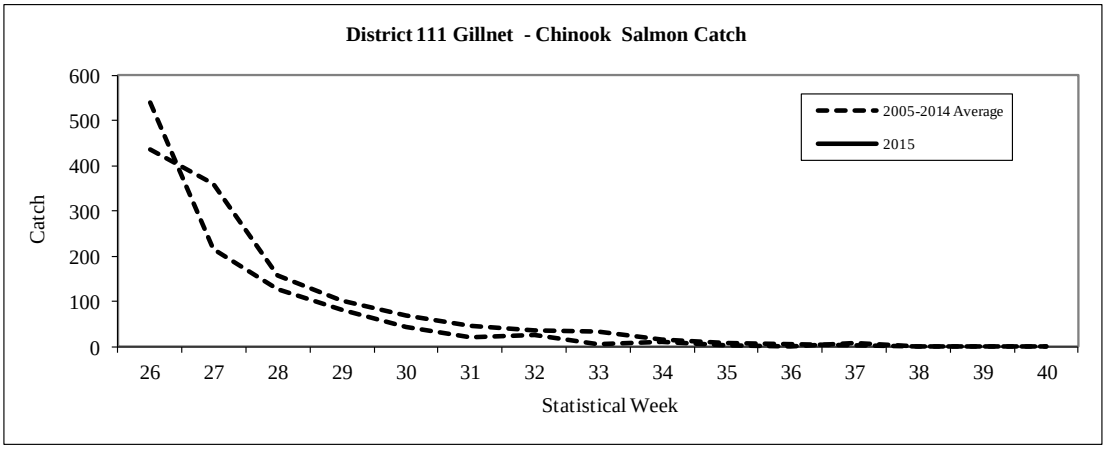


Figure 33.–Chinook salmon harvest by week in the District 111 drift gillnet fishery, 2015.

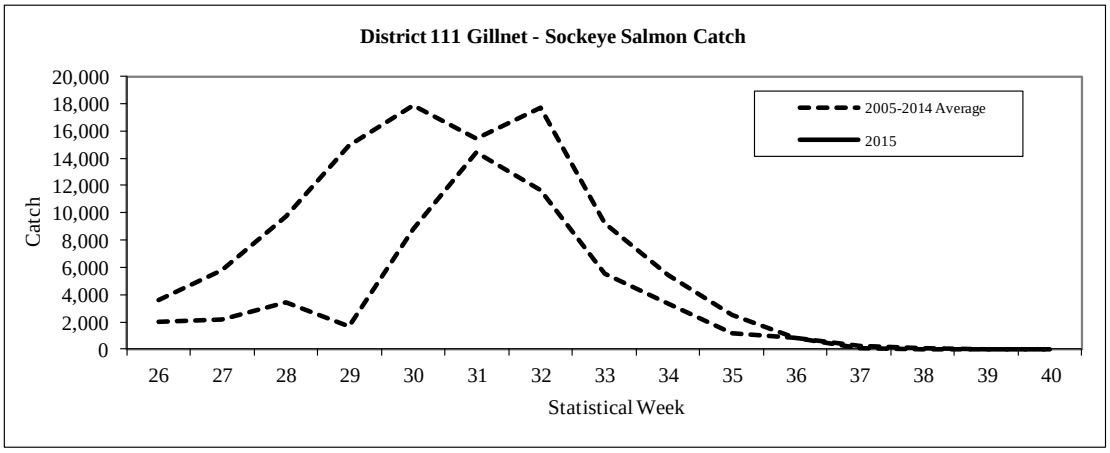


Figure 34.–Sockeye salmon harvest by week in the District 111 drift gillnet fishery, 2015.

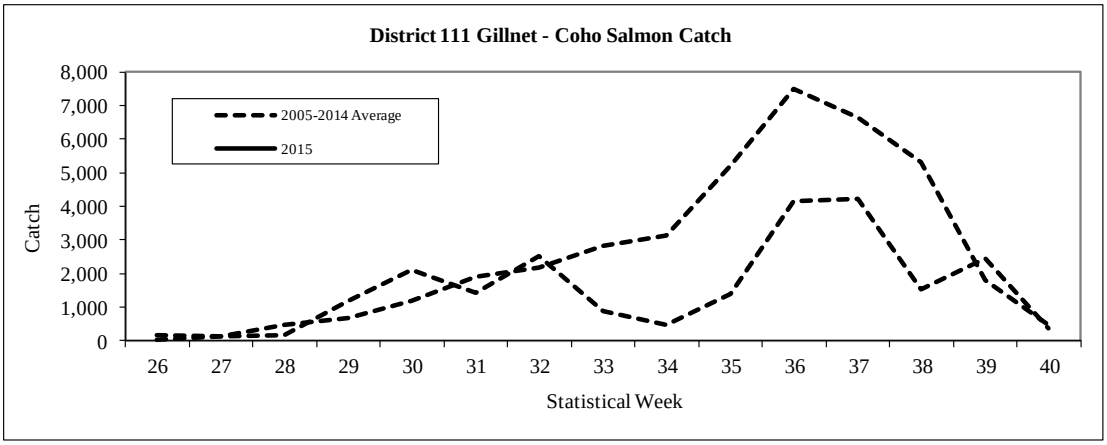


Figure 35.–Coho salmon harvest by week in the District 111 drift gillnet fishery, 2015.

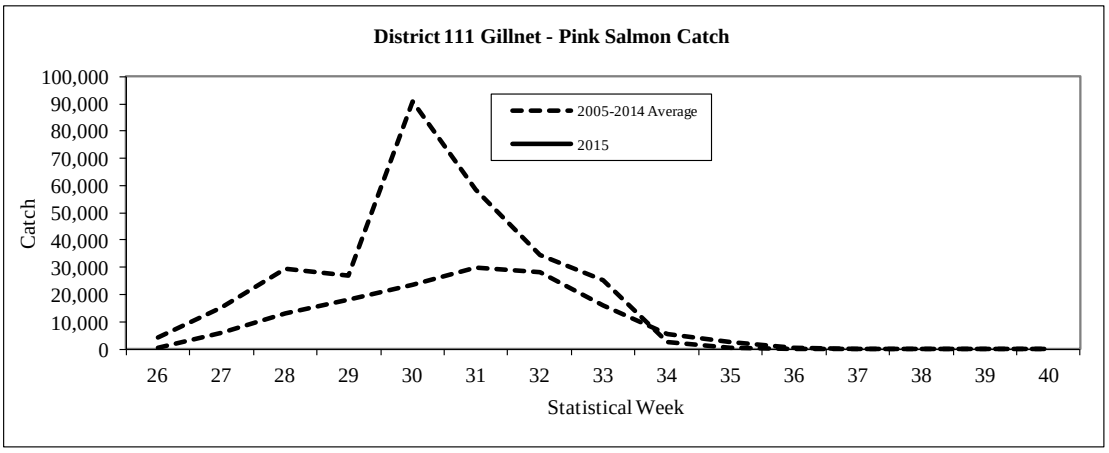


Figure 36.–Pink salmon harvest by week in the District 111 drift gillnet fishery, 2015.

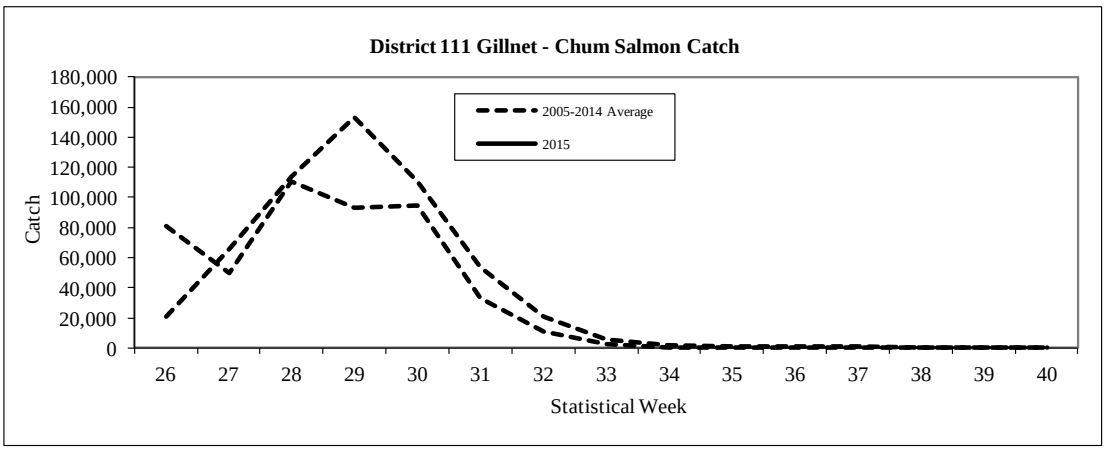


Figure 37.–Chum salmon harvest by week in the District 111 drift gillnet fishery, 2015.

Transboundary River Joint Enhancement

The transport of sockeye salmon fry from the Snettisham Hatchery facility back to the Canadian lakes was complete on May 30, 2015. Approximately 3.8 million fry were released in Tahltan,

King Salmon, and Tatsamenie lakes in Canada. The overall green egg to fry survival of 70% for brood year (BY) 2014 releases (Table 9) was above the previous five-year average survival of 58.3% (BY09-BY13) for Tatsamenie and Tahltan fry. Fry from one Tatsamenie stock incubator tested positive this year for IHNV, accounting for a loss of approximately 170,000 fry prior to transport/back-planting. After transporting BY14 fry back to their respective lakes, all TBR modules, incubators, and short-term fry rearing containers were broken down, cleaned, and disinfected prior to setting up to receive green eggs from BY15 egg-takes.

Brood year 2015 egg-takes were initiated on September 4 at Tahltan Lake and September 14 at Tatsamenie Lake. An estimated total of 5.74 million green eggs were collected from the two donor lakes. Tahltan Lake egg-takes were completed on September 27, and an estimated 4.84 million eggs in 12 egg lots were taken. Tatsamenie Lake egg-takes were completed on October 6 and 0.897 million eggs were collected in 4 lots. Escapement at King Salmon Lake was insufficient to allow for egg collection in 2015. Adult sockeye salmon tissues were collected on the spawning grounds by contractors for DFO and shipped to the ADF&G Juneau Fish Pathology laboratory via Snettisham Hatchery as per treaty agreement.

Table 9.–Summary of numbers and survival rates of brood year 2014 sockeye salmon fry released May 2015. Fish were raised at Snettisham Hatchery as part of the Transboundary River Salmon Enhancement Project.

Brood stock	Release site	Number of trips	Survival rate to eyed stage	Survival rate to release	Number released
Tahltan	Tahltan Lk	7	75.5%	68.9%	2,683,900
Tatsamenie	Upper Tats Lk	2	85.9%	67.7%	730,500
Tatsamenie	Upper Tats Lk, Extended Rearing	2	92.0%	89.6%	187,000
King Salmon L.	King Salmon L.	1	89.3%	83.0%	169,400
	Average/Totals	12	78.8%	70.0%	3,770,800

During the 2015 season, the ADF&G Thermal Mark Lab processed 18,468 sockeye salmon otoliths collected by ADF&G and DFO staff as part of the U.S./Canada fry-planting evaluation program. These collections came from commercial and test fisheries in both U.S. and Canadian waters on the Taku and Stikine Rivers over a 14-week period. The laboratory provided estimates on hatchery contributions for 86 distinct sample collections. Estimates of the percentage of hatchery fish contributed to commercial fishery catches were provided to ADF&G and DFO fishery managers 24 to 48 hours after samples arrived at the lab.

Alsek River Area Fisheries

Although harvest sharing arrangements of Alsek salmon stocks between Canada and the U.S. have not been specified, Annex IV of the Pacific Salmon Treaty calls for the development and implementation of cooperative abundance-based management plans and programs for Alsek River Chinook and sockeye salmon. Escapement goals are in place for Chinook and sockeye salmon stocks spawning at the Klukshu River, a tributary that flows into the Tatshenshini River, approximately 80 km northeast of its junction with the Alsek River. The principal escapement-monitoring tool for Chinook, sockeye, and coho salmon stocks on the Alsek River is the Klukshu River weir, operated by Fisheries and Oceans Canada in cooperation with the Champagne-Aishihik First Nation since 1976. In 2013, Canadian and U.S. biologists adopted a new

biological escapement goal range of 7,500 to 11,000 sockeye salmon through the Klukshu River weir. The current biological escapement goal range for Klukshu River Chinook salmon, adopted in February 2013, is a range of 800 to 1,200 fish.

The Department of Fish and Game manages the Alsek River commercial set gillnet fishery to achieve the agreed upon escapement goal ranges. Time and area openings are adjusted by monitoring fishery performance data and comparing it to historical CPUE. The duration of weekly fishing periods is based on fishery performance data (CPUE) and Klukshu River weir data. Historically, gillnets have often been restricted to a maximum mesh size of 6 inches through July 1 to minimize Chinook salmon harvest. The mesh restriction was lifted in 2013 and 2014, but was reintroduced in 2015.

Preseason expectations were for average to above average sockeye salmon and below average Chinook salmon runs in 2015. The overall Alsek drainage sockeye salmon run was expected to be approximately 84,000 fish, which would have been above the recent ten-year average of 63,000 fish. The outlook for 2015 was based on a predicted run of 19,400 Klukshu River sockeye salmon, derived from the latest Klukshu River stock-recruitment data, a Klukshu River contribution rate of 23% to the total run (based on mark-recapture results; 2000-04), and run size estimates using GSI (2005-06, 2011). Principal contributing brood years for the 2015 return were 2010 and 2011. The Klukshu River escapement in 2010 was approximately 19,000 sockeye salmon; well above the ten-year average of 11,000 fish. The sockeye salmon escapement in 2011 was 21,389, which was also well above average. Based on the primary brood year escapements, the outlook for Klukshu River Chinook salmon in 2015 was for a return of 2,000 fish; slightly above the ten-year average of 1,100 fish.

The 2015 Alsek River set gillnet fishery opened Sunday June 7 (week 24). The fishery was extended by one or two days in several weeks of the fishery through early August due to high catch rates of sockeye salmon. The number of days the fishery was open was below average, but the number of boats fishing during weekly openings was near the recent ten-year average throughout the season—the overall effort in boat-days was just below average (Table 10). The total number of individual boats fishing during the season was 19, which was near the 2005–2014 average of 18 boats. Harvests of Chinook salmon through late June were below the recent ten-year average (Table 10). Harvests of sockeye salmon were above average in many weeks of the fishery and the total harvest of 16,104 fish was just above the 2005–2014 average of 14,917 fish (Table 10). There was little effort after early August. In the past several years there has been reduced fishing effort during coho salmon season due to economic struggles and lack of pilots to transport fish to town. In 2015, only 11 coho salmon were harvested (Table 10). The U.S. commercial fishery in the Alsek River closed for the season on October 28 and the river was not fished the last five weeks of the season.

The Klukshu River weir count of 11,211 sockeye salmon was slightly above the upper bound of the 7,500 to 11,000 fish escapement goal range. The count of 2,604 early run sockeye salmon (count through August 15) and the late run count of 9,011 were both slightly above average. The 1,432 Chinook salmon counted through the Klukshu River weir exceeded the established goal range of 800 to 1,200 Chinook salmon.

Table 10.–Weekly fishing effort and salmon harvest for Alsek River, 2015.

Statistical Week	Start Date	Catch					Effort		
		Chinook	Sockeye	Coho	Pink	Chum	Boats	Days	Boat Days
24	7-Jun	75	381	0	0	0	15	1	15
25	14-Jun	69	820	0	0	0	13	1	13
26	21-Jun	71	2,428	0	0	0	13	2	26
27	28-Jun	15	1,723	0	0	0	12	1	12
28	5-Jul	11	5,147	0	0	0	12	3	36
29	12-Jul	1	745	0	0	0	10	1	10
30	19-Jul	0	693	0	0	0	10	1	10
31	26-Jul	1	2,123	0	0	0	11	3	33
32-39[a]	2-Aug	0	2,044	11	0	0	11	9	23
40–44	25-Oct	Opened Continuously—No Effort							
Total		243	16,104	11	0	0	19	22	178
2005-2014 Avg.		482	14,917	1,221	0	6	18	32	189
2015 as % of Avg.		50%	108%	1%		0%	106%	69%	94%

[a] Weeks with fewer than three permits, confidential information so data combined in catch table.

SOUTHEAST ALASKA CHINOOK SALMON FISHERY

All Gear Harvest

The 2015 SEAK Chinook salmon management programs were configured around an assumed draft abundance index (AI) of 1.45 for the 2015 fishing season, (Table 1).

This was the seventh year that the Annex IV, Chapter 3 provisions of the 2009 PST agreement were implemented. Therefore, the harvest limit for SEAK reflects a 15% reduction in allowable catch (AC) from that allowed under the 1999 PST Agreement. The preliminary total Chinook salmon harvest by all SEAK commercial fisheries was 323,517 fish, and the preliminary sport fish harvest was 81,809, for an all-gear harvest of 405,326 (Table 11). The preliminary all-gear PST harvest was 337,897 fish (Table 12).

Table 11.–Preliminary estimated all-gear Chinook salmon harvests in 2015**.**

2015 Preliminary Estimated All-Gear Chinook Salmon Harvests								
Gear	Total Harvest	AK Hatchery Harvest	Wild Terminal Exclusion	Alaska Hatchery Addon	Treaty Harvest	Quota	O/U	% O/U
Troll	269,809	22,092	216	18,420	251,172			
Sport	81,809	16,124	0	13,898	67,911			
Drift Gillnet	22,981	17,924	0	16,393	6,589			
Purse Seine	30,265	18,580	0	18,502	11,763			
Set Gillnet	462	0	0	0	462			
Total Net	53,708	36,504	0	34,895	18,813			
Total All Gear	***405,326***	***74,720***	***216***	***67,212***	***337,897***			

Note: Annette Island and terminal area harvests are included.

Table 12.–Chinook all-gear harvests in Southeast Alaska, 1987 to 2015, and deviation from the ceiling for years in which there were ceilings. Harvests are in thousands.

Year	Total Harvest	Add-on and Exclusion Harvest	Target Treaty Harvest	Treaty Harvest	Deviation Number	Deviation Percent
1987	282.4	17.1	263	265.3	2.3	0.9%
1988	279.3	22.5	263	256.8	-7.8	-3.0%
1989	291.0	21.5	263	269.5	6.5	2.5%
1990	366.9	45.9	302	321.0	19.0	6.3%
1991	359.5	61.5	273	298.0	25.0	9.2%
1992	258.8	36.8	227.4	222.0	-5.4	-2.4%
1993	304.1	32.9	263	271.2	8.2	3.1%
1994	264.4	29.2	240	235.2	-4.8	-2.0%
1995	235.7	58.8		176.9		
1996	236.3	81.3		155.0		
1997	343.0	56.3		286.7		
1998	270.6	27.4	260	243.2	-16.8	-6.5%
1999	251.0	52.2	184.2	198.8	14.6	7.9%
2000	263.3	76.8	178.5	186.5	8.0	4.5%
2001	265.7	78.8	250.3	186.9	-63.4	-25.3%
2002	426.5	69.4	371.9	357.1	-14.8	-4.0%
2003	439.4	59.3	439.6	380.2	-59.4	-13.5%
2004	499.3	82.2	418.3	417.0	-1.3	-0.3%
2005	493.1	104.5	387.4	388.6	1.2	0.3%
2006	435.5	75.4	354.5	360.1	5.6	1.6%
2007	404.6	76.4	259.2	328.2	69.0	26.6%
2008	244.2	71.4	152.9	172.8	19.9	13.0%
2009	293.7	65.6	176.0	228.0	52.0	29.6%
2010	284.7	53.9	215.8	230.8	15.0	6.9%
2011	357.0	66.3	283.3	290.7	7.4	2.6%
2012	295.0	52.5	205.1	242.5	37.4	18.3%
2013	257.2	66.1	176.0	191.2	15.2	8.6%
2014	485.4	52.6	439.4	432.8	-6.6	-1.5%
2015[1]	405.3	67.4		337.9		

[1] The actual all-gear harvest limit and deviation cannot be calculated until the CTC completes the postseason calibration.

Troll Fishery

The accounting of treaty Chinook salmon harvested by trollers begins with the winter fishery and ends with the summer fishery. The winter troll fishery is managed for a guideline harvest level (GHL) of 45,000 non-Alaska hatchery-produced Chinook salmon, with a guideline harvest range of 43,000−47,000 non-Alaska hatchery-produced fish, plus the number of Alaska hatchery-produced Chinook salmon harvested during the winter fishery. The 2014–2015 winter troll fishery was open from October 11, 2014 through March 25, 2015 and harvested a total of 50,673 Chinook salmon. Of these, 2,027 (4%) were of Alaska hatchery origin, of which 1,685 counted toward the Alaska hatchery add-on, resulting in a treaty catch of 48,988 (Table 13).

The spring troll fisheries target Alaskan hatchery-produced Chinook salmon and are conducted along migration routes or close to hatchery release sites. Terminal area fisheries, which begin during the spring, occur directly in front of hatcheries or at remote release sites. While there is no ceiling on the number of Chinook salmon harvested in the spring fisheries, the take of PST Chinook salmon is limited according to the percentage of the Alaskan hatchery fish taken in the fishery. Non-Alaska hatchery fish are counted towards the annual PST quota of Chinook salmon, while most of the Alaska hatchery fish are not.

In 2015, spring troll fisheries were conducted from April 16–June 30 in a total of 33 spring areas and six terminal area fisheries. A total of 54,471 Chinook salmon were harvested in spring and terminal troll areas combined, of which 15,756 (29%) were of Alaska hatchery origin and 13,151 counted toward the Alaska hatchery add-on. There were an additional 216 wild exclusion fish, resulting in a PST harvest of 41,104 fish (Table 13).

The 2015 summer troll fishery included one Chinook salmon retention period, from July 1–8. A total of 164,665 Chinook salmon were harvested, of which 4,310 (3%) were of Alaskan hatchery origin and 3,584 counted toward the Alaska hatchery add-on. The resulting PST catch was 161,080 fish. The total harvest for all troll fisheries in the 2015 accounting year was 269,809 Chinook salmon, of which 251,172 counted as PST harvest.

Table 13.–Preliminary 2015 troll fishery Chinook salmon harvest by season.

Gear/Fishery	Total Harvest	Alaska Hatchery Harvest	Alaska Hatchery Add-on	Terminal Exclusion Harvest	Total Term. Exclusion/ Alaska Hatchery Add-on	Treaty Harvest
Winter Troll	50,673	2,027	1,685	0	1,685	48,988
Spring Troll[a]	54,471	15,756	13,151	216	13,367	41,104
Summer Troll						
First Period	164,665	4,310	3,584	0	3,584	161,080
Second Period	0	0	0	0	0	0
Total Summer[b]	164,640	4,310	3,628	0	3,628	161,011
Total Traditional Troll	269,784	22,092	18,420	216	18,637	251,147
Annette Is. Troll	25	0	0	0	0	25
Total Troll Harvest	**269,809**	**22,092**	**18,420**	**216**	**18,637**	**251,172**

[a] Spring troll harvest includes all terminal and Wild Terminal Exclusion harvests for year.
[b] Total summer harvest includes confiscated harvest for year.

Net Fisheries

A total of 22,981 Chinook salmon were harvested in the drift gillnet fisheries in 2015, of which 17,924 (78%) were of Alaska hatchery origin and 16,393 counted toward the Alaska hatchery add-on, resulting in a PST harvest of 6,589 fish (Table 11). A total of 30,265 Chinook salmon were harvested in the purse seine fisheries, of which 18,580 (61%) were of Alaska hatchery origin and 18,502 counted toward the Alaska hatchery add-on, resulting in a PST harvest of 11,763 fish. A total of 462 Chinook salmon were harvested in the set gillnet fisheries, none of which were of Alaska hatchery origin, resulting in a PST harvest of 462 fish (Table 11).

With the exception of directed gillnet harvests of Chinook salmon in SEAK terminal area regulatory Districts 108 and 111, as provided in the Transboundary River agreement (Chapter 1), harvests of Chinook salmon in the net fisheries are primarily incidental to the harvest of other species and only constituted a small fraction (<1.0%) of the total net harvest of all species.

Recreational Fisheries

The Southeast Alaska king salmon sport fishery is managed under provisions of the Southeast Alaska King Salmon Management Plan (5 AAC 47.055). This plan prescribes management measures based upon the preseason abundance index determined by the Chinook Technical Committee of the Pacific Salmon Commission. The plan further stipulates that if the preseason abundance estimate for the current year is not available by May 1, the king salmon bag and possession limits and other management measures will be based on the previous year's preseason abundance index. Since the 2015 preseason abundance index was not available by May 1, the regional sport fish king salmon regulations outlined above were based on the 2014 preseason abundance index. The preseason abundance index generated for the SEAK AABM fishery in spring 2014 was 2.57, resulting in a preseason sport allocation of 81,353 treaty Chinook salmon under the harvest management plan adopted by Alaska Board of Fisheries. Based on this preseason AI and the SEAK King Salmon Management Plan, a resident sport fish angler was allowed to use two rods from October through March, and the bag and possession limit was three king salmon 28 inches or greater in length. The nonresident annual harvest limit was six king salmon 28 inches or greater in length; daily bag and possession limits were one king salmon 28 inches or greater in length except during May and June, when the bag and possession limit was two fish 28 inches or greater in length.

On June 26, although a preseason AI had not been bilaterally agreed to by members of the CTC, the PSC Commissioner for Alaska committed to the other Treaty Parties that SEAK Chinook salmon fisheries would be managed for an all-gear harvest based on the 2015 draft AI 1.45. Revised regulations were announced, which reduced the resident bag and possession limit to two king salmon 28 inches or greater in length. The nonresident annual harvest limit was reduced to three king salmon 28 inches or greater in length. The 2015 recreational fishery had an estimated preliminary harvest of 81,809 Chinook salmon, of which 67,911 counted as treaty harvest. The final total and treaty harvest in the sport fishery for 2015 will be available in late fall of 2016.

SOUTHEAST ALASKA COHO SALMON FISHERIES

Attachment B of the June 30, 1999 U.S.-Canada Agreement relating to the Pacific Salmon Treaty specifies provisions for inseason conservation and information sharing for northern boundary coho salmon. In 2015, troll CPUE in Area 6 in the early weeks of the fishery averaged

73.1 coho/day, which was well above the highest boundary area conservation trigger of 22 coho/day. The mid-July projection of regionwide total commercial harvest of 2.45 million was greater than the 1.1 million trigger for an early regionwide troll closure, specified in Alaska Board of Fisheries regulation and the PST conservation agreement.

The 2015 regionwide summer troll coho fishery began by regulation on June 1. There was no mid-season closure in August and the fishery was extended for 10 days past the normal September 20 ending date, with some area restrictions. The 2015 all-gear catch of coho salmon totaled 2.23 million fish, of which 1.94 million (87%) were taken in commercial fisheries (Table 14). The troll catch of 1.24 million fish was 23% below the 10-year average of 1.62 million fish and accounted for 64% of the commercial catch. Power troll wild coho CPUEs were above average during the third and fourth weeks of July and either at or below average for the rest of the season. The overall wild stock abundance (wild troll catch divided by an index of the troll exploitation rate) was estimated at 3.28 million, and was 18% below the 20-year average. The purse seine harvest of 294,300 fish was 2% below the 10-year average while the drift gillnet harvest of 274,900 fish was 27% below the 10-year average. The set gillnet harvest of 129,100 fish in the Yakutat area was 4% above the 10-year average, with 86% of the catch taken in the Situk-Ahrnklin Lagoon and 13% in the Tsiu River system. A very preliminary estimate of the Southeast Alaska sport catch (295,100) is 12% above the 10-year average (262,800 fish).

Wild production accounted for 1.42 million fish (73%) in the commercial catch compared with a recent 10-year average of 1.89 million fish (79% wild). The hatchery percentage of the commercial catch (26.7%) was the 3rd highest on record, behind 28.4% in 2013 and 27.1% in 2014. Of the estimated hatchery contribution of 518,000 fish, over 99% originated from facilities in Southeast Alaska. Escapement counts and estimates were within or above goal in all cases throughout the region. The total escapement of 956 coho salmon to Hugh Smith Lake was within the biological escapement goal (500-1,600 spawners); 2015 was the first year in which the goal was met after being exceeded for seven consecutive years. The estimated total run size of 1,979 adults was the 4th lowest return on record and 53% below the long-term average of 4,220 adults. Escapements to the three long-term northern Southeast indicator stocks (Auke Creek, Berners River, Ford Arm Creek) all exceeded their respective goals. The combined peak count of 10,032 coho salmon in the 14 surveyed streams in the Ketchikan area was above the 1987–2014 average of 8,620 spawners, and well above the goal of 4,250-8,500 spawners.

While smolt estimates were average or above-average in most systems, low adult returns (compared with recent averages) were influenced primarily by low marine survival. While marine survival was well below-average throughout the region, there was also an abrupt reversal of the recent pattern during 2009–2014 in which survival was relatively higher in the southern portion of the region, and a return to the pattern that favored more northern stocks during 1983–2006. In 2015, marine survival for northern inside indicator stocks ranged from 9–12%, the marine survival rate for the Hugh Smith stock in southern Southeast was under 6%.

Total exploitation rate estimates were low to moderate for all indicator stocks, ranging from 25% for Auke Creek to 52% at both Ford Arm Creek and Hugh Smith Lake. The estimated all-gear exploitation rate on the Hugh Smith Lake stock of 52% continued the trend toward moderate all-gear exploitation rates for that system, consistent with a decline from an average of 75% in the 1990s to 53% during 2000–2014. The Alaska troll fishery exploitation rate on the stock (24%)

was below the historical average of 33% from 1982–2014 and the peak decade average of 41% in the 1990s. Alaska troll fishery exploitation rates were also well-below the long-term average for Auke Creek (20%), and Ford Arm Creek (45%). The all-fishery exploitation rate on the Ford Arm Creek stock (52%) showed a sharp reduction from a recent period of historically high rates (averaging 74%) during 2011–2014, despite an increase in the Alaska troll exploitation rate from an average of 40% in 2011–2014 to 45% in 2015. The sharp decrease in the all-fishery exploitation rate on the stock resulted from a relatively weak local pink salmon to Khaz Bay, resulting in low fishing effort and a reduced incidental coho salmon harvest in the local purse seine fishery.

Table 14.–Coho salmon harvest in Southeast Alaska in 2015 by gear type (preliminary).

Gear Type	Harvest
Troll	1,241,100
Purse Seine	294,300
Drift Gillnet	274,900
Set Gillnet	129,100
Sport (marine and freshwater)	295,100
Total	2,234,500

II. PRELIMINARY 2015 CHINOOK AND COHO SALMON FISHERIES IN WASHINGTON AND OREGON

INTRODUCTION

This report describes the conduct of United States (U.S.) fisheries of interest to the Pacific Salmon Commission (PSC) that occurred during 2015 in the area north of Cape Falcon, Oregon and south of the U.S./Canada border. These fisheries were conducted under pre-season management plans that were consistent with Annex IV of the Pacific Salmon Treaty (PST 2008) including obligations defined within Chapter 3 for Chinook individual stock based management regimes (ISBM) and Chapter 5 for Southern Coho Management.

An overview of the Chinook (*Oncorhynchus tshawytscha*) and Coho (*Oncorhynchus kisutch*) salmon conservation challenges facing managers during the 2015 pre-season planning process in this region is provided. The conduct of major fisheries is described, and estimates of landed catch, where available, are compared to pre-season catch limits or expectations for Chinook (Table 1) and Coho (Table 2). For perspective, landed catches for those fisheries since 2010 are also presented. Where available, preliminary estimates of the number of Chinook or Coho salmon released by anglers in 2015 mark-selective fisheries are also presented. All estimates for the 2015 fisheries are preliminary and subject to change. Estimates of spawning escapements and abundance of Coho and Chinook stocks are not available at this time.

PRE-SEASON PLANNING

Pre-season planning for southern U.S. fisheries of interest to the PSC is a coordinated activity

involving Tribal, State and Federal management entities, with the involvement of conservation and fishing interests. The Pacific Fishery Management Council (PFMC) conducted a series of public meetings to consider options for ocean fishery season structures while the Tribes and States conducted government-to-government and public, open meetings throughout the region to develop and analyze alternative season structures for fisheries in the inside waters of the Columbia River, coastal Washington and Puget Sound. Participants in these various planning sessions evaluated the biological and socio-economic consequences of the alternative season structures for the outside (ocean) and inside (marine and freshwater) fisheries (Figure 38) including the anticipated impacts on U.S. southern origin stocks in fisheries conducted under the PST in Canada and Southeast Alaska. Agreement was reached on season structures expected to achieve conservation goals, domestic fishery objectives and legal obligations, including the PST, assuming fisheries are conducted as planned and pre-season abundance estimates are accurate.

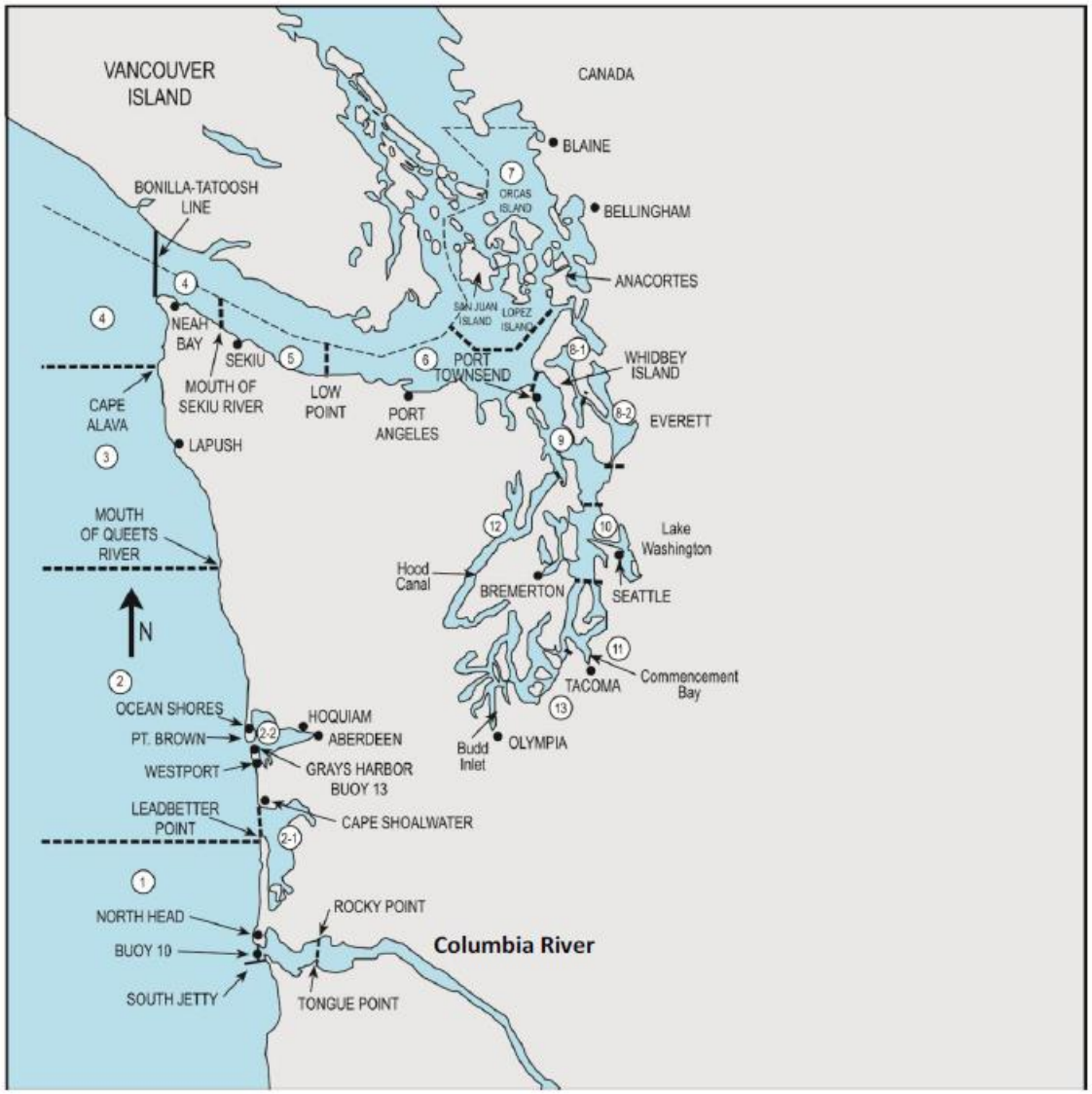


Figure 38. Map of Western Washington marine catch areas of the Washington coast (Areas 1 through 4) and Puget Sound (Areas 5 through 13) (WAC 220-22-030). Inside (Columbia

River) fisheries reported in this document extend beyond the scope of this map.

Chinook Salmon Management

Under the 2008 Pacific Salmon Treaty Agreement, southern U.S. fisheries are subject to the Individual Stock Based Management provisions of Annex IV, Chapter 3. These provisions require the non-ceiling index for aggregated Southern U.S. fisheries on Chinook stocks not achieving their management objectives to be no greater than 60% of the levels estimated for the 1979 – 1982 base period.

Conservation obligations associated with the U.S. Endangered Species Act (ESA) for threatened and endangered Chinook salmon stocks originating from Puget Sound and the Columbia River have been more constraining to southern U.S. fisheries than PST obligations. Catch quotas for the 2015 U.S. ocean fisheries in the area north of Cape Falcon, Oregon, were defined by the impact limits on ESA-listed lower Columbia River natural tule fall Chinook stocks, ESA-listed Puget Sound Chinook stocks, and the abundance of other healthy, harvestable Chinook salmon stocks contributing to fisheries in this area. Puget Sound fishing seasons were structured to provide fishing opportunity on healthy salmon species or stocks within the impact limits defined for ESA-listed Puget Sound Chinook.

Coho Salmon Management

During the pre-season fishery planning process of 2015, Canadian fishery managers informed the U.S. that the Interior Fraser management unit was again expected to be in the *low* categorical abundance status, and U.S. fisheries were constrained to ensure that the exploitation rate on this management unit did not exceed 10.0% as defined by the PST Southern Coho Management Plan. All U.S. natural spawning Coho management units specified by the PST Southern Coho Management Plan were forecasted to be in moderate or abundant status except Strait of Juan de Fuca, Quillayute and Queets River natural Coho were at low status.

The impact on natural Coho stocks, seasons and catch limits adopted for southern U.S. fisheries were predicted using the Fisheries Regulation Assessment Model (FRAM; PFMC 2008). The total exploitation rate on the Interior Fraser management unit was predicted to be 10.0% in Southern U.S. fisheries. Seasons and Coho quota levels for U.S. ocean fisheries were constrained primarily by the management objectives of Queets River natural Coho and ESA-listed lower Columbia River natural Coho, while limits to fisheries in marine areas within northern Puget Sound and the Strait of Juan de Fuca were primarily constrained by management objectives for the Interior Fraser Coho management unit.

NORTH OF CAPE FALCON OCEAN FISHERIES

Fisheries in this area are managed to meet conservation objectives for ESA listed stocks, natural stocks and brood stock goals for hatchery stocks. Within these stock management objectives, ocean fishing seasons are defined that meet legal requirements of Tribal treaties and allocations between Non-Tribal troll and sport fisheries. Ocean fishery seasons are also constructed to ensure a balance of opportunity for harvest with the inside fisheries. Lower Columbia River hatchery Coho and Columbia River fall Chinook have historically been the major stocks contributing to catches of ocean fisheries in the North of Cape Falcon area.

Chinook and Coho salmon catch quotas were established for the 2015 ocean Tribal, Non-Tribal troll and sport fisheries. Ocean fishery quotas for Chinook salmon were defined by exploitation rate limits on several ESA-listed Puget Sound Chinook stocks as well as the total exploitation rate limit of 41% on ESA-listed lower Columbia River natural tule fall Chinook stocks in all fisheries. Ocean fishery quotas for Coho salmon were defined by the total exploitation rate limit on Queets River natural Coho, ESA-listed lower Columbia River natural Coho, Interior Fraser Coho management units, and agreements that allocated the total allowable impacts between ocean and inside fisheries.

Non-Tribal Troll Fishery

Pre-season quota levels for the non-Tribal troll fisheries were 67,000 Chinook and 19,200 Coho (with a clipped adipose fin, hereinafter referred to as marked). The preliminary estimates of non-Tribal harvest in the 2015 North of Falcon troll fishery are 66,605 retained Chinook (99.4% of the coast-wide quota), and 5,050 retained Coho (26% of the coast-wide quota). Trollers harvested 39,170 Chinook in the May 1 – June 30 Chinook-only fishery and the remaining 27,435 Chinook were harvested in the all-species fishery between July 1 and September 23. The Coho catch represents 3,887 harvested in a mark-selective fishery and 1,163 harvested in a non-selective fishery from September 18-23.

Tribal Troll Fishery

The Tribal troll ocean fishery (also known as the Treaty troll fishery) quotas were defined by conservation concerns for ESA listed Chinook and Coho stocks. For Chinook salmon quotas Lower Columbia River Tule Chinook salmon, Mid-Hood Canal Chinook salmon and South Puget Sound Chinook salmon were the stocks that established the Chinook quota at 60,000. The Coho quota was constrained by the 10% exploitation rate objective for Interior Fraser Coho and Queets River Natural Coho salmon, creating a Coho salmon quota of 42,500. The Tribal troll fishery takes place in ocean areas 2, 3, 4 and 4B. The season was comprised of a May/June Chinook-directed fishery and a July 1 through September 15 all species (Chinook and Coho) fishery. The Chinook quota was split 50:50 between the two fisheries. The Chinook-directed fishery ran through all of May and closed on June 30 going over the 30,000 Chinook sub-quota by 0.03%. The Tribal trollers made 683 landings during this fishery. The all species fishery opened on July 1 with a Chinook sub-quota that was decreased by 916 Chinook salmon for the overage in the first fishery. This decreased the Chinook sub-quota to 29,084 Chinook salmon. The all-species fishery closed on September 15 taking 96% of the Chinook sub-quota and 9% of the Coho quota. The season concluded with a total catch of 58,900 Chinook salmon (98% of the overall quota) and 3,900 Coho salmon (9% of the quota). The Tribes made 1,112 landings during the ocean Tribal troll season.

Sport Fisheries

Pre-season quotas for the sport fishery were 64,000 Chinook (non-mark-selective equivalent of 58,000) and 150,800 marked Coho. The 64,000 Chinook quota included 10,000 in the May-June mark-selective fishery and 54,000 in the non-selective fishery. Preliminary total catch estimates for the ocean sport fisheries north of Cape Falcon were 42,200 retained Chinook (66% of the coast-wide quota) and 83,600 retained Coho (55% of the coast-wide quota). A description of the resulting season structure and catches by management area follows.

U.S./Canada border to Cape Falcon, OR

Sport salmon fishing was open for all species except Coho on May 15-16, May 22-23, and May 30-June 12 from the U.S./Canada border to the Queets River, and from May 31-June 13 between the Queets River and Cape Falcon operating under a coastwide quota of 10,000 marked Chinook. The estimate of landed catch for the coastwide mark-selective sport fishery is 1,200 Chinook (12% of the quota). The Chinook minimum size limit was 24 inches.

Preliminary estimates of Chinook retained and the percentage of legal size Chinook encountered that were retained and released in the Chinook mark-selective sport fishery, May 15 – June 12, 2015, for Areas 1-4 combined.

Chinook retained	Retained %	Released
1,200	74%	430

A detailed report of this fishery, including catch, effort and results of sampling and monitoring programs, will be available from the Washington Department of Fish and Wildlife in early 2015.

Columbia Ocean Area (including Oregon)

All-species salmon sport fishing opened in Ocean Area 1 (Columbia Ocean Area) on June 13 with a pre-season quota of 79,400 marked Coho and a guideline of 15,000 Chinook. Beginning September 4, the fishery was non-selective for Coho (remaining sub-area Coho quota – 41,100 fish – was converted at an impact neutral rate to a non-selective Coho quota of 15,300). The fishery closed as scheduled on September 30. The catch estimates for Area 1 are 11,900 Chinook (78% of the guideline), 38,300 Coho during the mark-selective portion of the fishery (48% of the mark-selective quota), and 6,200 Coho during the non-selective portion of the fishery (41% of the non-selective quota). An additional 240 Chinook were landed in the spring mark-selective fishery. The Chinook minimum size limit was 24 inches, with a sub-area closure in the Columbia Control Zone.

Preliminary estimates of Coho encounters (retained and released), and mark rate in the Area 1 Coho mark-selective sport fishery, June 13 – September 3, 2015.

Coho retained	Coho released	Total encounters	Mark %
38,300	22,900	61,200	63%

Westport, Washington

Ocean Area 2 (Westport, WA) opened for all-species salmon sport fishing on June 13 with a pre-season quota of 52,840 marked Coho and a guideline of 27,900 Chinook. Beginning September 4, the fishery was non-selective for Coho (remaining sub-area Coho quota – 30,000 fish – was converted at an impact-neutral rate to a non-selective quota of 13,000). The fishery closed as scheduled on September 30. The catch estimates for Area 2 are 18,400 Chinook (65% of the guideline), 22,800 Coho during the selective portion of the fishery (43% of the mark-selective quota), and 8,000 Coho during the non-selective portion of the fishery (62% of the non-selective quota). An additional 750 Chinook were landed in the spring mark-selective fishery. The Chinook minimum size limit was 24 inches.

Preliminary estimates of Coho encounters (retained and released), and mark rate in the Area 2 Coho mark-selective sport fishery, June 13-September 3, 2015.			
Coho retained	Coho released	Total encounters	Mark %
22,800	24,600	47,400	48%

La Push, Washington

Ocean Area 3 (La Push, WA) opened for all-species salmon sport fishing on June 13 with a pre-season quota of 3,710 Coho and a guideline of 2,700 Chinook. The fishery closed on its automatic closure date, September 30, and reopened October 1 through October 11. From September 4-30, the fishery was non-selective for Coho (remaining sub-area Coho quota – 3,200 fish – was converted at an impact neutral rate to a non-selective quota of 625. The catch estimates for Area 3 are 2,400 Chinook (85% of the guideline) and 400 Coho during the mark-selective portion of the fishery (74% of the mark-selective quota), and 200 Coho during the non-selective portion of the fishery (29% of the non-selective quota). An additional 7 Chinook were harvested in the spring mark-selective fishery. The Chinook minimum size limit was 24 inches.

Preliminary estimates of Coho encounters (retained and released), and mark rate in the Area 3 Coho mark-selective sport fishery, June 13 – September 3 and October 1-11, 2015.			
Coho retained	Coho released	Total encounters	Mark %
400	500	900	45%

Neah Bay, Washington

Ocean Area 4 (Neah Bay, WA) opened for all-species salmon sport fishing on June 14 with a pre-season quota of 19,220 marked Coho and a guideline of 7,000 Chinook. The fishery closed on its automatic closure date, September 21. Beginning September 1, the fishery was non-selective for Coho (remaining sub-area Coho quota – 15,100 fish – was converted at an impact-neutral rate to a non-selective quota of 4,600; a transfer of non-selective Coho from the Neah Bay area sport fishery to the La Push area quota resulted in a final non-selective Coho quota of 1,600). The catch estimates for Area 4 are 5,600 Chinook (81% of the guideline) and 4,200 Coho during the mark-selective portion of the fishery (22% of the mark-selective quota), and 1,550 Coho during the non-selective portion of the fishery (97% of the non-selective quota). An additional 300 Chinook were harvested in the spring mark-selective fishery. The Chinook minimum size limit was 24 inches.

Preliminary estimates of Coho encounters (retained and released), and mark rate in the Area 4 Coho mark-selective sport fishery, June 14 – September 21, 2014.			
Coho retained	Coho released	Total encounters	Mark %
4,200	7,400	11,600	36%

NORTH OF CAPE FALCON INSIDE FISHERIES

Many inside fisheries on the Washington Coast and in Puget Sound were closed to minimize impacts on wild Coho when in-season information indicated that run sizes were substantially lower than anticipated pre-season. In addition, managers were concerned about future impacts on production due to severe drought conditions and the small body size of returning adults.

WASHINGTON COASTAL RIVER FISHERIES

North Washington Coastal Rivers

Net and sport fisheries directed at salmon in this region were implemented based upon pre-season, Tribal-State agreements and subject to in-season adjustments. The 2015 north coastal rivers net harvest (all by Tribal fisheries that are non-selective) includes catch from the Sooes, Quillayute system, Hoh, Queets, and Quinault Rivers. The 2015 commercial Tribal net fisheries in north coastal rivers have harvested an estimated 15,700 Chinook salmon and 16,800 Coho salmon through November 15, 2015. Low returns of Coho to north coast streams led to in-season fishery restrictions and closures in several rivers.

Recreational fisheries conducted in the Quillayute, Hoh and Queets River systems, included mark-selective fisheries for hatchery Chinook salmon. Recreational fisheries for Coho salmon conducted in the Quillayute River system included mark-selective components. Harvest or impact estimates for these fisheries are unavailable at this time.

Grays Harbor, Washington

Harvest for Grays Harbor, WA includes catch from both the Humptulips and Chehalis Rivers through November 15, 2015. The non-selective Tribal net fisheries in Grays Harbor, and including fisheries in the Humptulips and Chehalis Rivers, harvested an estimated 10,500 Chinook salmon and 12,400 Coho salmon. The Quinault Nation closed its Coho fishery when in-season data indicated that wild Coho returns were much smaller than pre-season expectations. The non-Tribal commercial fishery in the northern portion of Grays Harbor near the Humptulips River (Area 2C)did not open in 2015 due to a lower than expected return of Coho. There were 62 Chinook salmon (mark-selective) and 1,507 Coho harvested in the Non-Tribal commercial gillnet fishery in Areas 2A and 2D. Sport fisheries conducted in the Chehalis and Humptulips Rivers included mark-selective components for Chinook and Coho salmon. Harvest data for these fisheries are not available at this time.

COLUMBIA RIVER FISHERIES

Tribal and Non-Tribal net and sport salmon fisheries in 2015 occurred during the winter/spring (January – June 15), summer (June 16 – July) and fall (August – October) periods. All fisheries were constrained by impacts on ESA listed stocks. Winter/spring fisheries were primarily constrained by impacts on ESA listed upper Columbia River spring Chinook, Snake River spring/summer Chinook and wild winter Steelhead. Summer fisheries were constrained by impacts to ESA listed Snake River Sockeye. Fall fisheries were mainly constrained by impacts to ESA listed wild lower Columbia tule fall Chinook and wild lower Columbia River Coho as well as Group B Steelhead which are part of the Snake River Steelhead distinct population segment (DPS). Snake River wild fall Chinook can be a constraint to fall season fisheries, but impacts to other listed stocks generally limit fisheries first.

Columbia River salmon fisheries are developed and regulated to meet conservation standards. Fisheries are managed to operate within the impact limits set for ESA listed stocks, meet the objectives for healthy Columbia River natural stocks, and ensure brood stock needs are met for hatchery salmon. Mainstem Columbia River fisheries are also developed and managed to remain within the requirements of the 2008 – 2017 *US v. Oregon* Management Agreement which

include Tribal/Non-Tribal sharing agreements. All 2015 data is preliminary and subject to change. This section includes harvest from Columbia River fisheries that are considered to be of the interest to PSC; therefore the data may not match other reports that include total harvest.

Winter-Spring Fisheries

Non-Tribal Net

The mainstem Winter/Spring commercial fishery has operated under mark-selective fishery regulations since 2002. In 2015, the winter/spring salmon season consisted of eight fishing periods (91 hours total) between March 31 and June 11. The fishery occurred downstream of Bonneville Dam, with time, area, and gear restrictions in place. Landings included 6,500 hatchery adult spring Chinook kept (3,700 released non-adipose fin clipped released). Additional fisheries occurred in off-channel areas (Select Areas) in the Columbia River estuary, Wanapum tribal fisheries upstream of Priest Rapids Dam are not reported in this document.

Preliminary adult Spring Chinook kept and released in the 2015 Winter/Spring Commercial non-Tribal tangle-net mark-selective fishery.

System	Area	Chinook Kept	Chinook Released	Total Handle	% Kept
Columbia River	Below BON (LCR)	6,500	3,700	10,200	64%

Sport

Mainstem Columbia River mark-selective sport fisheries began in 2001. The area below Bonneville Dam was open January 1 – April 11, April 16, May 2-3, May 9 and May 16 – June 15 for hatchery Chinook retention. Catch estimates include 19,600 hatchery adult spring Chinook (5,100 non-adipose fin clipped released). The area from Bonneville Dam upstream to the Oregon/Washington border (17 miles upstream of McNary Dam) was open March 16 – May 10 and May 28-June 15. Catch estimates for this area total 1,600 hatchery adult spring Chinook (500 non-adipose fin clipped released). The Snake River fishery structure included four specific catch areas open on a days-per-week rotation. The fishery opened in late April and continued into late May. The areas re-opened in early June and continued through June 30. Catch in the Snake River fishery totaled 1,900 hatchery adult spring Chinook (400 non-adipose fin clipped released). Fisheries also occur in tributaries but are not reported in this document.

Preliminary adult Spring Chinook kept and released in the 2015 Winter/Spring sport mark-selective fishery.

System	Area	Chinook Kept	Chinook Released	Total Handle	% Kept
Columbia River	Below BON (LCR)	19,600	5,100	24,700	79%
Columbia River	BON to WA-OR S/L	1,600	500	2,100	76%
Snake River	Washington Waters	1,900	400	2,300	83%

Tribal

Tribal winter/spring fisheries occur from January 1 through June 15. Tribal mainstem fisheries are not mark-selective. Tribal fisheries are conducted in the mainstem Columbia River from Bonneville Dam upstream to McNary Dam (Zone 6). Platform and hook and line fisheries also occur in accordance with various Memorandum of Understanding (MOUs) in the area immediately below Bonneville Dam, but in 2015, the tribes kept this fishery closed during the spring management period. No spring Chinook were harvested in the commercial winter season set-line Sturgeon fishery (January 1 – 31). Seven Chinook were harvested in the winter gillnet fishery (February 1 – March 21). Ceremonial and subsistence (C&S) fisheries include harvest from platform, hook and line, and gillnet fisheries through Tribal permits. Commercial sales were allowed for platform and hook and line caught fish beginning May 12. Weekly commercial gillnet fisheries also began May 12. Harvest estimates from C&S and commercial fisheries total 31,097 upriver spring Chinook. Fisheries are also conducted in Zone 6 tributaries and in Columbia and Snake River tributaries upstream from McNary Dam. Tributary harvest (including Snake Basin harvest) is not reported in this document.

Summer Fisheries

Non-Tribal Net

Summer season commercial fisheries are not mark-selective. Three fishing periods (32 hours total) occurred during June 17 – July 22 in the area below Bonneville Dam. Time, area, and gear restrictions were in place for all summer season commercial fisheries. Landings are estimated at 3,900 upper Columbia summer Chinook.

Sport

Summer season fisheries occurred from June 16-July 31 from the Astoria-Megler Bridge near the mouth of the Columbia River upstream to Priest Rapids Dam. The fishery was mark-selective for upper Columbia summer Chinook except during July 3-31 in the area from the Astoria-Megler Bridge upstream to the Oregon Washington state line. Catch estimates below Bonneville Dam total 5,900 adult Chinook kept (1,500 non-adipose fin clipped released) for both mark-selective and non-selective fisheries. Catch estimates from Bonneville Dam upstream to Priest Rapids Dam total 700 adult Chinook kept (300 non-adipose fin clipped released) for both mark-selective and non-selective fisheries. Additional fisheries occur in the area upstream of Priest Rapids Dam and in tributaries but are not reported in this document.

Preliminary adult Summer Chinook kept and released in the 2015 sport mark-selective fishery.

System	Area	Chinook Kept	Chinook Released	Total Handle	% Kept
Columbia River	Below BON (LCR)	2,000	1,300	3,300	61%
Columbia River	BON to PRD	300	300	600	50%

Tribal

Summer season fisheries occur from June 16 through July 31. Treaty Tribal fisheries are not mark-selective. Treaty Tribal fisheries are conducted in the mainstem Columbia River from Bonneville Dam upstream to McNary Dam (Zone 6). Platform and hook and line fisheries also occur in accordance with various MOUs in the area immediately below Bonneville Dam. Seven weekly commercial gillnet fishing periods were conducted June 16 – July 31. Platform and hook and line fisheries also occurred throughout the season, and fish were sold commercially or retained for subsistence use. Harvest estimates total 37,763 adult upper Columbia summer Chinook from mainstem fisheries. Minor summer season fisheries were also conducted in some Zone 6 tributaries and in tributaries upstream of McNary Dam. Tributary harvest is not reported in this document. The Colville and Wanapum tribes conduct C&S fisheries upstream of Priest Rapids Dam but harvest is not reported in this document.

Fall Fisheries

Non-Tribal Net

Fall season mainstem fisheries are typically categorized into early and late fall seasons. The early fall season generally encompasses the month of August, whereas the late fall season generally begins in mid-September and continues through October. Time, area, and gear restrictions were in place for all fall season commercial fisheries. In 2015 the early fall season consisted of 1-3 periods per week during August 9 – 31 (10 periods). The late fall season consisted of 1-5 periods per week during September 15 – October 20 (10 periods). A small mark-selective fishery using seine gear was also implemented. The seine fishery occurred during August 24- September 30. Since 2013 a MSF tangle net fishery targeting hatchery Coho has been conducted. The 2015 MSF Coho fishery consisted of three 12-hour periods. Landings included 1,000 hatchery coho (500 non-adipose fin clipped released). Harvest estimates total 84,000 fall Chinook (4,200 non-adipose fin clipped released) for the entire season (all gear types).

Preliminary adult Fall Chinook and Coho kept and released in the 2015 Commercial non-tribal seine net mark-selective fishery.

		Fall Chinook				Coho			
System	Area is Below BON. Gear type is:	Kept	Released	Total Handle	% Kept	Kept	Released	Total Handle	% Kept
Columbia River	Beach Seine	600	300	900	67%	50	100	150	33%
Columbia River	Purse Seine	2,200	3,600	5,800	38%	500	600	1100	45%

Preliminary Coho handle in the 2015 Commercial non-tribal Tangle Net mark-selective fishery.					
System	Area is Below BON. Gear type is:	Coho Kept	Coho Released	Total Handle	% Kept
Columbia River	Tangle Net	1,000	500	1,500	67%

Sport

Fall season fisheries are mark-selective for Coho and in recent years have included a brief mark-selective period for Chinook in the Buoy 10 area and in an 80-mile stretch in the lower Columbia River. The Buoy 10 fishery was open August 1- December 31; Chinook retention was allowed August 1 – 28 and October 1 – December 31 (with mark-selective regulations in place during August 24-28). Regulations at Buoy 10 include minimum size limits for Chinook (24-inches) and Coho (16-inches). Released fish would include adult and jack hatchery and wild fish that did not meet the size requirement, adult and jack fish requiring released under any mark-selective regulations and adult and jack fish requiring release under non-retention regulations. Buoy 10 catch estimates include 36,400 Chinook kept and 36,900 hatchery Coho kept. Released fish (hatchery, wild, adults and jacks) include 23,600 Chinook and 23,200 Coho. The mainstem sport fishery from the Rocky Point – Tongue Point line upstream to Bonneville Dam was open August 1 – December 31. In the area from the Rocky Point – Tongue Point line upstream to the Lewis River, mark-selective rules for Chinook were in effect September 8 – 14; then the area closed for Chinook retention during September 15-30. Catch estimates for the fishery downstream of Bonneville Dam include 41,500 adult Chinook kept and 6,000 released. The mainstem sport fishery from Bonneville Dam to the Highway 395 Bridge (near Pasco, Washington) was open August 1 – December 31. Catch estimates for this area total 13,000 adult fall Chinook. Additional fisheries occur on the Columbia River in the Hanford Reach area (downstream of Priest Rapids Dam), in tributaries and in the Snake River but are not reported in this document.

Preliminary adult Fall Chinook kept and released in the 2015 sport mark-selective fishery.					
System	Area	Chinook Kept	Chinook Released	Total Handle	% Kept
Columbia River	Buoy 10	6,400	7,500	13,900	46%
Columbia River	LCR Sport	1,300	3,600	4,900	27%
System	Area	Coho Kept	Coho Released	Total Handle	% Kept
Columbia River	Buoy 10	36,900	23,200	60,100	61%

Tribal

Fall season fisheries occur from August 1 through December 31. Tribal fisheries are not mark-selective. Tribal fisheries are conducted in mainstem Columbia River from Bonneville Dam upstream to McNary Dam (Zone 6). Platform and hook and line fisheries also occur in accordance with various MOUs in the area immediately below Bonneville Dam. Platform and

hook and line fisheries were open and allowed commercial sales through Dec 31. The commercial gillnet fishery consisted of seven weekly fishing periods August 17 – October 2. Preliminary harvest estimates for all fall season fisheries total 254,403 adult fall Chinook and 2,711 adult coho. Fisheries are also conducted in some Zone 6 tributaries and in the Snake and Clearwater Rivers. Harvest of chinook in tributary fisheries is not reported in this document.

PUGET SOUND FISHERIES

In 2015, Puget Sound marine fisheries of interest to the Pacific Salmon Commission were regulated to meet conservation and allocation objectives for Chinook, Coho, Chum, Pink and Sockeye salmon stocks, per Tribal-State agreement. For Puget Sound Chinook listed under the ESA, fisheries were managed according to the Puget Sound Chinook Harvest Management Plan (PSIT and WDFW 2010). This management plan defines limits to total exploitation rates for natural stocks and was determined by the National Marine Fisheries Service (NMFS) to be consistent with requirements specified under the ESA 4(d) Rule.

Release requirements were applied to many sport and net fisheries for Chinook, Coho, Pink and Chum salmon, the latter to protect ESA-listed Hood Canal and Strait of Juan de Fuca summer Chum.

Puget Sound marine fisheries were constrained by the need to meet management objectives for ESA listed Puget Sound Chinook, including Lake Washington, Nisqually, Skagit, Skokomish, and Puyallup River Chinook. Interior Fraser Coho was the primary Coho management unit of concern for managing fisheries in the Strait of Juan de Fuca and northern Puget Sound.

Strait of Juan de Fuca Sport

Selective Chinook retention was allowed for sport fishing in salmon management Area 5 from February 16 – April 10 and Area 6 from December 1, 2014 – April 10, 2015. Sport fishing regulations allowed retention of marked Chinook and marked Coho beginning July 1 in Areas 5 and 6. Chinook mark-selective fishing opportunity was limited to the period through August 15. The sport fishery remained open to a Coho mark-selective opportunity through September 30, excluding eight days in September in Area 5 and through September 30 in Area 6. Wild Coho retention was legal September 12-14, 19-21 and 26-27 in Area 5 and October 1 – 31 in Area 5 and 6. Selective retention of Chinook was legal in Area 5 and Area 6 from October 1 – 31. An additional mark-selective fishery for Chinook is open from December 1 – 31, 2015 in Area 6. The preliminary estimate for Area 5 Chinook retained for the entire open fishing period July 1 – August 15 was 4,908 fish. A preliminary estimate of Coho retained for the mark-selective and non-selective open periods was 26,662 fish.

Preliminary estimates of Chinook retained, released (legal and sub-legal size), and the legal-size mark rate in the Area 5 sport mark-selective fishery, July 1 – August 15, 2015.

Chinook retained	Chinook released	Total encounters	Mark % (legal size)
4,908	32,440	37,348	55%

Preliminary estimates of Coho retained, released and the mark rate in the Area 5 Coho mark-selective sport fishery, July 1 – September 18 and September 26-October 31, 2015.			
Coho retained	Coho released	Total encounters	Mark %
16,230	26,834	43,064	37%

A detailed report of this summer period sport fishery, including catch, effort and results of sampling and monitoring programs, will be available from the Washington Department of Fish and Wildlife in early 2016.

Strait of Juan de Fuca Tribal Troll (Area 4B, 5, and 6C)
During the winter Tribal troll fishery in Areas 4B, 5, and 6C (November 1, 2014 – April 15, 2015), 3,500 Chinook were caught. In the summer Tribal troll fishery in Areas 5 and 6C only (June 1 – September 30, 2015), 1,600 Chinook and 900 Coho were caught. The Tribal catch estimates from this area do not include catch from Area 4B during the May-September PFMC management period, which have been included in the North of Cape Falcon Tribal ocean troll summary.

Strait of Juan de Fuca Tribal Net
Preliminary estimates of the 2015 catch in the Strait of Juan de Fuca Tribal net fisheries (no non-Tribal net fisheries in the Strait of Juan de Fuca) are 700 Chinook and 700 Coho salmon.

San Juan Islands Net (Areas 6, 7, and 7A)
Preliminary estimates of the 2015 catch in the San Juan Island net fishery directed at Sockeye, Pink or Chum salmon total 45 Chinook and 400 Coho salmon for the Non-Tribal fishery. Tribal fishery landings from this area for all gear types total 4,700 Chinook and 3,600 Coho.

San Juan Islands (Area 7) Sport
Marked Chinook retention was allowed in the entire area for the period December 1, 2014 – January 28, 2015 and January 29 through February 15, 2015 on Fridays through Sundays. The numbers of Chinook retained and released by anglers during this fishery were estimated by an intensive sampling program and are presented in the table below. A detailed report of this fishery, including catch, effort and results of sampling and monitoring programs, is available from the Washington Department of Fish and Wildlife. The southern and southeastern (Rosario Strait) portions of this catch area were again closed July 1 – September 30 to protect Puget Sound Chinook salmon. The remaining area was open for retention of Chinook and Coho salmon from July 1 – October 31. Release of unmarked Coho salmon was required for the months of August through September and for unmarked Chinook during October. Additional sub area closures are described in the Washington State Sport Fishing Rules Pamphlet. Catch estimates and sampling information for this area for the period May 1 – November 30 are not available at this time.

Estimated Chinook retained, released (legal and sub-legal size) and the legal size mark rate in the Area 7 sport mark-selective fishery, December 1, 2014 – February 15, 2015.			
Chinook retained	Chinook released	Total encounters	Mark % (legal size)
3,447	6,508	9,955	79%

Inside Puget Sound (Areas 8-13) Sport

Mark-selective sport fisheries directed at hatchery Chinook were conducted in Area 8.1 (Skagit Bay & Saratoga Passage), Area 8.2 (Port Susan & Port Gardner), Area 9 (Admiralty Inlet), Area 10 (Seattle – Bremerton), Area 11 (Tacoma), and Area 12 (Hood Canal) during the winter (October, 2014 – April, 2015) period, and in Areas 9, 10, 11, 12, and 13 (South Puget Sound) during the summer (May – September, 2015) period.

Detailed reports of these fisheries, including retained and released encounters, effort and mark rates from sampling and monitoring programs, will be available from the Washington Department of Fish and Wildlife in the spring of 2016.

Mark-selective sport fisheries directed at hatchery Coho were conducted in Area 13 for the period July 1 to October 31, 2015.

Puget Sound Chinook mark-selective sport fisheries conducted in marine areas during the period October 1, 2014 through December 31, 2015.

Areas	Season
8.1 & 8.2	November 1, 2014 – April 30, 2015
9	November 1-30, 2014; Jan 16 – April 15, 2015; July 16 – July 26, 2015; and delayed opening for winter fishery.
10	October 1, 2014 – January 31, 2015; July 16 – September 30, 2015 (Sinclair Inlet only); and October 1 – December 18, 2015
11	February 1 – April 30, 2015 and June 1 – December 31, 2015
12	February 1 – April 30, 2015 and July 1 – December 31, 2015
13	May 1 – December 31, 2015

Puget Sound Marine Net (Areas 8-13 & 7B-D)

To achieve conservation objectives for natural Puget Sound Chinook and Coho, limited marine net fishing opportunities directed at returns of hatchery Chinook and both hatchery and natural returns of Coho were planned for 2015Chinook and Coho were also intercepted in fisheries directed at Pink and Chum salmon. A total of 33,700 Chinook and 22,300 Coho were landed in Puget Sound marine net fisheries (Areas 8-13 & 7B-D) during 2015.

Puget Sound Rivers Fisheries

Tribal net and non-Tribal sport fisheries directed at salmon in this region were implemented based upon pre-season, Tribal-State agreements and subject in part to in-season adjustment. The Net harvest (in Puget Sound Rivers by Tribal fisheries) included catch from river systems in the Strait of Juan de Fuca, Hood Canal, and Puget Sound. A total of 21,900 Chinook and 15,300 Coho were landed in Puget Sound River net fisheries during 2015. Many net fisheries were closed early in-season due to much lower than predicted natural Coho returns as well as small fish size and ongoing drought conditions.

Mark-selective fisheries directed at Chinook salmon were also conducted in the following Puget Sound Rivers with PSC Chinook coded wire tag (CWT) exploitation rate indicator stocks or double index tag (DIT) groups:

Chinook mark-selective sport fisheries conducted in Puget Sound Rivers, 2015.	
River	Season
Nooksack River	September 1 - 30
Cascade River (Skagit)	June 1 – July 15
Skagit River	June 1 – July 15
Nisqually River	January 1 – 31;July 1 –December 31
Skokomish River	August 1 – September 1

A Coho mark-selective fishery (MSF) occurred on the Skagit River from September 1 – October 18, 2015. This recreational coho MSF closed early on October 19 because in-season run size assessments indicated that Skagit coho run sizes were significantly below pre-season forecasts. During 2015, no other mark-selective sport fisheries were conducted in any Puget Sound Rivers with PSC Coho CWT exploitation rate indicator stocks or DIT groups.

REFERENCES

Pacific Salmon Treaty (PST) Act of 1985. 2008 Agreement. U.S.-Canada. Public Law 99-5, 16 U.S.C. 3631.

Puget Sound Indian Tribes and Washington Department of Fish & Wildlife (PSIT and WDFW). 2010. Comprehensive Management Plan for Puget Sound Chinook: Harvest Management Component. Northwest Indian Fisheries Commission, Olympia, Washington. 237 p.

Pacific Fishery Management Council (PFMC). 2008. Fishery Regulation Assessment Model (FRAM): An Overview for Coho and Chinook v3.0. Pacific Fishery Management Council, Portland, Oregon. 43 p.

Table 15. Preliminary 2015 Landed Chinook Catches for Washington and Oregon Fisheries of Interest to the Pacific Salmon Commission. Values are presented in number of fish rounded to the nearest 100. [9/]

FISHERIES	2015 Preseason [/13] Total Mortality [1/]	2015 Preseason [/13] Landed [2/]	2015 Preliminary Landed	Landed 2014	Landed 2013	Landed 2012	Landed 2011	Landed 2010
OCEAN FISHERIES								
Commercial Troll								
Neah Bay and La Push (area 3,4,4B) [3/]	95,300	77,500	73,500	77,100	63,700	79,500	43,000	39,600
Columbia Ocean Area and Westport (area 1,2) [14/]	82,000	49,500	52,100	39,400	28,400	20,600	18,500	49,000
Sport (see text for quota information)								
Neah Bay (area 4) [4/]	11,300	9,400	8,500	5,900	6,200	5,600	3,000	3,300
La Push (area 3) [4/]	3,400	2,800	2,400	1,600	2,400	1,300	1,500	1,200
Westport (area 2) [4/]	42,300	35,600	19,200	23,500	13,700	19,500	19,100	27,000
Columbia Ocean Area (area 1) [4/]	22,600	16,200	12,200	11,300	8,600	9,100	7,200	7,200
INSIDE FISHERIES								
Sport [10/]								
Strait of Juan de Fuca (area 5,6) [5/]	19,300	12,600	5,000	12,600	14,900	13,900	9,500	9,100
San Juan Islands (area 7)	10,800	8,900	na	9,200	9,500	5,800	6,500	3,600
Puget Sound (area 8-13)	19,600	10,600	na	14,900	16,600	22,000	11,600	15,600
Puget Sound Rivers [12/]	17,800	17,200	na	12,200	19,600	23,200	18,200	15,600
North WA Coastal Rivers	na	na	na	1,200	2,900	1,600	2,300	1,300
Grays Harbor [7/]	na	na	na	1,500	3,800	4,600	3,400	2,200
Columbia River (Spring) [6/]	na	na	23,100	19,400	8,400	17,000	16,100	34,500
Columbia River (Summer) [6/]	na	na	5,100	2,300	2,100	3,200	5,500	3,400
Columbia River (Fall) (incl. Buoy 10) [6/]	na	na	91,200	62,400	74,500	47,000	44,300	29,400
Commercial [11/]								
Strait of Juan de Fuca net and troll (area 4B,5,6C)	7,200	5,900	5,800	6,000	4,000	4,000	4,300	4,000
San Juan Islands (area 6,7,7A)	8,500	8,400	4,800	6,900	3,900	400	5,700	6,800
Puget Sound Marine (area 8-13;7B-D)	38,100	37,300	33,700	28,400	70,100	75,600	63,200	40,600
Puget Sound Rivers [12/]	39,300	39,300	21,900	21,400	34,400	38,300	37,500	40,700
North WA Coastal Rivers	na	na	15,700	20,200	14,400	12,500	11,800	9,000
Grays Harbor (area 2A-2D) [7/]	na	na	10,500	5,100	2,900	5,300	8,200	4,600
Columbia River Net (Winter/Spring) [8/]	na	na	37,600	28,200	11,200	23,800	20,100	52,000
Columbia River Net (Summer) [8/]	na	na	41,700	22,200	15,300	9,500	25,600	20,500
Columbia River Net (Fall) [8/]	na	na	338,000	365,900	312,500	119,800	183,600	163,800

Table 15 Footnotes

[1/] Estimates of total mortality (not adjusted for adult equivalents) include non-retention mortality. Total Mortality is estimated by Fishery Regulation Assessment Model (FRAM) as catch + incidental mortality, where incidental mortality = drop off + non-retention mortality (PFMC 2008).

[2/] For the ocean fisheries, this column shows the Chinook troll and recreational quotas used for 2015 pre-season fishery planning as distributed by ocean area (Landing Quotas = Landed). See text for any in-season adjustments.

[3/] Includes Area 4B catch during the PFMC management period (May 1 – September 15); Area 4B Treaty troll catch outside PFMC period included under Strait of Juan de Fuca net and troll (October-April).

[4/] Includes catch from the spring mark-selective fishery.

[5/] 2015 catch represents creel estimates from July 1 - October 31 in Area 5 only, since Catch Record Card (CRC) annual estimates are not yet available.

[6/] Mainstem retained sport catch only (upstream to McNary Dam for spring, Priest Rapids Dam for summer and to Hwy 395 for fall). See tables 10, 22-23 in the current Joint Staff Report regarding spring and summer Chinook and tables 25-27 in the annual fall report. http://wdfw.wa.gov/fishing/crc/staff_reports.html.

[7/] Includes Grays Harbor catch, as well as catch from the Chehalis and Humptulips Rivers and their tributaries for sport and Chehalis and Humptulips Rivers for net estimates.

[8/] Mainstem retained catch only, includes tribal ceremonial and subsistence (C&S) and tribal commercial and non-tribal commercial for all gear types from Columbia River fisheries upstream to McNary Dam. See tables 10, 18, 27 & 28 annual Joint Staff Reports regarding Winter/Spring fisheries and Tables 20, 24 & 26 in the Fall report.

[9/] Includes catch from mark-selective fisheries as shown in table 3.

[10/] Sport data for the most recent two years are preliminary.

[11/] Includes Non-Tribal and Tribal commercial and take home, as well as Tribal Ceremonial and Subsistence for all gear types. Starting in 2012, the Copalis, Moclips, and Ozette Rivers have been removed from the landed catch.

[12/] Chinook fisheries in Puget Sound Rivers are modeled using the Terminal Area Management Module (TAMM), based upon FRAM output of terminal run sizes. Total Mortality is estimated in TAMM as catch + non-retention mortality (PFMC 2008).

[13/] FRAM modeled pre-season fishery impacts cover the current fishery planning year, for Chinook defined as May 1 through April 30.

[14/] Includes Oregon troll catch in Area 1

Table 16. Preliminary 2015 Landed Coho Catches for Washington and Oregon Fisheries of Interest to the Pacific Salmon Commission. Values are presented in number of fish rounded to the nearest 100.[6/]

	2015			Landed				
	Preseason [9/]							
FISHERIES	Total Mortality [1/]	Landed [2/]	Preliminary Landed	2014	2013	2012	2011	2010
OCEAN FISHERIES								
Commercial Troll								
Neah Bay and La Push (area 3,4,4B) [3/]	51,600	46,000	4,100	60,100	48,800	38,600	14,200	9,600
Columbia Ocean Area and Westport (area 1&2) [10/]	28,000	16,200	4,800	19,000	5,300	2,700	3,000	5,000
Sport (see text for quota information)								
Neah Bay (area 4)	19,100	14,900	7,800	5,600	6,500	7,500	3,100	3,700
La Push (area 3)	4,700	3,700	600	4,600	2,800	2,200	2,100	1,200
Westport (area 2)	65,600	52,800	30,800	54,500	20,400	12,000	13,800	12,600
Columbia Ocean Area (area 1)	93,900	79,400	44,500	75,100	20,500	11,400	26,700	24,900
INSIDE FISHERIES								
Sport [7/]								
Strait of Juan de Fuca (area 5,6) [4/]	40,900	35,200	26,700	66,200	41,300	76,200	21,400	13,600
San Juan Islands (area 7)	1,500	1,300	na	2,000	2,600	2,200	900	600
Puget Sound Marine (area 8-13)	52,000	49,500	na	60,000	72,100	91,300	34,500	6,000
Puget Sound Rivers	39,400	37,600	na	17,900	70,000	43,500	40,400	9,600
North WA Coastal Rivers	1,000	1,000	na	8,900	8,000	3,400	7,900	5,800
Grays Harbor [5/]	18,300	17,400	na	27,200	21,200	18,300	14,600	12,500
Columbia River Buoy 10	54,500	45,000	36,900	57,700	7,600	7,400	7,600	8,000
Commercial [8/]								
Strait of Juan de Fuca net and troll (area 4B,5,6C)	3,800	3,700	1,600	2,400	2,700	3,600	2,800	3,200
San Juan Island (area 6,7,7A)	13,000	7,000	3,900	20,000	19,600	10,500	11,300	4,700
Puget Sound Marine (area 8-13,7B-D)	189,900	185,600	22,300	108,200	169,800	236,200	136,700	101,800
Puget Sound Rivers	94,600	92,700	15,300	73,000	137,400	123,600	89,100	64,200
North WA Coastal Rivers	58,200	57,100	16,800	101,000	44,000	38,300	82,900	95,300
Grays Harbor (area 2A-2D) [5/]	55,000	53,900	13,900	80,300	30,400	44,000	32,300	30,800

Table 16 Footnotes:

[1/] Estimates of total mortality include non-retention mortality. Total Mortality is estimated by Fishery Regulation Assessment Model (FRAM) as catch + incidental mortality, where incidental mortality = drop off + non-retention mortality (PFMC 2008).

[2/] For ocean fisheries this column shows the Coho troll and recreational quotas used for 2015 pre-season fishery planning as distributed by ocean area (Landing Quotas = Landed). See text for any in-season adjustments.

[3/] Includes area 4B catch during the PFMC management period (May 1 – September 15); area 4B Treaty troll catch outside the PFMC period included under Strait Juan de Fuca net and troll (October-April).

[4/] 2015 catch represents creel estimates from July 1 - October 31 in area 5 only, since catch record cards (CRC) annual estimates are not yet available.

[5/] Includes Grays Harbor catch, as well as catch from the Chehalis and Humptulips Rivers; their tributaries are included in sport estimates only.

[6/] Includes catch from mark-selective fisheries where estimates are available.

[7/] Sport data for the most recent two years are preliminary. All data subject to change. For Buoy 10, kept catch only, see tables 25 in the annual fall report. http://wdfw.wa.gov/fishing/crc/staff_reports.html.

[8/] Includes Non-Tribal and Tribal commercial and take home, as well as Tribal ceremonial and subsistence (C&S) for all gear types. Starting in 2012, the Copalis, Moclips, and Ozette Rivers have been removed from landed catch.

[9/] FRAM modeled pre-season fishery impacts cover the current fishery planning year, for Coho defined as January 1 through December 31.

[10/] Includes Oregon troll catch in Area 1

Table 17. Mark-Selective Chinook and Coho Fisheries by Area and Year. "Yes" denotes that a mark selective fishery occurred, even if it only occurred in a subset of the fishing area, season, gear type, or user group.

Selective Coho	**2015**	**2014**	**2013**	**2012**	**2011**	**2010**	**2009**	**2008**
Ocean Troll								
Cape Flattery & Quillayute (Areas 3/4)	yes	yes	yes	yes	yes	yes	yes	yes
Columbia R & Grays Harbor (Areas 1 & 2)	yes	yes	yes	yes	yes	yes	yes	yes
Ocean Sport								
Neah Bay (Area 4)	yes	yes	yes	yes	yes	yes	yes	yes
LaPush (Area 3)	yes	yes	yes	yes	yes	yes	yes	yes
Grays Harbor (Area 2)	yes	yes	yes	yes	yes	yes	yes	yes
Col. R. (Leadbetter Pt. to Cape Falcon)	yes	yes	yes	yes	yes	yes	yes	yes
Sport								
Juan de Fuca (Areas 5 & 6)	yes	yes	yes	yes	yes	yes	yes	yes
San Juan Islands (7)	yes	yes	yes	yes	yes	yes	yes	yes
Puget Sound Sport (Areas 8-13 all year)	yes	yes	yes	yes	yes	yes	yes	yes
Puget Sound Rivers	yes	yes	yes	yes	yes	yes	yes	yes
North WA Coastal Rivers	yes	yes	yes	yes	yes	yes	yes	yes
Grays Harbor (Areas 2-2)	yes	yes	yes	yes	no	yes	yes	yes
Columbia River Buoy 10	yes	yes	yes	yes	yes	yes	yes	yes
Commercial								
North WA Coastal Rivers	no	no	no	no	no	no	no	no
Grays Harbor (Areas 2A-2D)	yes	yes	no	no	yes	yes	yes	no
Columbia River Net/ - Fall	yes	yes	yes	no	no	no	no	no
Strait of Juan de Fuca (Areas 4B/5/6C) Net & Troll	no	no	no	no	no	no	no	no
San Juan Islands (Areas 6, 7 & 7A)	yes	yes	yes	yes	yes	yes	yes	yes
Puget Sound Marine (Areas 8-13)	no	no	no	no	no	no	no	yes
Puget Sound Rivers	no	no	no	no	no	no	no	no
Selective Chinook	**2015**	**2014**	**2013**	**2012**	**2011**	**2010**	**2009**	**2008**
Ocean Troll								
Cape Flattery & Quillayute (Areas 3/4/4B)	no	no	no	no	no	no	no	no
Columbia. R & Grays Harbor (Areas 1 & 2)	no	no	no	no	no	no	no	no
Ocean Sport								
Neah Bay (Area 4)	yes	yes	yes	yes	yes	yes	no	no
La Push (Area 3)	yes	yes	yes	yes	yes	yes	no	no
Grays Harbor/Westport (Area 2)	yes	yes	yes	yes	yes	yes	no	no

Col. R./Ilwaco (Leadbetter Pt. to Cape Falcon)	yes	yes	yes	yes	yes	yes	no	no
Sport								
Juan de Fuca (Area 5 & 6)	yes	yes	yes	yes	yes	yes	yes	yes
San Juan Islands (Area 7)	yes	yes	yes	yes	yes	yes	yes	no
Puget Sound Sport (Areas 8-13)	yes	yes	yes	yes	yes	yes	yes	yes
Puget Sound Rivers	yes	yes	yes	yes	yes	yes	yes	yes
North WA Coastal Rivers	yes	yes	yes	yes	yes	yes	yes	yes
Grays Harbor (Areas 2-2)	yes	yes	yes	yes	no	no	no	no
Columbia River Sport - Winter/Spring	yes	yes	yes	yes	yes	yes	yes	yes
Columbia River Sport - Summer	yes	yes	yes	yes	yes	yes	no	no
Columbia River Sport - Fall	yes	yes	yes	yes	no	no	no	no
Commercial								
North WA Coastal Rivers	no	no	no	no	no	no	no	no
Grays Harbor (Areas 2A-2D)	yes	yes	yes	yes	no	no	no	no
Columbia River Net-Winter/Spring	yes	yes	yes	yes	yes	yes	yes	yes
Columbia River Net - Summer	no	no	no	no	no	no	no	no
Columbia River Net - Fall	yes	yes	yes	no	no	no	no	no
Strait of Juan de Fuca(4B/5/6C) Net & Troll	no	no	no	no	no	no	no	no
San Juan Islands (Areas 6, 7 & 7A)	yes	yes	yes	yes	yes	yes	yes	yes
Puget Sound Marine (Areas 8-13)	yes	no	no	no	yes	yes	no	no
Puget Sound Rivers	yes	yes	yes	yes	yes	no	no	no

III. PRELIMINARY REVIEW OF THE 2015 WASHINGTON CHUM SALMON FISHERIES OF INTEREST TO THE PACIFIC SALMON COMMISSION

This summary report provides a preliminary review of the 2015 U.S. Chum salmon (*Oncorhynchus keta*) fisheries conducted by Puget Sound salmon co-managers (Puget Sound Treaty fishing tribes and the State of Washington) in the Strait of Juan de Fuca (Salmon Management and Catch Reporting Areas 4B, 5 and 6C), the San Juan Islands and the Point Roberts area (Areas 7 and 7A) (Figure 39), conducted in compliance with provisions of Chapter 6 of Annex IV of the Pacific Salmon Treaty (PST 2008). The harvest and abundance information provided are based on preliminary data reported through November 15, 2015 and is subject to correction and revision as additional information becomes available.

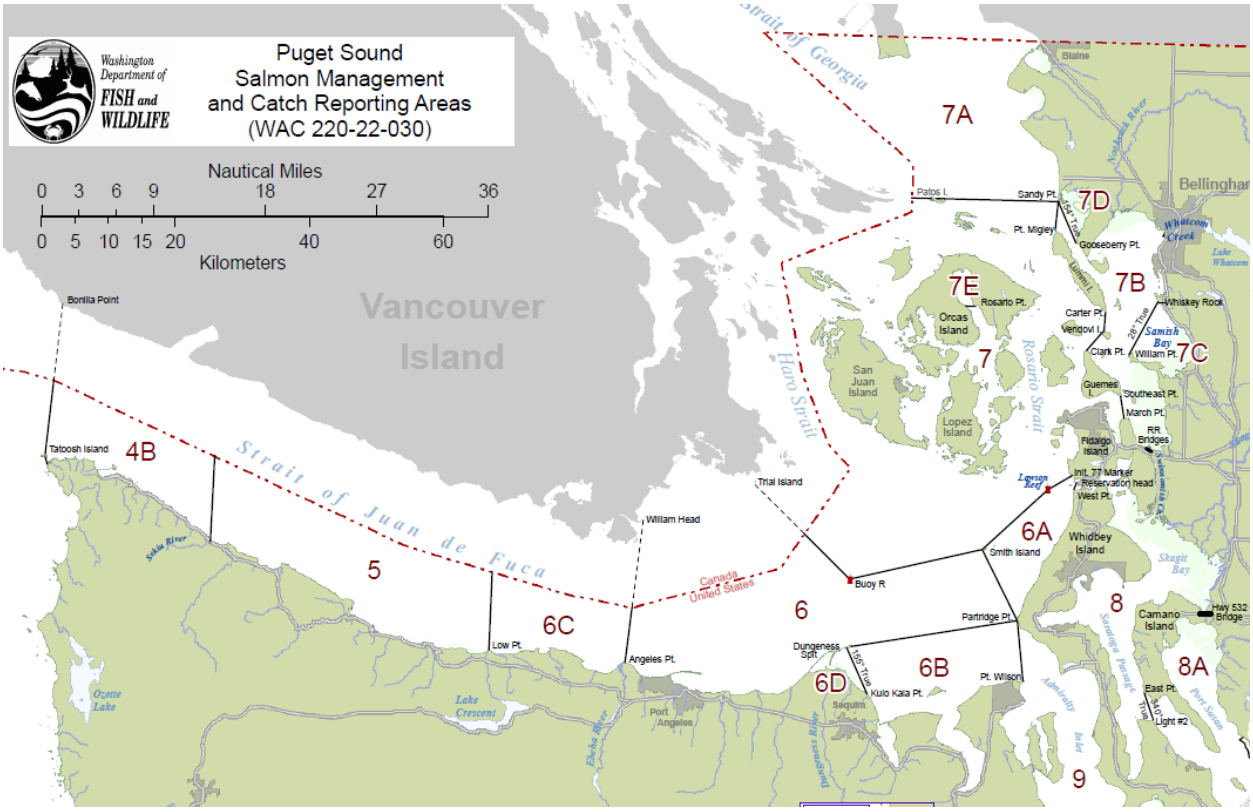


Figure 39. Puget Sound Salmon Management and Catch Reporting Areas with Chum salmon fisheries of interest to the Pacific Salmon Commission.

MIXED STOCK FISHERIES

Areas 4B, 5 and 6C

As in previous years, the Chum salmon fishery in Areas 4B, 5 and 6C was restricted to Treaty Indian fishers using gillnets. The fall Chum-directed salmon fishery opened the week of October 11, with a schedule of six days per week and continued through November 14. A total of 7,013

Chum salmon were harvested during this period. However, including incidental catches of Chum salmon prior to the Chum-directed fishing season, a total of 7,958 Chum salmon were harvested (Table 18). During the fall Chum fisheries in Areas 4B, 5, and 6C, there was a reported by catch of 124 Coho, zero Chinook, and zero Steelhead.

TABLE 18. PRELIMINARY 2015 CHUM SALMON HARVEST REPORT FOR WASHINGTON SALMON CATCH REPORTING AREAS 4B, 5, 6C

Areas 4B, 5, 6C	
Treaty Indian, Gill Net Only	
Time Periods	GN
Through 9/19	126
9/20-9/26	23
9/27-10/3	6
10/4-10/10	790
10/11-10/17	2,938
10/18-10/24	2,349
10/25-10/31	1,500
11/1-11/7	226
11/8-11/14	0
Total	7,958

Areas 7 and 7A

Chum salmon fisheries in Areas 7 and 7A are regulated to comply with a base harvest ceiling of 130,000 Chum salmon, unless a critically low level of abundance is identified for those stocks migrating through Johnstone Strait ("Inside Southern Chum salmon") (PST 2008). Chapter 6 of Annex IV specifies that U.S. commercial fisheries for Chum salmon in Areas 7 and 7A will not occur prior to October 10. Paragraph 10 (a-b) specifies run sizes below 1.0 million as critical (estimated by Canada). For run sizes below the critical threshold, the U.S. catch of Chum salmon in Areas 7 and 7A will be limited to those taken incidentally to other species and in other minor fisheries, and shall not exceed 20,000. U.S. commercial Chum fisheries during 2015 were initiated on October 10.

Paragraph 10 (d) states that Canada will provide an estimate of Fraser River Chum salmon run size no later than October 22. If that estimate is below 900,000, then the U.S. will limit its fishery to not exceed a catch of 20,000 additional Chum salmon from the day following notification. An estimated Fraser River Chum salmon run size of 1,567,000 was provided by Canada on October 21. Paragraph 10(d) further states that the total catch is not to exceed 130,000 Chum Salmon. The fishery was therefore continued through October 23. Total U.S. catch between October 10 and October 23 in Areas 7 and 7A was 124,847 Chum salmon (Table 2). The Non-Treaty gillnet and purse seine fleets were open daily October 12, 13, 15 and then continuously from October 19 through October 22. The Treaty Indian gillnet and purse seine fisheries were opened on October 10 and ran continuously through October 23.

Non-Indian reef net fisheries targeting adipose-marked Coho salmon were conducted from the end of Fraser Panel control in Area 7 (September 8) until September 30, with Chum salmon retention prohibited. From October 1 through October 22, reef nets were open daily with Chum salmon retention allowed. The reef net fishery was reopened from October 25 through November 7, but there was no effort during this period. Chum salmon catch in this fishery, between October 1 and November 7, was 5,851 fish. Although the reef net fishery was re-opened, there was no reef net fishing effort after October 22.

The total 2015 Chum salmon catch by all gears in Areas 6, 7, and 7A, reported through October 23, was 125,322 (Table 20). Catch distribution, between Areas 7 and 7A, was 77% and 23% respectively. However, it should be noted that these catch reports may be incomplete as of the date of this report. There were 33 Chum salmon reported as incidental catch in Areas 7 and 7A during Fraser Panel approved Sockeye salmon directed fisheries during August and September. During the fall Chum salmon-directed fisheries in Areas 6, 7 and 7A, there was a reported by-catch of 3,282 Coho, 19 Chinook, and zero Steelhead (Table 3).

In 2014, for the first time under the 2008 PST Chum agreement, the U.S. landed the full share of 130,000 Chum salmon allowed to be caught in Area 7/7A in a non-critical year under the current Chapter 6 of the Pacific Salmon Treaty (PST) (Table 2). Chapter 6.10 (h) of the PST provides guidance for overage calculations, as follows: "Catches in excess of 135,000 Chum shall result in an overage being calculated by subtracting 130,000 from the total Chum catch. Overages will be accounted for by reducing the U.S. annual catch ceilings in up to two subsequent non-critical Inside Southern Chum salmon years." As shown in Table 2, the total U.S. catch (tribal and non-tribal) in Area 7/7A during 2015 was 124,847 Chum, with a payback to Canada of 5,153 Chum in the first year. Therefore, the remaining number of Chum owed to Canada in the next non-critical year is 11,418 (Table 19).

TABLE 19. U.S. 7/7A CHUM CATCHES, 2009-2015

Year	Total U.S. catch	Total U.S. Share	Uncaught share	Overage vs. 130K share	Number Paid Back in 2015 [a/]	Remaining Number Owed to Canada [b/]
2009	24,073	130,000	105,927	0		
2010	23,404	130,000	106,596	0		
2011	60,485	130,000	69,515	0		
2012	72,866	130,000	57,134	0		
2013	79,650	130,000	50,350	0		
2014	146,571	130,000	0	16,571		
2015	124,847	130,000	0	0	5,153	11,418

[a/] (U.S. share of 130,000) - (Total U.S. actual catch in 2015 of 124,847) = 5,153 Chum paid back to Canada in 2015.
[b/] Remaining Chum owed to Canada in the next non-critical year: (Overage in 2014 at 16,571) - (Amount paid back in 2015 at 5,153) = Remaining amount of 11,418.

TABLE 20. PRELIMINARY 2015 CHUM SALMON HARVEST REPORT FOR WASHINGTON SALMON CATCH REPORTING AREAS 6, 7, 7A

	Area 6	Area 7				Area 7A			Area 6,7,7A
Time Periods	GN	PS	GN	RN	Area Total	PS	GN	Area Total	Total
Through 9/26	0	25	0	0	25	7	1	8	33
9/27-10/3	0	0	0	878	878	0	0	0	878
10/4-10/10	0	2,130	0	1,539	3,669	0	0	0	3,669
10/11-10/17	475	43,159	1,040	3,220	47,419	10,498	7,003	17,501	65,395
10/18-10/24	0	40,081	3,433	214	43,728	5,251	6,368	11,619	55,347
10/25-10/31	0	0	0	0	0	0	0	0	0
11/1-11/7	0	0	0	0	0	0	0	0	0
Total	475	85,395	4,473	5,851	95,719	15,756	13,372	29,128	125,322
Gear Type Abbreviations: GN=Gill Net; PS=Purse Seine; RN=Reef Net									
10/10- 11/7 By-catch	Coho: 3,280		Chinook: 19		Steelhead: 0				

PUGET SOUND TERMINAL AREA FISHERIES AND RUN STRENGTH

Pre-season forecasts for Chum salmon returns to Puget Sound predicted a fall Chum run size totaling approximately 956,000 fish. As of the date of this report, in-season estimates indicate that Chum returns to Puget Sound are generally at or above forecast with some exceptions. In-season run size updates from the 2015 fall Chum fisheries in Hood Canal and South Puget Sound indicate those runs are above forecast at 617,091 and 565,000, respectively. Some Puget Sound Chum fisheries are still underway and additional in-season estimates of abundance may occur. As of the date of this report, spawning escapement surveys are in progress for most Puget Sound stocks and therefore escapement estimates are not yet available. Early indications from these surveys do however suggest that nearly all stocks will meet escapement goals; although, some central Puget Sound Fall Chum stocks appear to be below forecast again this year.

REFERENCES

Pacific Salmon Treaty (PST) Act of 1985. 2008 Agreement. U.S.-Canada. Public Law 99-5, 16 U.S.C. 3631.

IV. PRELIMINARY REVIEW OF 2015 UNITED STATES FRASER RIVER SOCKEYE AND PINK SALMON

INTRODUCTION

The 2015 Fraser River Panel fishing season was implemented under Annex IV of the Pacific Salmon Treaty (PST), and guidelines provided by the Pacific Salmon Commission to the Fraser River Panel. The treaty establishes a bilateral (U.S. and Canada) Fraser River Panel (Panel) that develops a pre-season management plan and approves in-season fisheries within Panel Area waters directed at sockeye and pink salmon bound for the Fraser River (Figure 40). In partial fulfillment of Article IV, paragraph 1 of the PST, this document provides a season review of the

2015 U.S. Fraser River salmon fisheries as authorized by the Panel. Catch and abundance information presented is considered preliminary.

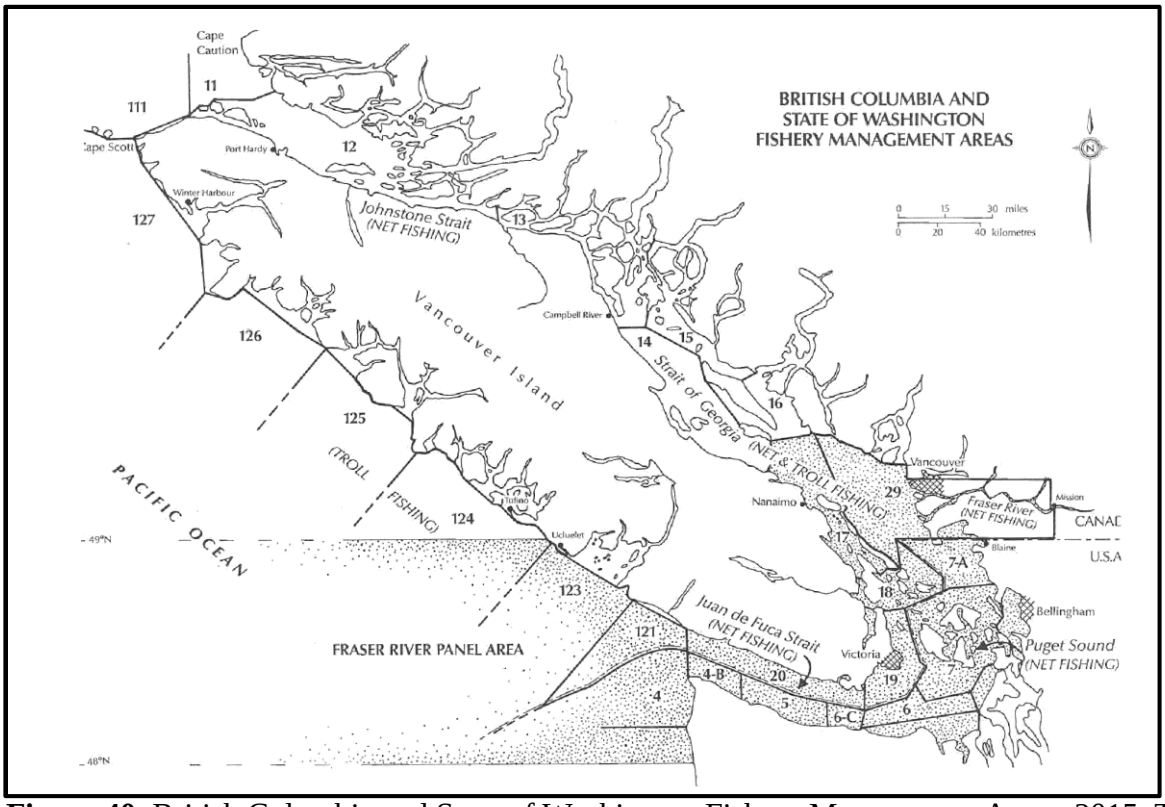


Figure 40. British Columbia and State of Washington Fishery Management Areas, 2015. The shaded area in the figure represents the marine waters managed by the Fraser River Panel.

PRESEASON EXPECTATIONS AND PLANS

Forecasts and Escapement Goals

Pre-season run size forecasts and escapement goals by run timing group (run) at various probability levels were provided to the Panel by the Department of Fisheries and Oceans, Canada (DFO). Table 21 shows the 2015 agreed pre-season sockeye forecasts based on the 50 percent probability level forecasts, which represent the mid-point of the range of possible run sizes for all runs with the exception of Early Stuart. For Early Stuart, the 25 percent probability level forecast was used for pre-season planning. This approach was agreed to due to the expectation for overall low abundance and the very high proportions of age 5 fish in the forecast. Table 21 also provides the escapement goals for the sockeye run timing groups based on the pre-season forecasted abundance. The escapement goals for all runs can change in-season as the run size estimates are updated.

Fraser River pink salmon returns were projected pre-season at 14,455,000 fish, with an escapement goal of 6 million fish.

Table 21. 2015 pre-season Fraser River sockeye forecasts and escapement goals by run timing group.

	Early Stuart	Early Summer	Summer	Lates	Total
Forecast of Abundance	16,000	837,000	4,675,000	1,236,000	6,764,000
Escapement Goal	16,000	334,800	1,636,300	494,400	2,481,500

Diversion

Northern diversion rate is defined as the percentage of Fraser sockeye migrating through Johnstone Strait (rather than the Strait of Juan de Fuca) in their approach to the Fraser River. Due to much higher than average sea surface temperatures (SST) in May, the pre-season diversion forecast for sockeye was 96% (compared to the long-term average of 62%). An updated forecast in July using both May and June SSTs predicted a diversion rate of 95%. For pink salmon, the average northern diversion rate since 1997 of 56% was used for pre-season planning.

Management Adjustments (MA) and Environmental Conditions

Management adjustments (MA) for sockeye salmon reflect the anticipated difference between escapement estimates at Mission (minus catch above Mission) and actual spawning escapements. Adjustments adopted by the Panel are added to the gross escapement goal, effectively increasing the spawner escapement goal for that run timing group. For 2015, MAs were modeled using forecasts of environmental conditions and return timing or median historical differences between estimates. Table 22 provides the pre-season projected MAs that were used for planning fisheries. In-season management adjustments use MA models that are based on both measured and forecasted temperatures and discharges or, for Late-run sockeye, upstream migration timing.

Table 22. 2015 pre-season proportional management adjustment (pMA) and corresponding management adjustments (MA) for each run group.

Early Stuart		Early Summer		Summer		Lates	
pMA	MA	pMA	MA	pMA	MA	pMA	MA
0.68	10,900	1.0	334,800	0.17	278,200	0.95	469.700

Run Timing

Run timing is temporal information about the presence of a salmon stock in a specific time and area. Run timing is an important variable when planning fisheries and predicting run size in-season. The following Area 20 50% dates (the dates when 50% of the run is forecasted to have passed through Area 20) were predicted pre-season for the major Fraser River sockeye run groups and for Fraser River pink salmon.

Table 23. 2015 Area 20 historic 50% run timing dates and updated pre-season timing forecasts in June. For this report the historic run timing dates are used for pre/post season comparison purposes.

Run Group	Area 20 50% Run Timing Historic Date	Area 20 50% Run Timing (June)
Early Stuart	July 4	July 8
Early Summers	July 30	August 1
Summers	August 8	August 7
Lates	August 16	August 17
Pink salmon	August 28	August 28

U.S. Total Allowable Catch (TAC)

Pre-season, the U.S. TAC was established at 444,100 sockeye across all run groups and 2,119,000 pink salmon. The TAC available by sockeye run group is shown in Table 24.

Table 24. 2015 total US total allowable catch (TAC) by run group.

Run Group	Pre-season US TAC
Early Stuart	0
Early Summers	18,900
Summers	395,300
Lates	29,900
Total	444,100

Preseason Management Plans

During the pre-season planning process the Panel evaluates and adopts management approaches for Fraser sockeye and pink salmon that address conservation and harvest objectives for each major run group. The Panel develops fishing plans and in-season decision rules with the objective of meeting management goals. Managing Fraser River sockeye and pink salmon involves a trade-off between catching abundant runs and meeting escapement objectives for less abundant run groups.

In 2015, the pre-season forecast of ~6.8 million sockeye resulted in available U.S. TAC across all run groups except the Early Stuart (Table 24). The majority of TAC was in the Summer run group.

In 2015, Panel concerns about performance of MA models based on environmental conditions, along with uncertainty in long-term environmental forecasts available pre-season, led the panel to adopt MA values based on medians of past years' MAs.

While planning pre-season fishing schedules, the U.S. Section had available TAC across the Early Summer run, Summer run, and Late run groups. Pre-season fishing schedules were developed to start fishing during the peak of the Early Summer run migration. The more limited TAC available for the Late run group was anticipated to delay the start time for pink salmon directed fisheries and to limit the number of Treaty and All Citizens fishery openings.

IN-SEASON MANAGEMENT

In-season, the Pacific Salmon Commission staff analyzes a variety of information to produce best estimates of northern diversion, management adjustments, run-timing, abundance, and harvest by run group. These estimates are created using stock identification information (both genetic data and scales), test fishing data, escapement counts past Mission, harvest data, and environmental information.

Run Assessment

The final in-season abundance estimates for 2015 (Table 25) indicate that sockeye returned at ~31% of the pre-season forecast when summed across all run groups. Individual run group abundance varied considerably from 13% of forecast for Late run sockeye to 200% above forecast for Early Stuart. Both Early Summer and Summer sockeye run groups performed similarly relative to pre-season expectations, with respective returns of 45% and 33% of the pre-season forecast. The return of pink salmon was only 40% of the pre-season forecast.

The 2015 Fraser sockeye return was later than historic timing for all run groups but the Early Summer run (Table 26). Run timing ranged from 2 days late for Early Stuart (50% date July 6) to 5 days late for Late run sockeye (50% date August 21). In comparison, timing for pink salmon was 6 days earlier than the long-term average.

Table 25. Comparison of 2015 pre-season vs. in-season abundance estimates for Fraser River sockeye salmon by run group and for pink salmon.

Run Group	Pre-Season 50% Probability Forecast	In-Season Run Size Estimate	Comparison: In-Season / Pre-Season Forecast
Early Stuart	16,000[1]	32,000	200%
Early Summer	837,000	373,000	45%
Summer	4,675,000	1,549,000	33%
Lates	1,236,000	165,800	13%
Total Sockeye	6,764,000	2,119,800	31%
Pink salmon	14,455,000	5,781,300	40%

[1]25% probability level forecast adopted by Panel for Early Stuart.

Table 26. Comparison of 2015 preliminary 50% run timing dates through Area 20 to in-season-estimates.

Run Group	Pre-season 50% Run Timing Date	In-season 50% Run Timing Date
Early Stuart	July 4	July 6
Early Summer	July 30	July 30
Summer	August 8	August 10
Lates	August 16	August 21
Pink salmon	August 28	August 22

Season Description

Prior to July 25:

Run size Changes: Early Stuart sockeye run size was changed to 30,000 and migration was considered nearly complete.

Timing: The Early Stuart sockeye Area 20 50% migration timing date was estimated to be July 7th, 3 days later than pre-season expectations.

Diversion: The 5-day average northern diversion rate for sockeye was 34%.

Stock ID: Early Stuart migration in marine areas was nearing completion and Summer run and Early Summer run sockeye were the dominant groups migrating through marine areas.

Environmental Conditions/MA: In-river temperatures decreased after a peak of 20.5˚C on July 13th, but were forecasted to rise over the next week. River discharge was below the historical average at ~3,000 m^3s^{-1}. The Early Stuart management adjustment was increased to 4.18 (0.68 pre-season).

Fisheries: All Treaty Indian and All Citizens' fisheries remain closed.

Week ending August 1:

Run size Changes: There were no changes to run group sizes this week.

Timing: There were no changes to Area 20 50% migration timing date for any run group this week.

Diversion: The 5-day average northern diversion rate for sockeye was estimated to be 35%.

Stock ID: Marine test catches were dominated by Summer run sockeye (80%), followed by Early Summer run (20%).

Environmental Conditions/MA: In-river discharge was ~ 34% lower than the historical average for this date at 2,922 m^3s^{-1}, and in-river temperatures were 19˚C. Temperatures were forecasted to increase over the next week. No changes were made to the MA this week.

Fisheries: Treaty Indian fisheries were open in areas 4B/5/6C on July 25 – August 1. All Citizens' fishing remains closed.

Week ending August 8:

Run size Changes: Run size for Early Stuart was increased to 32,000 (pre-season 16,000), and the Early Summer run size was decreased to 424,000 (pre-season 837,000).

Timing: The Area 20 50% migration timing date was changed for Early Stuart to July 6 (pre-season July 4) this week.

Diversion: The northern diversion rate for sockeye continued to increase with an 5-day average diversion rate of 54% (average of purse seine and gillnet test fisheries).

Stock ID: Stock ID proportions showed a progression in the migration and subsequent expected changes in stock proportions compared to the previous week with Summer run sockeye making up the largest proportion (86%) followed by Early Summer run (13%), and Late run sockeye (1%) through Juan de Fuca Strait. The first pink salmon stock ID samples from Area 20 indicated about 37% of the pinks present were of Fraser River origin.

Environmental Conditions/MA: In-river temperature decreased slightly to 18.7˚C (0.7˚C above average), and river discharge was ~36% below average for this date at 2,530 m^3s^{-1}. No changes were made to the MA this week.

Fisheries: Treaty Indian fisheries in areas 4B/5/6C remained open. Treaty Indian fisheries in areas 6/7/7A were open on August 1, 3, and 6. All Citizens' fisheries in areas 7/7A opened on August 1 with openings for reef nets on August 1, 6, 7, and 8; and gillnet and purse seine openings on August 2, 5, 7,and 8.

Week ending August 15:

Run size Changes: Early Summer, Summer, and Late sockeye run groups were downgraded to 350,000; 1,150,000; and 419,000, respectively.

Timing: Early Summer sockeye run timing was updated to July 29th, 1 day earlier than pre-season expectation.

Diversion: The 5-day average Fraser sockeye northern diversion rate through Johnstone Strait increased to 78% and the pink salmon diversion rate was estimated to be 10%.

Stock ID: Late run sockeye were beginning to build in test fisheries with 8% of Area 20 test catches from the Late run. Summer run sockeye made up the largest portion of stock ID samples at 83%, followed by the Early Summer run at 8%. Pink salmon stock ID samples from Area 20 indicated about 55% of the pinks present were of Fraser River origin.

Environmental Conditions/MA: In-river temperatures increased from the previous week to 19.8˚C (1.8˚C above average) but were forecast to decrease over the next week. Fraser River discharge continued to decline to 2,440 m^3s^{-1}, which is ~30% below the historical average. No changes were made to the MA this week.

Fisheries: Treaty Indian fisheries in areas 4B/5/6C were open daily this week from August 9 - 12, while areas 6/7/7A were open on August 9-11. All Citizens' fisheries were closed.

Week ending August 22:

Run size Changes: Summer run sockeye run size was updated to 1,600,000.

Timing: Summer run sockeye migration timing was updated to August 11 (3 days later than pre-season).

Diversion: 5-day average sockeye diversion through Johnstone Strait continued to increase to 90% and pink salmon diversion increased to 53%.

Stock ID: Early summer and Summer run abundance started to decline this week with test catches made up of 4% Early Summer run, 82% Summer run and 14% Late run. Pink salmon stock ID samples from Area 20 indicated about 75% of the pinks present were of Fraser River origin.

Environmental Conditions/MA: In-river temperatures remained above average at 19.7˚C (1.7˚C above average), while river discharge was ~28% below average at 2,203 m^3s^{-1}. No changes were made to the MAs this week.

Fisheries: All Treaty Indian and All Citizens' fisheries were closed.

Week ending August 29:

Run size Changes: Early Summer and Summer sockeye run sizes were increased to 400,000 and 1,700,000 respectively this week. No changes were made to the Late run size.

Timing: Early Summer migration timing was changed to July 31 (1 day later than pre-season) and Summer run timing was changed to August 12 (4 days later than pre-season).

Diversion: Sockeye migration continued to increase through Johnstone Strait this week with 5-day average sockeye northern diversion rate at 95% while the average rate for pink salmon diversion declined to 23%.

Stock ID: Early Summer run migration was largely complete with none estimated in Area 20 samples. Summer run and Late run abundances remained strong at 45% and 55%, respectively. Pink salmon stock ID samples from Area 20 indicated about 67% of the pinks present were of Fraser River origin.

Environmental Conditions/MA: In-river temperature declined slightly over the last week to 18.1˚C (0.9˚C above average). River discharge remained below average at 1,828 m^3s^{-1} (30% below average). No changes were made to the MA this week.

Fisheries: Treaty Indian fisheries opened August 25-29 in areas 4B/5/6C while Treaty Indian fisheries in areas 6/7/7A were open August 27-29. All Citizens' gillnet and purse seine fisheries in areas 7/7A were open August 25 and 26 while reef nets were open August 26 and 27.

Week ending September 5:

Run size Changes: The Late run size was decreased to 300,000 sockeye. Pink salmon run size was decreased from the pre-season forecast of 14,455,000 to 6,000,000 fish.

Timing: Late run sockeye migration timing was moved back to August 23 which is 7 days later than the pre-season forecast. Timing for pink salmon was moved to August 21 which was 7 days earlier than pre-season expectations.

Diversion: 5-day average diversion of sockeye through Johnstone Strait is estimated to be 99%. 5-day average northern diversion for pink salmon increased to 77%.

Stock ID: Stock ID proportions were dominated by Summer run sockeye at 76%, followed by 22% Late run sockeye.

Environmental Conditions/MA: River discharge increased over the past week to 1,982 m^3s^{-1}; ~19% below average. River temperatures dropped by 2.0˚C since last week, and were 16.1˚C this week (0.4˚C below average). No changes were made to the MA this week.

Fisheries: Treaty Indian fisheries opened August 29-September 2 in areas 4B/5/6C while Treaty Indian fisheries in areas 6/7/7A were open August 31 - September 1. All Citizens' gillnet and purse seine fisheries in areas 7/7A were open August 30 and September 1 while reef nets were open August 30, 31 and September 1.

Week ending September 12:

Run size Changes: Summer and Late sockeye run sizes were decreased to 1,500,000 and 200,000, respectively. Pink salmon run size was increased slightly to 6,200,000.

Timing: Timing of Summer and Late run sockeye were updated to August 10 (2 days later than pre-season) and August 21 (5 days later than pre-season), respectively. Pink salmon migration timing was changed to August 22 (6 days earlier than pre-season).

Diversion: Diversion of sockeye through Johnstone Strait is now ~99%. Pink salmon 5-day average northern diversion increased to 91%.

Stock ID: Stock ID samples from Johnstone Strait indicated Late run sockeye were 53% of the total migration while 47% were Summer run.

Environmental Conditions/MA: No environmental condition updates were provided to the Panel this week. No changes were made to the MA this week.

Fisheries: All Treaty Indian and All Citizens' fisheries were closed.

After September 12:

Run size Changes: No further changes were made to run sizes.

Timing: No further in-season changes were made to stock migration timing.

Diversion: No further in-season changes were made to sockeye or pink salmon northern diversion rates.

Stock ID: Stock ID samples from the remainder of the season were dominated by Late run sockeye followed by Summer run sockeye.

Environmental Conditions/MA: Updated environmental conditions were not distributed after the Summer run migration had ended. The MA for Late run sockeye is not updated using environmental conditions.

Fisheries: All Treaty Indian and All Citizens' fisheries were closed.

HARVEST

Between July 25 and Sept. 2 the United States caught a total of 46,501 Fraser River sockeye and 334,717 Fraser River pink salmon in Panel area waters (Tables 27 and 28). During this period Treaty Indian fisheries in Areas 4B/5/6C were open for a total of 25 days and in Areas 6/7/7A for 8 days. The All Citizens fishery in Areas 7/7A was open for 9 days for reef nets and 8 days for gillnet and purse seine gears. The Treaty Indian fishery caught 35,138 sockeye and 190,104 pink salmon while the All Citizens fishery caught 11,363 sockeye and 144,613 pink salmon.

Table 27. Preliminary estimate of 2015 U.S. catches of Fraser River sockeye salmon in Panel area waters.

	Treaty Indian	All Citizens
Ceremonial and Subsistence (all areas)	2,023	0
Commercial Catch in Areas 4B/5/6C	806	0
Commercial Catch in Areas 6/7/7A	32,309	11,363
Total Catch	35,138	11,363
% of U.S. Catch	75.6%	24.4%

Table 28. Preliminary estimate of 2015 U.S. catches of Fraser River pink salmon in Panel area waters.

	Treaty Indian	All Citizens
Ceremonial and Subsistence (all areas)	3,352	0
Commercial Catch in Areas 4B/5/6C	533	0
Commercial Catch in Areas 6/7/7A	186,219	144,613
Total Catch	190,104	144,613
% of U.S. Catch	56.7%	43.2%

POST-SEASON REPORT FOR
2015 CANADIAN TREATY LIMIT FISHERIES

Prepared by: Fisheries and Oceans Canada

January 4, 2016

Table of Contents

1 INTRODUCTION

The chapters in Annex IV of the Pacific Salmon Treaty outline the joint conservation and harvest sharing arrangements between Canada and the United States of America (U.S.) for key stocks and fisheries subject to the Treaty. On December 23, 2008, Canada and the U.S. ratified new provisions for five chapters under Annex IV of the Pacific Salmon Treaty. These chapters came into effect on January 1, 2009 and remain in force until 2018. Chapter 4, which covers Fraser River sockeye and pink salmon, was revised in July 2014 and these revisions cover fisheries in 2014 through 2019. All management regimes under Annex IV continue to be implemented by Fisheries and Oceans Canada (DFO) for the 2015 season.

The catches reported in this document provide the best information available to December 1, 2015, and may change once all catch information for 2015 has been reviewed. The catches are based on in-season estimates (hailed statistics); on-grounds counts by DFO, logbooks, dockside tallies, landing slips (First Nation fisheries), fish slip data (commercial troll and net), creel surveys and observers (recreational and commercial).

Annex fisheries are reported in the order of the Chapters of Annex IV. Comments begin with expectations and management objectives, escapements (where available and appropriate) and catch results by species. The expectations, management objectives, catches and escapements focus on those stocks and fisheries covered by the Pacific Salmon Treaty. Appendix 1 summarizes 1996-2015 catches in Canadian fisheries that have at some time been under limits imposed by the Pacific Salmon Treaty.

Annually, DFO releases a Salmon Outlook document which is referenced in various sections of this report; this document provides a preliminary indication of salmon production, and associated fishing opportunities by geographic area and species stock groups called an Outlook Unit for the coming season.

All Southern commercial, recreational, First Nations, Excess Salmon to Spawning Requirements (ESSR) and test fisheries are reported in Appendix 8-11.

2 TRANSBOUNDARY RIVERS

2.1 STIKINE RIVER

Canada developed a fishing plan for Stikine River salmon fisheries based on the catch sharing and management arrangements outlined in Annex IV, Chapter 1, Paragraph 3 of the Pacific Salmon Treaty (PST), including the arrangements agreed to on January 17, 2008 for the 2009 to 2018 period. Accordingly, the 2015 management plan was designed to meet agreed escapement targets and the following harvest objectives: 1) to harvest 50% of the total allowable catch (TAC) of Stikine River sockeye salmon in existing fisheries; 2) to allow additional harvesting opportunities in terminal areas for enhanced sockeye that were surplus to spawning requirements; 3) to harvest up to 5,000 coho salmon in a directed coho fishery; and 4) to harvest up to 1,890 coho in a directed chinook fishery in addition to a harvest of up to 2,300 coho as a base level catch in the directed sockeye fishery. A pre-season forecast of 30,200 chinook exceeded the PST threshold run size of 28,100 which allowed for a directed chinook fishery in 2015.

In 2015 Canada was obligated under Annex IV, Chapter 1, Paragraph 4 of the PST to take corrective actions to bring future catches in alignment with Treaty provisions. This paragraph was triggered given that Canada exceeded its Treaty catch share of sockeye salmon on three occasions during the past five years. As such, Canada reduced its TAC of Tahltan Lake sockeye by 10 percent, which mirrors the average TAC overage Canada harvested since 2010.

The 2015 commercial fishing season opened on May 3 (statistical week 19) and ended September 10 (statistical week 37). From statistical weeks 19 through 25, the commercial fishing fleet engaged in a directed chinook fishery. From statistical weeks 26 through 34 a directed sockeye fishery was prosecuted followed by a directed coho fishery which ended in statistical week 37.

Commercial gear consisted of one 135-metre (443 ft.) gill net per licence holder. The maximum mesh size allowed was 204 mm (8”) through June 20, after which time the maximum mesh size was restricted to 140 mm (5.5”). The lower Stikine commercial fishing grounds covered the area from the international (U.S. / Canada) border upstream to near the confluence of the Porcupine and Stikine Rivers, and also included the lower 10 km (6 mi.) reach of the Iskut River. The upper Stikine commercial fishing grounds covered the area located upstream from the Chutine River.

In the upper Stikine commercial fishery the fishing periods generally mirrored those in the lower Stikine commercial fishery, but lagged by one week. Fishers were permitted one net. As in past years, the commercial fishing area was extended upstream to the mouth of the Tuya River. This action was taken in order to provide for a terminal fishing opportunity on Tuya River sockeye salmon, specifically at sites located upstream of the Tahltan River. For the eighth consecutive year, no commercial fishing activity occurred at this site. The Tuya run, which consists entirely of sockeye produced from the Canada-U.S. Stikine enhancement program, has no spawning escapement requirement since these fish are unable to return to Tuya Lake due to several velocity barriers located in the lower reach of the Tuya River. Tuya sockeye are released into Tuya Lake as young of the year juveniles.

The First Nation Food, Social, and Ceremonial (FSC) fishery located near the community of Telegraph Creek, British Columbia (B.C.) was active from the last week in May to the third week in August, with no time or gear restrictions imposed in 2015.

Most of the chinook salmon recreational fishing effort in the Stikine River watershed typically occurs in the lower reach and at the mouth of the Tahltan River. Additional activity occurs less intensively in the Iskut River and other areas within the Stikine River drainage. Recreational fishing activity commenced in late June and lasted until the third week of July with retention being approximately 35% above the ten year average. In 2015, the Tahltan First Nation encouraged its members to not fish in a chinook holding area that is located below the slide area near the beginning of the Tahltan River canyon.

A rock slide occurred in Tahltan River in 2014. In March of 2015 a crew of two people over a period of approximately two weeks drilled holes into large boulders in which inert expanding cement was applied. The results were that the boulders were fragmented into much smaller sizes that were manually moved downstream and also moved downstream by the affects off the spring freshet. Approximately fifty cubic meters of rock was moved. The work done at the site increased the width of the water channel which decreased the velocity of the water and provides for increased migration success. The effects of the rockslide on chinook and sockeye migration in 2015 have not been summarized at this point.

Chinook Salmon

The pre-season forecast of 30,200 large (i.e. fish with a mid-eye to fork length of >660mm (~26") or a fork length of >735mm (~29") Stikine River chinook salmon, as developed by the Canada / U.S. Technical Committee for the Transboundary Rivers (TCTR) allowed for a directed chinook fishery in 2015. A pre-season forecast run size of <28,100 precludes Canada or the U.S. from scheduling a directed fishery, whereas an in-season run size of >24,500 large chinook is required to permit a targeted chinook fishery. Based on the pre-season forecast and an escapement goal of 21,000 the allowable catch (AC) in the directed chinook fishery was 1,890 and the base line catch (BLC) in the directed sockeye fishery was 2,300.

The directed chinook fishery commenced on May 3rd (statistical week 19) and ended on June 14th (statistical week 25). The total combined gill net catch of chinook salmon in the First Nation and commercial fisheries included 4,157 large chinook salmon and 1,537 jacks compared to 2005 - 2014 averages of 6,847 large chinook salmon and 1,243 jacks, while the sockeye test fishery yielded a harvest of 25 large chinook and 59 jack chinook salmon compared to the 2005-2014 averages of 18 large chinook salmon and 14 jack chinook salmon. The 2015 recreational fishery yielded a total catch of 75 large chinook salmon and 25 jack chinook salmon compared to the 2005-2014 average of 49 large chinook salmon and 12 jack chinook salmon.

The pre-season estimate of 30,200 large chinook salmon held throughout the directed chinook fishery. An in-season chinook run forecast could not be generated due to weak data. Instead, a forecast of 28,131 large chinook salmon and an escapement goal of 17,400 was generated after the close of the directed chinook fishery. This increased the (AC) in the directed chinook fishery to 3,267.

The final post-season estimate of the terminal run was 27,042 large chinook salmon, including an in river run size based on mark-recapture data of 25,600 large chinook salmon and a total U.S.

catch estimate of 1,442 large chinook salmon. Accounting for the total Canadian catch of 4,257 large chinook salmon (includes commercial, First Nation, recreational and test catches), the total system-wide spawning escapement was estimated at approximately 21,343 large chinook salmon. There were mortalities associated with the 2014 Tahltan River rockslide that will lower system-wide spawning escapement but results have not been summarized at this point. The escapement estimate of 21,343 is 23% above the target S_{MSY} escapement goal of 17,400 large chinook salmon and within the escapement goal range of 14,000 to 28,000 large chinook salmon. The final post-season run size of 27,042 fish translated into an allowable Canadian harvest of 4,586 large chinook, while the U.S. was permitted a harvest of 3,654 large chinook in directed commercial fisheries.

The 2015 chinook salmon escapement enumerated at the Little Tahltan weir was 451 large chinook and 489 jack chinook salmon. The actual escapement of 451 large chinook salmon in the Little Tahltan River was well below the S_{MSY} estimate of 3,300 fish and failed to meet the lower end of the escapement goal range of 2,700-5,300 large chinook salmon. The proportion of Little Tahltan escapement to the Stikine wide escapement was only 2%, while on average the contribution of this stock exceeds 14%. This is the ninth consecutive year that the lower end of the escapement objective was not achieved for Little Tahltan chinook salmon.

In addition to the mark-recapture study, the Little Tahltan weir project and aerial surveys, genetic samples were collected on a weekly basis from chinook salmon caught in the U.S. District 108 fishery, and from weekly catches taken in the Canadian commercial fishery. These data were used to determine the total U.S. interception of Stikine River chinook; the in river genetics will be analysed to assess stock specific run timing and run size.

Sockeye Salmon

The forecast for Stikine River sockeye salmon, as developed by TCTR, was for a terminal run size[1] of 171,200 fish including: 81,500 Tahltan Lake origin sockeye salmon (50,400 wild and 31,100 enhanced); 34,000 enhanced Tuya Lake sockeye; and 55,700 non-Tahltan wild sockeye salmon, which constituted a below average forecast. For comparison, the previous 10-year average (2005 - 2014) terminal run size was approximately 179,257 fish.

Preliminary combined catches from the Canadian commercial and First Nation gill net fisheries in the Stikine River totaled 60,046 sockeye in 2015; above the 2005 - 2014 average of 53,806 fish. The lower Stikine River commercial fishery harvested 51,660 sockeye, while the upper Stikine River commercial and First Nation fisheries harvested a total of 202 and 8,184 sockeye salmon, respectively. The preliminary estimate of the total contribution of sockeye salmon from the Canada/U.S. Stikine sockeye enhancement (i.e. the fry-planting program) to the combined Canadian First Nation and commercial catches was 29,602 fish (or 49% of the catch).

In addition to these catches, 1,865 sockeye salmon were taken in the stock assessment test fishery located near the U.S. / Canada border.

A total of 33,159 sockeye salmon was counted through the Tahltan Lake weir in 2015, 13.5% above the 2005 - 2014 average of 28,667 fish and slightly above the escapement goal range of

[1] Terminal run excludes U.S. interceptions that occur outside Districts 108 and 106.

18,000 to 30,000 fish. An estimated 15,585 fish (47%) originated from the fry-planting program, which was slightly below the 49% contribution observed in smolts leaving the lake in 2012, the principal smolt year contributing to the 2015 return. A total of 3,871 sockeye salmon were collected for brood stock of which 400 were analysed for stock identification purposes, resulting in a spawning escapement of 29,288 sockeye salmon in Tahltan Lake.

The total estimated run size of 71,686 Tahltan Lake sockeye was approximately 12% below the pre-season expectation of 81,500 fish.

The spawning escapements for the non-Tahltan and the Tuya stock groups are calculated using stock identification, test fishery and in-river commercial catch and effort data. The average of the test fishery and the commercial fishery catch-per-unit of effort (CPUE), which operated over the full duration of the run, were used as the principal tool in assessing the spawning ground escapements of non-Tahltan Lake and the Tuya sockeye stock groupings. Based on the run reconstructions generated from the test and commercial fishery CPUE, the preliminary escapement estimates for 2015 were 39,094 non-Tahltan and 22,971 Tuya sockeye salmon. The non-Tahltan spawning escapement estimate was within the escapement goal range of 20,000 to 40,000,was 23% above the mid-point escapement goal of 30,000 sockeye salmon, and above the 10 year average of 25,289 fish. The estimated escapement of 22,971 Tuya Lake sockeye salmon was well above the recent 10 year average of 10,935 fish. These fish do not contribute to the natural production of Stikine River sockeye salmon due to migration barriers that obstruct entry to their nursery lake and potential spawning areas.

Based on the in-river run reconstruction of the Tahltan Lake run expanded by run timing and stock identification data in the lower river and estimated harvests of Stikine River sockeye salmon in U.S. terminal gill net fisheries, the preliminary post-season estimate of the terminal sockeye run size is approximately 188,649 fish. This estimate includes 71,686 Tahltan Lake origin fish, 51,640 Tuya Lake origin fish, and 65,323 sockeye of the non-Tahltan stock aggregate. A Stikine River run size of this magnitude is above the 2005 - 2014 average terminal run size of 179,257 sockeye salmon and is approximately 9% above the preseason forecast of 171,200 fish.

Similar to 2008 - 2014, Canada relied on other in-season abundance estimates than those derived from the Stikine sockeye management model (SMM). As a result, most of the in-season run projections used in management of the Canadian fisheries were based on the average of the SMM model and an in-river regression model. The run size projections ranged from 109,500 fish in statistical week 28 to 219,800 fish in statistical week 35. The preliminary post-season estimate was 188,649 sockeye salmon with a Canadian allowable harvest of 57,760 fish. The actual harvest was 60,046 fish, slightly above the allowable catch.

Coho Salmon

For the seventh consecutive year, most of the commercial fishing fleet remained in the fishery to harvest coho salmon resulting in a total catch of 5,619 coho salmon. A catch of 4,923 coho salmon was taken during the targeted coho fishery in statistical weeks 35-37. The total catch was above the recent 10 year average of 3,825 fish.

A coho salmon test fishery was not conducted in 2015. Incidental catches and CPUE taken in the sockeye salmon test and commercial fisheries were well below average. The CPUE observed in

the targeted coho salmon fishery was below average for statistical weeks 35 and 36 but above average for statistical week 37. Aerial surveys of six index spawning sites yielded below average counts taken under excellent viewing conditions.

Joint Sockeye Salmon Enhancement

Joint Canada/U.S. enhancement activities continued from 2014 through 2015 with the collection of sockeye salmon eggs from Tahltan Lake in British Columbia, transportation of eggs to the Snettisham Hatchery in Alaska where they were raised to fry, and subsequent transportation and release at out-plant sites in British Columbia.

Through late May and early June 2015 approximately 2.7 M fry were out-planted into Tahltan Lake. No fry were released into Tuya Lake. The fry originated from the 2014 egg-take and were mass-marked at the Snettisham hatchery with thermally induced otolith marks. Green egg to released fry survival was approximately 76%. No Tahltan Lake origin fry reared at the Snettisham hatchery were lost due to Infectious Hematopoietic Necrosis virus (IHNv). Sockeye salmon enhancement programs have been subject to IHNv outbreaks before as the disease is naturally occurring in Stikine sockeye stocks.

In the fall of 2015, approximately 4.5 M sockeye salmon eggs of a targeted 5.5 M were collected at Tahltan Lake and transported to Snettisham Hatchery in Alaska. As in previous years additional efforts beyond beach seining were employed to acquire brood stock including angling and temporarily holding female brood stock to mature in floating net pens in the lake. Some challenges were faced this year including similar concerns to 2014 regarding salmon passage around a rock slide barrier on the Tahltan River and bad weather delaying air transport of eggs to Snettisham Hatchery. Based on initial hatchery survival rates and historical egg to survival rates an estimated 3.2 M sockeye salmon fry will be available in 2016 for release.

2.2 TAKU RIVER

As with the Stikine River, the fishing plan developed by Canada for the Taku River was based on the arrangements in Annex IV, Chapter 1, Paragraph 3 of the PST in effect for 2009 through 2018. Accordingly, the plan addressed conservation requirements and contained the following harvest objectives: 1) harvest 20% of the TAC of Taku River sockeye salmon (adjusted as necessary according to projections of the number of enhanced sockeye), plus the projected wild sockeye in-river escapement in excess of 1.6 times the spawning escapement goal; 2) to harvest enhanced Taku River sockeye salmon incidentally to wild sockeye salmon; 3) to harvest 5,000, plus any excess over the escapement target of 70,000 coho salmon in a directed coho salmon fishery, dependent on in-river run size projections; and 4) to consider a directed chinook salmon fishery once weekly in-season estimates suggested an allowable catch, weekly harvest guidelines were to be adjusted down by 30% in response to poor Taku River chinook production in recent years.

The 2015 commercial fishing season on the Taku River opened on June 21 (statistical week 26), and closed on September 7 (statistical week 37) for the season due to poor coho salmon projections. Fishing area and gear restrictions were as per recent years, and incorporated the maximum gill net length of 36.6 metres (120 ft.), established in 2008 for drift gill nets and in 2009 for set gill nets.

The Taku River commercial fishing grounds in Canada consist of the mainstem of the river from the international border upstream approximately 18 km (11 miles), to a geological feature known locally as Yellow Bluff. Almost all fishing activity takes place in the lower half of this area, downstream of the Tulsequah River.

The First Nation FSC fishery is primarily located in the lower Taku River in the same area as the commercial fishery described above. However, small numbers of fish are also harvested on the lower Nakina River and at the outlet of Kuthai and King Salmon Lakes. There were no time or gear restrictions imposed on the First Nation fishery in 2015.

Most of the chinook salmon recreational fishing effort in the Taku watershed typically occurs on the lower Nakina River. Less intensively-used recreational fishing sites exist on the Tatsatua River, the Sheslay River and other areas within the Taku River drainage. Effort and catches are poorly documented but are believed to be negligible for all species except chinook salmon and steelhead (due to the remote nature of the watershed and difficult access).

Chinook Salmon

The bilateral pre-season forecast was for a terminal run of 26,100 large chinook salmon, approximately 25% below the previous 10-year average of 34,900 fish. The forecast generated by the Taku River chinook salmon model was 37,000 fish. However, due to persistent overestimation in recent years coupled with a pattern of decline in chinook salmon stocks in the North Pacific, the forecast was reduced by 41%. A forecast run size of 26,100 fish was slightly above the S_{MSY} escapement goal of 25,500 fish, and as a result, there was no allowable catch (AC) for either the U.S. or Canada, and a minor adjustment to the base level catches (BLCs) of 1,500 fish for Canada and 3,500 fish for the U.S. was required. The test fishery allocation of 1,400 large chinook was unchanged.

The catches of large chinook salmon in the Canadian fisheries were: 1,357 in the test/assessment fishery; 868 large chinook salmon captured incidentally in the directed commercial sockeye salmon fishery; 117 large chinook salmon in the First Nation FSC fishery; and an estimated 105 large chinook salmon in the recreational fishery. The total base level and test/assessment fishery harvest of 2,447 large chinook salmon was within the allowance of 2,900 fish. In-season run projections did not identify an AC for Canada to conduct a directed fishery.

The bilaterally agreed Taku River large chinook spawning escapement estimate for 2015 was 28,850 fish which was above the S_{MSY} target of 25,500 and within the goal range of 19,000 to 36,000. The 2005-2014 average spawning escapement is 26,231 large chinook (which was associated with a higher target until 2009). During aerial surveys of five index areas, a total of 3,297 large chinook salmon were observed; this was 10% below the 2005-2014 average.

The Canadian catch of large chinook was 70% below the 2005-2014 average of approximately 3,700 fish (excluding test/assessment fisheries). The 2015 harvest of small chinook was 317 fish (305 commercial and 12 First Nation FSC), 46% below the 2005-2014 average of 587 fish.

Sockeye Salmon

The Canadian pre-season run outlook for wild sockeye salmon was 216,000 fish, approximately 20% above the previous 10-year average total run size of 180,000 fish. In addition, approximately 6,700 adult sockeye salmon of Tatsamenie Lake origin were expected to return

from fry out plants associated with the Canada/U.S. joint Taku sockeye salmon enhancement program. The forecasted return of enhanced Tatsamenie Lake origin sockeye salmon was 12% below the average return of 7,600 fish.

The Canadian sockeye salmon catch was 19,881 fish, of which 19,747 were taken in the commercial fishery, 85 in the First Nation FSC fishery, and 49 in assessment/test fisheries. This harvest was 5% below the 2005-2014 average total of 21,000 fish, with the contribution of sockeye salmon from the bilateral enhancement program estimated at 123 fish (<1% of the total Canadian catch).

To reduce by-catch of chinook salmon, the maximum permissible mesh size in the first two weeks of the directed sockeye salmon fishery which commenced in late June was 140 mm (5.5”). Projections of the total wild sockeye salmon run size, TAC, and total escapement were made frequently throughout the fishing season. As in past years, projections were based on the joint mark-recapture program, the estimated catch of Taku River sockeye in U.S. fisheries, the catch in the Canadian fishery, and historical run timing information. Projections in 2015 ranged from 90,000 in statistical week 28 (July 5-11) to 194,000 in statistical week 30 (July 19-25). The preliminary post-season estimate of run size is 191,735 fish (comprising 190,622 wild sockeye and 1,113 enhanced sockeye). Subtracting the escapement target of 75,000 from the wild run of 190,622 fish, resulted in a TAC of approximately 116,000 wild fish. The Canadian allowable catch, based on a 20% harvest share (which in turn is associated with an enhanced return of 1 to 5,000 fish), was 23,200 fish; the actual catch was 19,592 wild fish, representing 17% of the TAC of wild fish. Likewise, the U.S. allowable catch of wild fish, based on an 80% harvest share, was 92,800 fish; the actual catch was 40,904 fish, representing 44% of the TAC of wild fish.

The estimated spawning escapement of wild sockeye salmon in the Canadian section of the Taku River was 129,967 fish which was well above the target range of 71,000 to 80,000 fish. The escapement is 34% above the 2005-2014 average of 97,156 fish. Based on weir counts, escapements to the Kuthai, Little Trapper, Tatsamenie and King Salmon lakes were 341, 13,253, 1,537, and 1,683 sockeye salmon, respectively. The Kuthai Lake escapement was 79% below the primary brood year count, and 76% below the 2005-2014 average. The Little Trapper escapement was four times the primary brood year count and 53% above average. The Tatsamenie count was 56% below the primary brood year count and 82% below average while the escapement to King Salmon Lake was average.

Coho Salmon

The catch of 8,185 coho salmon (7,886 commercial and 299 First Nation FSC) was 4% below the 2005-2014 average of 8,483 fish. The catch during the directed commercial coho salmon fishery, after statistical week 33, was 5,459 fish. A test/assessment fishery was implemented in 2015, catching a total of 1,998 coho. Based on mark-recapture data, the preliminary bilateral estimate of the run into the Canadian section of the drainage is 70,361 fish. In accordance with PST harvest arrangements for the 2015 Taku River coho salmon season, at a run size of this magnitude; Canadian harvesters were entitled to harvest only 5,000 fish for assessment purposes starting in statistical week 34. The preliminary post-season spawning escapement estimate is 60,178 fish, 39% below the previous 10-year average of 99,213 fish. The 2015 escapement was below the recently revised target of 70,000 but within the goal range of 50,000 to 90,000 fish.

Joint Sockeye Enhancement

Joint Canada/U.S. enhancement activities continued from 2014 through 2015 with sockeye salmon fry hatched at Snettisham Hatchery in Alaska transported back to Tatsamenie Lake, British Columbia (where these fish were collected as eggs in 2014).

Approximately 87% of the 1.3 M sockeye salmon eggs collected in 2014 from Tatsamenie Lake survived to the fry stage at the Snettisham Hatchery in Alaska. Approximately 169,700 pre-emergent fry from one incubator were destroyed due to Infectious Hematopoietic Necrosis virus (IHNv). Sockeye salmon enhancement programs have been subject to IHNv outbreaks before and while unfortunate the losses are within normal occurrence levels.

Between May 22 and May 30, 2015 approximately 731,000 emergent sockeye salmon fry were out-planted into Tatsamenie Lake. In addition, as part of an onshore extended rearing project, approximately 187,000 fed fry were released into onshore rearing tanks and a trial net rearing pen. Mortality of these fish was observed soon after delivery and DFO veterinarian assistance was requested resulting in a successful treatment for a bacterial infection and reared fry were released shortly after treatment. Smolt production for the year was slightly above average with a preliminary estimate of 512,000. A breakdown of the origin of the smolts is underway pending otolith results.

Sockeye eggs were collected from King Salmon Lake in 2014 with a target of 250,000 eggs for a feasibility evaluation project. Total number of eggs collected and delivered to Snettisham Hatchery was 199,000. Green egg to fry survival was 89% resulting in 169,000 fry released back to King Salmon Lake on May 23, 2015.

For 2015, the agreed bilateral Taku River enhancement production plan (TEPP) identified collection of up to 2.0 M sockeye salmon eggs from Tatsamenie Lake and 250,000 eggs from Little Trapper Lake for transport to Snettisham Hatchery in Alaska for incubation and thermal marking. Approximately 731,000 sockeye salmon eggs were collected from Tatsamenie Lake as a result of unexpectedly low escapement to the lake limiting appropriate brood stock collection. No eggs were collected from Little Trapper as the egg take project was pending the identification of a proponent and the approval to re-establish salmon passage to Trapper Lake. In 2015 further project information was collected and a plan was developed to approach the passage project in support of a potential sockeye enhancement program for Trapper Lake.

2.3 ALSEK RIVER

Although catch sharing provisions for Alsek River salmon stocks between Canada and the U.S. have not yet been specified, Annex IV of the Pacific Salmon Treaty calls for the development and implementation of cooperative abundance-based management plans and programs for Alsek River chinook and sockeye salmon. In 2013, escapement goal ranges for Alsek River chinook and sockeye salmon were accepted by the Transboundary Rivers Panel, these are: 3,500 to 5,300 chinook and 24,000 to 33,500 sockeye salmon. Additionally, the escapement targets were revised for Klukshu River chinook and sockeye salmon, these are: 800-1,200 chinook and 7,500-11,000 sockeye. The principal escapement-monitoring tool for chinook, sockeye, and coho salmon stocks on the Alsek River is the Klukshu weir, in operation since 1976 by DFO in cooperation with the Champagne-Aishihik First Nation (CAFN).

Total drainage abundance programs are being investigated as part of the development of abundance-based management regimes and to accurately assess whether the escapement goals

for Alsek River chinook and sockeye salmon stocks are appropriate and achievable. At this time, there are no programs in place to estimate the drainage-wide coho salmon escapement. A large and variable proportion of the escapement of each species is enumerated at the weir on the Klukshu River. Current escapement monitoring programs include the Klukshu River weir, Village Creek counter, and post-season run reconstructions using genetic stock identification analyses which allow for annual comparisons of escapement indices. The most reliable long-term comparative escapement index for Alsek River drainage salmon stocks is the Klukshu River weir count.

The harvest estimate for the 2015 First Nation FSC fishery is comprised of the fish taken from the Klukshu River weir (elders only) and an estimate of catches above/below the weir (based on the past relationship with the weir count and harvest). An estimated 87 chinook, 1,084 sockeye and zero coho salmon were harvested in the FSC fishery. The recent average catches are 57 chinook, 1,109 sockeye, and 6 coho salmon. Preliminary catch estimates for the Tatshenshini recreational fishery were an estimated 44 chinook salmon retained (48 released), and zero sockeye salmon retained (20 released). There were no coho recorded, although this value is considered incomplete as some effort and harvest may have occurred after monitoring ceased. The catches were 98%, 0%, and 0% of average for chinook, sockeye and coho salmon, respectively. No in-season restrictions were implemented as escapement objectives were met for both chinook and sockeye.

The preliminary weir count and escapement estimates of Klukshu River sockeye salmon in 2015 were 11,588 and 11,363 fish, respectively. The count of 2,604 early run fish (count through August 15) was above the average of 2,498 as was the count of 8,984 late run fish, with an average of 8,361. The total escapement of 11,363 fish was above the upper end of the escapement goal range of 7,500 to 11,000 fish. The sockeye salmon count at Village Creek was not completed in 2015 due to technical issues associated with the video monitoring system; average is 2,000 fish.

The most reliable comparative chinook salmon escapement index for the Alsek River drainage is considered to be the Klukshu River weir count. The preliminary chinook salmon weir and escapement estimate in 2015 was 1,432 and 1,388 fish, respectively. The 2015 escapement estimate was above the upper end of the escapement goal range of 800 to 1,200 Klukshu chinook salmon.

The Klukshu River coho salmon weir count was 1,810. The 2015 count, as in past years, is not considered a complete indicator of run strength as the weir is removed prior to the end of the coho salmon run to the Klukshu River.

3 NORTHERN BRITISH COLUMBIA

3.1 PINK SALMON

Areas 3-1 to 3-4 Pink Net Catch

For 2015, Canada was to manage the Area 3-1 to 3-4 net fisheries to achieve an annual catch share of 2.49% of the annual allowable harvest (AAH) of Alaskan Districts 101, 102 and 103 pink salmon. With a total return of approximately 20.59 million pinks, the Alaskan Districts 101, 102 and 103 AAH was approximately 12.08 million pinks. The resulting Sub-area 3-1 to 3-4 Canadian commercial net total allowable catch of this AAH was approximately 300,869 pinks of Alaskan Districts 101, 102 and 103 origin.

In the Canadian northern boundary area, pink salmon returns were anticipated to be average to below average for Area 3 and Area 4, based on brood year return strength. Actual returns to both Area 3 and Area 4 were below average. The 2015 preliminary Canadian pink salmon catch in Sub-areas 3-1 to 3-4 was 80,266, and the Alaska stock component of this catch is estimated to be 77,331 pieces, or 0.64% of the AAH. This result is well below the annex agreement of 2.49%.

Area 1 Pink Troll Catch

For 2015, Canada was to manage the Area 1 troll fishery to achieve an annual catch share of 2.57% of the annual allowable harvest (AAH) of Alaskan Districts 101, 102 and 103 pink salmon. With a Total Return of 20.59 million pinks, the resulting Area 1 Canadian commercial troll total allowable catch of this AAH was approximately 310,536 pinks of Alaskan Districts 101, 102 and 103 origin.

The Canadian commercial troll fishery targeting pink salmon was open in the northern portion of Area 1 (Dixon Entrance AB Line) from July 1 to September 30. Pink retention was also permitted during the Chinook-directed fishery in parts of Area 1, which was open from June 18 to July 31 and from August 25 to September 30. Effort directed at pink salmon in Area 1 was minimal in 2015. The fishery harvested a total of 41,551 pink salmon, with an estimated 39,462 pieces being of Alaskan origin. This equates to 0.33% of the Alaskan District 101, 102 and 103 pink AAH, well below the annex agreement of 2.57%.

3.2 NORTHERN B.C. CHINOOK AGGREGATE ABUNDANCE-BASED MANAGEMENT (AABM)

The pre-season abundance index for North Coast B.C. troll and Haida Gwaii recreational chinook fisheries in 2015 was 1.23, which permitted a total allowable catch of 160,400 chinook salmon in these fisheries. Preliminary estimates indicate a total catch of 158,903 chinook salmon; 106,703 caught in commercial troll fisheries and 52,200 in recreational fisheries.

The North Coast B.C. troll fishery was opened for chinook fishing from June 18 to July 30 and from August 25 to September 30. The entire 2015 Northern B.C. troll fishery was conducted under a system of individual transferable quotas. The minimum size limit was 67 cm and barbless hooks and revival boxes were mandatory. No troll test fisheries were conducted in the North Coast of B.C. in 2015.

Recreational fishing was open with a daily limit of two chinook/day and a daily possession limit of four chinook. An estimated 52,200 chinook were caught in the Haida Gwaii (Queen Charlotte

Islands) recreational fishery. A minimum size limit of 45 cm was in effect and barbless hooks were mandatory in the recreational fishery.

3.3 NORTHERN B.C. CHINOOK INDIVIDUAL STOCK-BASED MANAGEMENT (ISBM)

Fisheries included in this category are commercial net fisheries throughout north and central B.C., marine recreational fisheries along the mainland coast and freshwater recreational, and First Nations FSC fisheries in both marine and freshwater areas. The PST obligations in these fisheries are for a general harvest rate reduction (estimated in aggregate across fisheries) for ocean mixed stock fisheries and for stock-specific objectives (i.e., achieving the escapement goal) in terminal areas.

North Coast commercial gill net catches totalled 2,434 chinook from Areas 3 to 6 (from hailed catch data). Chinook catch in Areas 3 and 4 were 1,792 and 621 chinook, respectively. No chinook were reported caught in Area 5 and only 21 were caught in Area 6. These preliminary estimates of gill net catches include chinook less than 5 pounds (graded as jacks and small red fleshed chinook) not normally included for PSC accounting. Small chinook typically makes up less than 5% of commercial gill net catches. Hail catch data tend to underestimate catch reported in fish slips by 25 to 30%. In addition, a total of 750 large chinook and 102 jacks were caught in the Tyee Test fishery on the Skeena River.

Central Coast commercial gill net catches totalled 5,333 chinook with 5,328 from Area 8 and 5 from Area 7 (from hailed catch data).

Tidal recreational catch from lodges operating in the Smiths Inlet, Rivers Inlet, Hakai Pass and Bella Bella areas were estimated using log books. Approximately 10,597 chinook were retained at lodges in these areas in 2015.

Preliminary estimates for tidal recreational catches near the mainland coast of Northern B.C. were 12,760 from a creel survey conducted in Areas 3 and 4 in 2015. The 2015 catches in the mainland recreational fishery in Areas 5 and 6 were not available at the time of writing. The preliminary estimate from a freshwater creel survey conducted in the Skeena River below Terrace in 2015 was 3,442 large chinook and 1,475 jacks. The tidal and freshwater catches of chinook salmon in Northern B.C were larger in 2015 than 2014.

Catches by First Nations in the North Coast exceeded 17,524 chinook in 2015. Nisga'a and Gitanyow catches from the Nass River were 8,503 chinook. Haida catches on Haida Gwaii were estimated at 2,530 chinook. Catches by First Nations fisheries in the Skeena River were estimated at 6,491 chinook.

Catches by First Nations in the tidal portion of the Central Coast were reported as 180 chinook. The non-tidal catches included 2,598 Atnarko River chinook (Area 8) and 2 chinook from Rivers Inlet (Area 9).

3.3.1 Northern B.C. ISBM Chinook Stock Status

Since assessments of the ISBM fisheries are relative to the escapements achieved in the chinook indicator stocks, a brief overview of the 2015 returns is provided. Northern B.C. terminal runs to the Nass and Skeena Rivers improved from relatively low returns observed in 2013 and 2014. Preliminary estimates of chinook escapements to the upper Nass River were 16,433. Preliminary

Skeena River chinook escapements were approximately 41,694. Preliminary Petersen mark-recapture Atnarko River chinook escapement estimate was 57,615, the largest return of chinook salmon recorded for the system.

4 SOUTHERN B.C. CHINOOK AGGREGATE ABUNDANCE-BASED MANAGEMENT (AABM)

4.1 OBJECTIVES AND OVERVIEW

Chinook fisheries are managed by either an aggregate abundance-based management (AABM) or individual stock-based management (ISBM) regime. Allowable harvest impacts in AABM areas are determined by provisions in the Pacific Salmon Treaty and subject to domestic considerations, such as conservation and allocation. In Southern B.C., all AABM chinook fisheries are located off the West Coast Vancouver Island (WCVI), including components of the recreational fishery, First Nations fisheries, and the Area G troll fishery.

For the period October 2014 through September 2015, the forecast chinook abundance index was 0.85 of the PST base period. Therefore, under treaty provisions, the maximum allowable catch was 127,278 chinook for WCVI AABM fisheries; which includes a 30% reduction consistent with the treaty provisions that came into effect in January 2009.

Based on the WCVI AABM TAC, 69,141 was set aside for the pre-season expected catch for the offshore recreational and First Nations fisheries. The remaining 58,137 chinook were allocated to the commercial fisheries (Area G and T'aaq-wiihak).

Table 4-1: Pre-Season and Post-Season Total Allowable and Preliminary Catch Estimates for October 2014-September 2015 WCVI AABM Chinook

	Pre-Season Estimate	**Post-Season Estimate**
WCVI AABM Abundance Index	0.85	under review
	Pre-Season TAC	**Post-Season Catch**
WCVI AABM chinook TAC*	127,278	under review
AABM Recreational	60,000[+]	48,775
First Nations (FSC)	5,000	996**
Maa-nulth Treaty	4,141	2,950**
T'aaq-wiihak demonstration	7,267	6,234
Area G Troll	50,870	54,338
Total AABM	**127,278**	**113,293**

*The total Area G troll TAC is calculated as the difference between the WCVI AABM chinook TAC less offshore recreational catch, NTC First Nations Expected FSC catch, Maa-nulth Domestic Allocation and T'aaq-wiihak Allocation.
**First Nations catch is preliminary.
[+] Pre-season expected catch

Further considerations for managing chinook catch in WCVI AABM fisheries are driven by concerns regarding the low status of natural WCVI, Lower Strait of Georgia (LGS), Fraser River Spring 4_2, Spring 5_2, Summer 5_2 chinook, and Interior Fraser coho populations.

Several ocean fisheries in Canada intercept WCVI origin chinook, including northern troll, Haida Gwaii recreational, WCVI troll and WCVI recreational. Ocean fisheries in Canada are limited to a 10% exploitation rate, even if PST provisions allow for a higher catch. Management measures are in place to reduce the impact of fisheries on WCVI origin chinook while still providing harvest opportunities.

Continued efforts were made in 2015 to limit the impact of the troll fishery on low-status chinook populations, including time and area constraints, and limits on effort (boat-days) to protect stocks of concern.

AABM chinook catch and release information from all fisheries can be found in Appendix 2.

4.2 FISHERIES

4.2.1 First Nations Food Social and Ceremonial and Treaty Fisheries

The 2015 WCVI Nuu-chah-nulth Tribal Council (NTC) AABM FSC chinook reported catch (at the time of this report) was 996, and catch from Maa-nulth Nations domestic fisheries was estimated at 2,950. Total AABM chinook reported for First Nations FSC and domestic fisheries was 3,946.

4.2.2 Recreational Fisheries

The WCVI AABM recreational chinook fishery primarily takes place in offshore Areas 121-127 from June to September. Chinook catch from inshore Areas 21-27 in June and Areas 21-24 in July are also included in the AABM estimate. Catch and effort are largely driven by abundance and weather, and together both can affect annual harvests. Previous sampling has indicated that there is minimal AABM catch and effort outside of this period.

Chinook management measures are in place in the near-shore AABM areas to protect migrating WCVI origin chinook. These measures include a 77 cm maximum size limit in those portions of Areas 123-127 that lie shoreward of a line drawn 1-mile seaward of the surf line. This area is commonly referred to as the 'Chinook Conservation Corridor', and is in place to protect migrating WCVI origin chinook. In areas along the WCVI, where hatchery origin chinook are considered to make up a high portion of the recreational catch, anglers are permitted to retain two chinook per day of which one can be larger than 77 cm. The mandatory use of barbless hooks and a daily limit of two chinook are also in place.

Chinook catch in the AABM recreational fishery is estimated through several catch monitoring programs, including a creel survey, a logbook program and DFO's electronic survey information (iREC). The creel survey continues to be the most utilized catch monitoring program in this area particularly because it collects effort (number of boat trips), and catch per unit effort data. Catch for any given species within a defined time-area stratum is estimated by multiplying effort estimates by CPUE. Total effort is estimated through vessel counts, gathered via aerial or on-water boat surveys of the fishing area. CPUE is estimated from interviews with anglers at specific landing sites and from trip logbooks and manifests submitted by lodges and guides through a voluntary monitoring program. Logbook effort is removed from effort estimates where there is overlap. Data regarding the daily activity profile of the fishery, fishing locations, and the proportion of guided versus un-guided effort are also gathered from angler interviews.

The total chinook catch in the 2015 WCVI AABM recreational fishery was estimated to be 48,775, which is down 25% from the 5 year average of 64,500. The total chinook released in the 2015 WCVI AABM fishery was estimated to be 28,330, which is down 50% from the 5 year average of 55,500. Effort in the AABM area for 2015 was 30,691 boat trips.

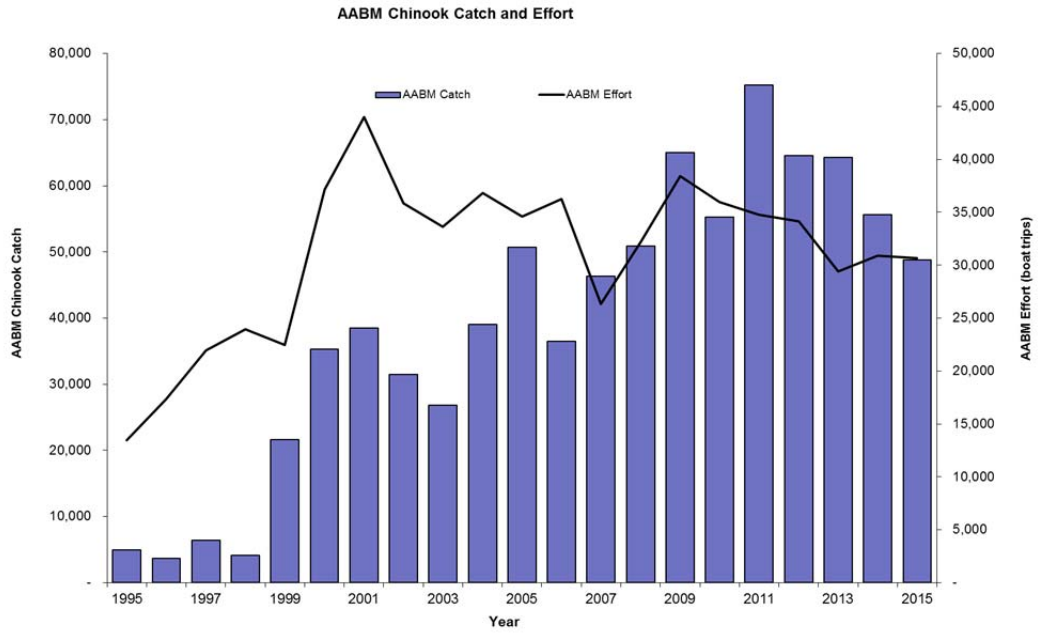


Figure 4-1. Preliminary WCVI Chinook AABM Catch and Effort, 1995-2015

4.2.3 Commercial

4.2.3.1 Commercial Harvest

The WCVI AABM commercial TAC was set at 58,137; the commercial TAC was apportioned with 87.5% to Area G Troll and 12.5% to the T'aaq-wiihak First Nations demonstration fishery. The Area G Troll TAC was 50,870 chinook. In early September, the expected recreational catch was reduced by 4,000 to 56,000 based on preliminary creel survey results through August. This increased the Area G TAC by 3500 to 54,370; the T'aaq-wiihak allocation was increased by 500 chinook. The total estimated Area G troll catch was 54,338 chinook.

For the 2014/2015 chinook year (October 2014 to September 2015), fisheries continued to be shaped by conservation concerns for the following domestic stocks: natural WCVI, Lower Strait of Georgia (LGS), and Fraser River Spring 4_2, Spring 5_2, Summer 5_2 chinook and Interior Fraser River coho.

Area G Troll Summary

The Area G Troll annual management plan is designed to maintain exploitation rates on stocks of concern within established limits, by the use of fishing time and area closures in conjunction

with fishing effort limits. The management plan distributes catch and effort throughout the fishing year.

The management plan is subject to change as required to address specific conservation concerns as they arise. For the 2015 fishing season the following changes to annual fishing plan were implemented:

Conservation measures introduced in the Area G troll fishery in 2011-12, to address low returns of Fraser River Spring 4_2, Spring 5_2, and Summer 5_2 chinook were implemented again in the 2014-15 season. For Area G troll that meant there was no June fishery and the July fisheries were delayed until the third week of July.

To avoid exceeding the overall WCVI AABM TAC, 20% of the Area G TAC was allocated to September fisheries. If preliminary AABM catch estimates to August 31 indicate the overall WCVI AABM TAC may be exceeded, the Area G TAC set aside for September would be used to assist Canada with staying within its overall WCVI chinook TAC.

Retention of all coho salmon by-catch was permitted in all openings between September 15 and December 31.

Area G Troll Fishing Periods:

October to March period:

During the period from October 1 to March 15, a harvest level of approximately 20% of the Area G annual TAC was recommended, based on the PST chinook model calibration and assigned harvest levels for the outer WCVI area.

March 16 to April 18 period:

A full time-area closure was maintained from March 16 to April 18 annually to avoid interception of Fraser River Spring 4_2 and Fraser River Spring & Summer 5_2 chinook.

Late April/ mid-June period:

During the period from April 19 to June 15, a harvest of approximately 40% of the Area G annual TAC was recommended, based on the PST chinook model calibration and assigned harvest levels for the outer WCVI area. In addition, total effort (boat-days) was limited to recent year averages, and areas of southwest Vancouver Island were closed until May 7 (partial openings from May 2 to 7), in order to avoid interception of Fraser River Spring 4_2, Spring 5_2, and Summer 5_2 chinook.

June 16 to July 23 period:

A full time-area closure was maintained from June 15 to July 23 in Management Areas 125 to 127, and from June 16 to July 31 in Management Areas 123 to 124, to avoid interception of Fraser River Spring 4_2, Spring 5_2, and Summer 5_2 chinook.

July 24 through early August:

During this period, a harvest of approximately 20% of the Area G annual TAC was recommended, based on the PST chinook model calibration and assigned harvest levels for the outer WCVI area. In addition, the fishery was managed to minimize mortality on wild coho

through: a) a maximum interception of coho; and b) the mandatory use of large (minimum 6") plugs. As well, the fishery was managed to minimize mortality of WCVI origin chinook through the use of time-area closures of near shore areas ("Chinook Conservation Corridor"), where WCVI chinook stocks are prevalent.

September period:

During the September period, a harvest of approximately 20% of the Area G annual TAC was recommended based on the PST chinook model calibration and assigned harvest levels for the outer WCVI area. The Area G harvest level in September has the potential to increase if there is available remaining WCVI AABM TAC after accounting for First Nation FSC and recreational fisheries. However, if First Nations or the recreational sectors catches are larger than projected, the available commercial TAC is reduced. During harvest opportunities between September 15 and December 31 retention of coho by-catch was permitted.

For all troll fisheries, selective fishing practices were mandatory, including single barbless hooks and revival tanks for resuscitating non-retention species prior to release.

Since 1999, a major objective for the management of the WCVI troll fishery has been to distribute the catch throughout the fall-winter-spring-summer periods. This objective was continued in 2014/2015.

The late July and August plug fisheries were monitored to determine encounter rates of other species and estimate numbers of released chinook. Biological sampling was conducted for size distributions, and stock compositions (Coded Wire Tags, DNA and otolith samples).

Table 4-2: Post-Season Preliminary Monthly Catch Estimates for 2009/10 to 2014/15 WCVI AABM Chinook Area G Troll Fisheries

	2014/2015	2013/2014	2012/2013	2011/2012	2010/2011	2009/2010
October	213	2,358	3,344	0	0	0
November	56	28	230	57	0	0
December	0	25	312	188	0	0
January	186	49	1,018	129	0	0
February	612	586	358	542	1,849	0
March	731	1,422	501	243	875	0
April	3,841	13,345	1,374	10,493	8,670	8,553
May	27,405	40,336	25,737	22,334	41,239	31,296
June	0	0	0	0	34,394	23,652
July	0	26,494*	0	0	15,619*	0
August	13,953*	10,002*	0	4,280*	21,284*	11,642*
September	7,341	15,360	2,519	17,264	0	3,980
Total	**54,338**	**110,005**	**35,393**	**55,530**	**123,930**	**79,123**

*Plug fishery.

4.2.3.2 First Nation Commercial Harvest

T'aaq-wiihak Demonstration Fishery

In addition to fishing opportunities for FSC purposes, DFO provided commercial fishing opportunities to five Nuu-chah-nulth First Nations located on the West Coast of Vancouver

Island - Ahousaht, Ehattesaht, Hesquiaht, Mowachaht/Muchalaht, and Tla-o-qui-aht – that have aboriginal rights to fish for any species of fish within their Fishing Territories and to sell that fish, with the exception of geoduck.

In 2015 the Department authorized an AABM chinook salmon demonstration fishery for the T'aaq-wiihak Nations with an initial TAC of 7,267 pieces. In early September, the expected recreational catch was reduced by 4,000 to 56,000 based on preliminary creel survey results through August. This increased the T'aaq-wiihak TAC by 500 to 7,767 based on their share of the commercial AABM TAC (12.5%). The fishery was carried out in portions of Management Areas 24, 25, 26, 124, 125 and 126 on the west coast of Vancouver Island discontinuously between July 27 and September 30, 2014. The total commercial catch sold during this fishery was estimated at 6,234 chinook.

The fishery was monitored by T'aaq-wiihak fishery monitors, independent observers and DFO staff. Biological samples for DNA, and heads from salmon indicating presence of a coded wire tag, were collected by J.O. Thomas and Associates, a company which provides independent, certified verification services.

5 SOUTHERN B.C. CHINOOK INDIVIDUAL STOCK BASED MANAGEMENT (ISBM)

5.1 OBJECTIVES AND OVERVIEW

In addition to the PST regime, Canada implemented management actions as required to ensure conservation of Canadian origin chinook and to meet domestic allocation requirements. These chinook fisheries were managed to harvest rates on an individual stock basis (ISBM).

Measures were taken in 2015 in First Nations Food Social and Ceremonial (FSC), recreational and commercial chinook fisheries to protect WCVI, LGS, Fraser River Spring 4_2, Spring 5_2, and Summer 5_2 chinook stocks. FSC management actions included time and area closures and reduced fishing times. Recreational measures included barbless hooks, time/area closures, size restrictions and mark selective fisheries. Commercial measures included barbless hooks, time and area closures, gear restrictions, mandatory use of revival tanks, daily catch reporting, mandatory logbooks and non-retention provisions for most fisheries. Post-release mortality information for chinook included in ISBM management was determined from studies conducted in 2000-2001.

Specific management actions were taken to protect WCVI origin chinook in Canadian ocean fisheries (not including enhanced terminal areas), the harvest of which was restricted to an exploitation rate of 10%. Most Southern B.C. commercial fisheries were regulated so that impact on WCVI wild chinook stocks was minimized, with the exception of terminal recreational, commercial and First Nations FSC fisheries where local abundance permitted.

LGS chinook stocks are improving from historic lows seen in 2009 and are rebuilding slowly. Significant management measures in recreational and commercial fisheries continued to be in place throughout 2015 to protect these stocks. Some LGS chinook stocks are seeing a gradual increase in terminal returns, particularly in the Cowichan River, which is encouraging; however, their productivity and Salmon Outlook category remains low.

Fraser River Spring 4_2, Spring 5_2, and Summer 5_2 chinook stocks had specific management measures in place to reduce exploitation in FSC, recreational and commercial fisheries. FSC management actions in the Fraser River included time and area closures, and reduced fishing times. Recreational fisheries in Juan de Fuca Strait, the lower Strait of Georgia and the approach waters of the Fraser River had specific time, area, size and mark selective restrictions designed to minimize the amount of exploitation on these chinook stocks. Fraser River tidal and non-tidal recreational fisheries had delayed starting dates, implemented to protect Fraser River Spring 4_2, Spring 5_2, and Summer 5_2 chinook stocks. In addition, due to extreme environmental conditions in 2015, the chinook directed recreational fisheries in the approach waters to and in the Fraser River were even further delayed to late July and early August. Commercial troll fisheries on the WCVI were also managed with time and area closures in 2015 for Fraser River Spring 4_2, Spring 5_2, and Summer 5_2 chinook stocks.

In 2015, recreational fisheries in freshwater areas were also closed for parts of the summer in many parts of Southern B.C. due to high water temperatures.

ISBM chinook catch and release information from all fisheries can be found in Appendix 3.

5.2 STOCK STATUS

5.2.1 West Coast Vancouver Island Chinook

West Coast Vancouver Island Chinook

Wild WCVI chinook are a stock of concern. While stocks are low and stable, they are below target and have not rebuilt from low abundances that resulted from a decline in productivity observed during the early to mid-1990s. Of particular concern are those stocks that originate from the SWVI area conservation unit (i.e. Clayoquot Sound).

Hatchery production supports terminal fisheries directed at surplus production with extensive management measures in place to reduce impacts on wild origin stocks. For WCVI hatchery stocks, the terminal return is defined as total catch (First Nation FSC, recreational and commercial) in the near approach areas of the hatchery plus escapement (brood collection plus natural spawners). In these hatchery approach areas, catch is dominated by the hatchery stock (e.g. >95%), therefore, higher exploitation rates are permitted than in times and areas dominated by naturally produced WCVI chinook stocks.

5.2.2 Johnstone Strait/Mainland Inlet Chinook

Currently only three systems are monitored consistently in Areas 12 and 13. The Nimpkish River is assessed using standardized swim surveys and stream walks by hatchery staff. An intensive mark-recapture program is carried out by Quinsam Hatchery to estimate escapement on the Campbell/Quinsam system. A mark-recapture program has been in development over the past few years on the Phillips River, with the plan to eventually establish it as a mainland chinook indicator. Other systems are covered using intermittent visual surveys.

Nimpkish River

In 2015, the coverage of the chinook timing was greatly impacted by flow conditions during mid to late October, which made coverage of the watershed difficult. Assessment coverage up until that time period and during the early portions of November will be used to determine escapement to the system for 2015. Hatchery staff were very successful in collecting their full brood stock target of 77 females and 77 males for enhancement. The preliminary escapement estimate of just over 1,300 individuals is similar to 2014 and is a continued improvement over the low but stable returns seen prior to 2012, which averaged around 600 adults.

Campbell/Quinsam System

The Campbell/Quinsam, a long-term chinook indicator, has been assessed by carcass mark-recapture since 1984. Preliminary results for the 2015 program have the combined system chinook estimate at approximately 4,000 adults; an increase over the 2014 return of approximately 2,700. Estimate precision improved on the Campbell but declined on the Quinsam (high level of bear activity and damage to carcasses).

The Quinsam Hatchery achieved their chinook brood stock target for 2015.

Phillips River

Preliminary results from the mark-recapture program on the Phillips River indicate the chinook escapement is in the range of 2,100 adults, a continuation of the strong trend over the past few

years. River conditions were stable for most of the program, but the dead pitch was impacted by a reduction in carcass condition related to increased bear activity.

The local hatchery was again successful in meeting its brood target and plan to release 150,000 coded wire tagged chinook smolts next spring to contribute to the assessment program.

5.2.3 Strait of Georgia Chinook

Fall:

Total returns to Strait of Georgia streams north of Nanaimo, virtually all of which are enhanced, have been stable for the last fifteen years. In general, 2015 chinook escapements were similar to or lower than 2014 in this area. Most systems had a decrease in abundance with the exception of Qualicum River which was similar to previous years, and Puntledge Falls which increased in spawner abundance.

In the southern Strait of Georgia, total returns have been on a decreasing trend over the last 25 years. Specifically, the Nanaimo River chinook abundance has been generally stable since 1995 and the Cowichan River chinook abundance has decreased since the very high escapements in the 1990s to the low in 2009. Since that year the spawner abundances have slightly increased to approximately half of the long term average. In 2015, the Nanaimo River chinook abundance for both Summers and Fall decreased over the previous year. Goldstream and Chemainus River chinook continue to have very low numbers of spawners.

Cowichan River chinook (a wild chinook indicator stock) has been in decline since 1995-1996 and culminated in a low total adult return to river of 1,260 in 2009 with subsequent improvements. This population continues to be a stock of concern. Exploitation rates on Cowichan chinook were historically high (averaging 80-90%), declined to a low of 34% on the 1995 brood year, and steadily increased to 75% on the 2000 and 2001 brood years. Various harvest restrictions have been put into effect over the last 20 years to reduce exploitation on Strait of Georgia chinook. Additional conservation measures were introduced in 2005 to reduce the harvest of Cowichan chinook by the Strait of Georgia recreational and WCVI troll fisheries. First Nations have substantially reduced harvests of chinook in the Cowichan River in recent years. The declining trends since 1990 in various southern Strait of Georgia Rivers are attributed to high exploitation rates, a decline in marine survival, and habitat issues.

In 2015, chinook escapement to Cowichan River was similar to the previous year. The preliminary analysis from the enumeration project is an estimate of 7,000 spawners (all ages) and 421 brood stock taken for the Cowichan River Hatchery. Approximately 75% of the spawners are age 3+ (‘adults’) and the other 25% are age 2 (‘jacks’ and ‘jills’). Water levels were low until mid-September although upstream migration occurred during storm events and higher flows motivated the chinook to migrate upstream to the spawning areas. The number of chinook caught in local First Nation FSC fisheries has not yet been reported.

On the mainland side of the northern Strait of Georgia, Sliammon and Lang hatcheries continue to have variable returns, however in the last five years the returns to Lang Creek have been stronger than in previous years. There are a few very small, wild populations remaining in the Theodosia and Skwakwa rivers, and those rivers entering Jervis Inlet, where assessment data are poor or not available. Historically, a large proportion of the chinook stock aggregate originating from rivers north of Nanaimo migrate into central and northern B.C. and Alaska. Exploitation

rates on this stock aggregate have gradually been reduced over the last 15 years, thus the stable trend in annual returns to rivers over this period suggests a reduction in marine survival.

Spring/Summer:

The Puntledge, Nanaimo and more recently the Cowichan system have identified early runs of chinook in the Strait of Georgia. Cowichan Summer run chinook were monitored this year and preliminary results show an abundance of 200-300 individuals. These were shown to move upstream into the Cowichan Lake through the summer, dropping downstream in August and September to spawn. Efforts to recover Puntledge summers to viable levels have resulted in improved returns to the river since 1999. The 2006 and 2007 natural spawning escapements ranged from 200 - 500 adults (not including brood capture), which is down from the record high in 2005 of approximately 2,500 adults, but is substantially higher than escapements recorded in the previous decades. The preliminary estimate for 2015 escapement to Puntledge is approximately 603 adults which is a reversal of the increasing abundance trend over the past three years. Monitoring of Nanaimo spring and summer chinook escapement has occurred less frequently. This year's escapement of Nanaimo summers is estimated to be about 350 chinook adults, which is below average for the last 15 years.

5.2.4 Fraser River and Area Chinook

Fraser River Chinook

Preliminary indications are that the Spring 5_2 aggregate spawner abundance is greater than the 2010 parent brood. Concerns continue to exist with respect to the overall spawning abundance which will likely be similar to levels observed in the base period.

Returns to the Spring 4_2 aggregate again improved considerably over parent brood levels in 2011, however the aggregate total escapement is at similar levels to those observed during the base period.

Yearling (stream-type) summer chinook (Summer 5_2 aggregate) returns were mostly better than the parental escapements in 2010, and marginally above those observed in the base period.

In 2015, the escapement of the Summer 4_1 aggregate was strong and all stocks exceeded brood escapement levels; on average, the MU achieved 135% of the parental escapement observed in 2010.

Annual lower Fraser River fall-run chinook stock group escapements are, on average, large (>100,000). The major contributor and principal focus of assessment of this stock group is chinook returning to the Harrison River, and Harrison River transplants to the Chilliwack River. Forecasts for this stock group in 2015 were below desired escapement ranges. For both the Harrison and Chilliwack rivers, the field study portions of the escapement assessments are just concluding; and data entry and analyses have not started. Field estimates for Harrison indicate escapements are likely to be about 90,000 adults (33,000 was forecast); for the Chilliwack, the preliminary field estimate of escapement is 26,700 (39,000 was forecast). Values are preliminary and will be updated in coming months.

Howe Sound/Squamish River

No information is available at this time.

Burrard Inlet

No information is available at this time.

Boundary Bay

No information is available at this time.

5.3 FISHERIES

5.3.1 First Nations Food Social and Ceremonial and Treaty Fisheries

WCVI FSC Fisheries

A total of 1,051 pieces were harvested by rod and reel and as by catch during other salmon fisheries. Catch reports for Maa-nulth domestic harvest indicate a combined ISBM FSC chinook harvest of 434 pieces. NTC First Nations ISBM catch reported to date is 534 pieces.

The total WCVI FSC chinook catch to date is 2,019 pieces.

Johnstone Strait FSC Fisheries

Data are still being compiled on various First Nations catches in Johnstone Strait; however, preliminary catch is estimated at 261 chinook.

Strait of Georgia FSC Fisheries

Data are still being compiled on various First Nations catches in the Strait of Georgia; however, preliminary catch is estimated at 4 chinook.

Lower Fraser Area FSC Fisheries (Mouth to Sawmill Creek)

FSC fisheries took place in the Fraser River between the mouth and Sawmill Creek from April through November 2015. The total chinook harvested in the lower Fraser River (below Sawmill Creek) was 20,373.

B.C. Interior (Fraser River upstream of Sawmill Creek and Thompson watershed)

FSC fisheries took place on the Fraser River upstream of Sawmill Creek from May through to November 2015. Chinook harvest and release estimates were 3,339 and 90, respectively.

5.3.2 Recreational Fisheries

West Coast Vancouver Island

WCVI recreational ISBM fisheries are managed to fall within Canada's 10% exploitation rate on WCVI wild chinook. To help achieve this objective management measures are put in place along the coast in areas that tagging studies have shown to be the main WCVI chinook migratory routes. This area is known as the Chinook Conservation Corridor, and is an area one nautical mile seaward of the surf line, extending from Areas 123 to 127. The majority of WCVI chinook >77 cm that are caught in the recreational fishery are mature females, and starting July 15 in those waters north of Estevan Point and August 1 for those waters south of Estevan Point, the retention of chinook >77 cm is not permitted. In terminal areas, in proximity to production

hatcheries (Nitinat, Barkley Sound, Nootka Sound) where hatchery chinook make up a significant part of the catch, these restrictions are typically reduced and the retention of one chinook >77 cm is permitted. These terminal restrictions depend on abundance and can be more restrictive if local chinook abundance forecasts are low. Barkley Sound is normally included in the measures outlined above for areas with production hatcheries as the Robertson Creek Hatchery is located in that area. However, in 2015, with a high return of 3 year olds and a low return of 4 and 5 year old chinook, Area 23 was included in the chinook corridor restrictions. These measures expire in NWVI after September 30 and in SWVI after October 15 when most of these chinook are considered to have migrated through the corridor. Other management measures in effect to reduce recreational impacts on chinook include barbless hooks, a minimum size limit, daily limits and annual limits.

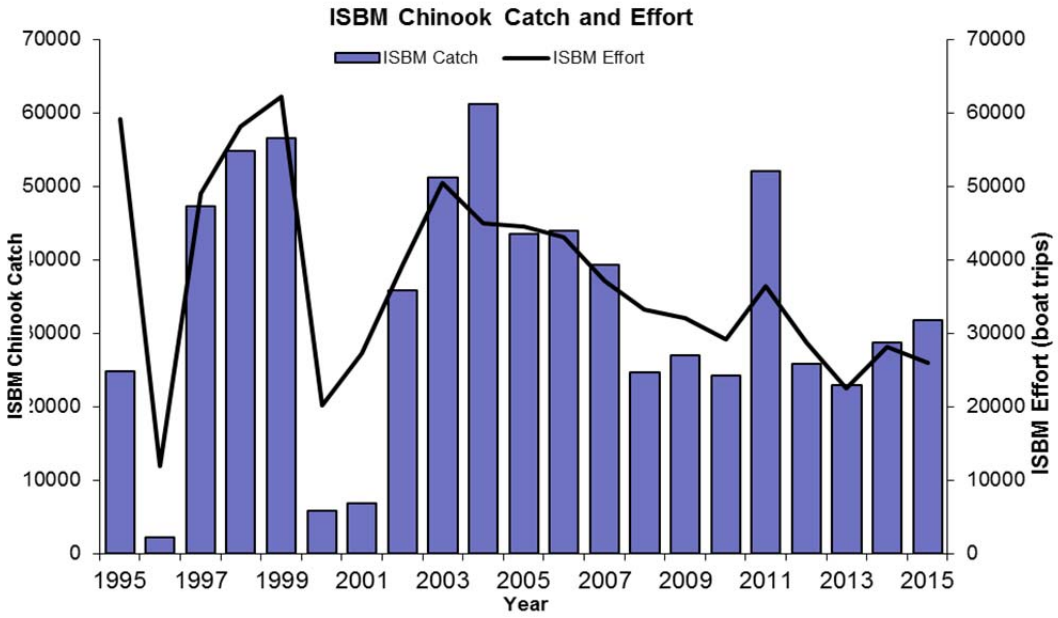


Figure 5-1: Recreational WCVI Chinook ISBM Catch and Effort, 1995-2015

Inside Areas: Strait of Georgia, Johnstone Strait, and Juan de Fuca Strait

2015 recreational fisheries in these areas were designed to minimize impact on returning Fraser River Spring 4_2, Spring 5_2, and Summer 5_2 chinook. Management measures put in place to protect these stocks included a mark selective fishery (Victoria area) and size limits in specific areas/times.

In those waters near Victoria between Cadboro Point and Sheringham Point (Subareas 19-1 to 19-4 and 20-5), retention regulations were adjusted from March 1 to June 12 where anglers were permitted to retain two chinook per day either wild or hatchery marked between 45 cm and 67 cm or hatchery marked only chinook over 67 cm in length. From June 13 to July 17, the daily limit remained at two wild chinook of which one could be greater than 67 cm.

The Strait of Georgia "chinook corridor" extending from Subareas 18-1 to 18-6, 18-9, 18-11, 19-5 and a portion of 29-4 and 29-5 that lies south from a point on the east side of Valdes Island and extending 57 degrees true for 5 nautical miles remained in place in 2015. In this corridor the

daily limit was two chinook of which only one could be over 67 cm from May 4 to July 17. The minimum size limit is 62 cm.

Drought like conditions in the summer of 2015 elevated the concern for Lower Strait of Georgia chinook, including Cowichan River chinook due to reduced river flows and high river temperatures. Salmon non-retention measures were put into effect in Subareas 17-5 to 17-7, 17-9, 18-6 to 18-8 and 19-7 to 19-12. These areas had chinook non-retention measures in effect from August 1 through October 15. As river conditions improved in the fall of 2015 these areas reverted back to chinook non-retention areas on October 15.

For the Johnstone Strait and Strait of Georgia areas chinook management measures also included an annual limit of 15 chinook, a daily limit of two chinook and a minimum size limit of 62 cm. For the Canadian portion of Juan de Fuca Strait south of Cadboro Point, regulations included an annual limit of 20 chinook, a daily limit of two chinook and a minimum size limit of 45 cm.

In 2015 marine recreational fisheries were monitored by creel surveys in three main areas 1) Juan de Fuca including Victoria (south of Cadboro Point) and Juan de Fuca Strait through Subareas 20-1; 2) Portions of the Strait of Georgia including Areas 14 through 18, that portion of Area 19 north of Cadboro Point, Areas 28 and 29; and 3) Johnstone Strait including Areas 11 to 13. Monitoring of the Strait of Georgia recreational fishery took place from June-October (not all areas were surveyed every month), and Juan de Fuca Strait recreational fishery (February to October) has been fairly consistent from year to year using an access point (landing site) survey for collecting catch, CPUE, and biological information combined with an aerial survey for effort counts. In addition, logbook programs, directed at estimating the recreational catch by fishing guides during guided trips, were conducted in the Campbell River and Victoria Areas in 2015. The Johnstone Strait creel survey commenced in Area 13 in May and continued through until the end of September, and from June through August included Areas 11 and 12.

Effort, catch and release information from marine fisheries are summarized in Table 7-2.

Region 1: Vancouver Island Tributaries

Freshwater restrictions were in effect in most tributaries on Vancouver Island due to drought like conditions in 2015. Rivers on the southern half of Vancouver Island (Regions 1-1 to 1-6) were closed to angling on July 8 and the remaining portions of Region 1 (Regions 7-13) closed to angling August 1. Region 1 rivers were re-opened on September 11 due to improved water flows and near-normal temperatures. The Qualicum Nitinat, Somass and Conuma Rivers provided some recreational opportunities to harvest enhanced chinook stocks.

Qualicum River

Qualicum River opened for chinook on August 1 for four per day less than 62 cm. On October 16 the regulation changed to four chinook per day of which 2 could be greater than 62 cm. The Qualicum River was not monitored by creel survey during 2015.

Somass/ Stamp

During 2015 there was a non-tidal opening on the Somass/Stamp River (Area 23) with chinook retention. Due to a low forecast of 4 and 5 year old Robertson Creek chinook protective measures were required on the Somass and Stamp rivers to protect female chinook salmon Including: increased closed areas, size limit and reduced quotas. The drought conditions

experienced during the summer also delayed the August 25th opening to September 1, 2015. The fishery remained open until December 31, 2015. The daily limit was one chinook salmon which must be less than 77 cm. The Somass/Stamp Rivers were not monitored by creel survey during 2015.

Nitinat

During 2015 there was a planned non-tidal opening for the Nitinat River (Area 22) from August 25, 2015 to September 30, 2015. The drought conditions experienced during the summer delayed the August 25th opening until environmental conditions improved allowing fish migration on September 4, 2015. The fishery remained open until October 1, 2015. The daily limit was two with only one greater than 77 cm. The salmon fishery was closed for retention of chinook from October 1 until October 14 to protect chinook salmon during the peak spawning period. The salmon fishery re-opened from October 15 until December 31 with non-retention of chinook salmon. The area above Parker Creek was closed to fishing. The Nitinat River was not monitored by creel survey during 2015.

Conuma

Angling for chinook in the non-tidal portion of the Conuma River typically opens on August 25th but was delayed, along with many other streams in Region 1 until September 11th due to low water levels and high water temperatures. The daily limit was two with only one greater than 77 cm. The Conuma River was not monitored by creel survey during 2015. At the recommendation of the Area 25 Roundtable, a finfish recreational closure was implemented on August 29th in Moucha Bay to protect holding chinook waiting for conditions in the Conuma River to improve before migrating to the spawning grounds. This closure was lifted on September 11th.

Fraser River and Tributaries

Fraser River Spring 4_2, Spring 5_2, and Summer 5_2 chinook stocks required additional management measures again in 2015 due to continued concerns about stock status.

In Subareas 29-6, 29-7, 29-9 and 29-10, the 2015 fishing regulations were as follows:

- May 1 to July 12, no fishing for chinook salmon.
- July 13 to July 31, daily limit for chinook salmon was zero. This management measures was put in place due to adverse environmental conditions and to reduce potential impacts on co-migrating sockeye.
- August 1 to August 14, daily limit was two chinook (wild or hatchery marked) with a minimum length of 62 cm.
- August 15 to August 28, no fishing for salmon. This management measure was in place due to high water temperatures and concerns with potential impacts to co-migrating sockeye salmon.
- August 29 to December 31, the daily limit was two chinook (wild or hatchery marked) with a minimum length of 62 cm.

Tidal Fraser and Region 2 Fraser River:

In the tidal waters of the Fraser River the following regulations were in place for 2015:

- January 1 to July 31, no fishing for salmon.

- August 1 to August 14, the daily limit was four chinook per day with only one over 50 cm allowed to be retained.
- August 15 to August 28, no fishing for salmon. This management measure was in place due to high water temperatures and concerns with potential impacts to co-migrating sockeye salmon.
- August 29 to December 31 the daily limit for wild or hatchery marked chinook salmon was four with only one over 62 cm allowed to be retained.

In the non-tidal waters (Region 2) of the Fraser River the following regulations were in place for 2015:

- January 1 to August 2, no fishing for salmon.
- August 3 to August 14, the daily limit was four chinook per day with only one over 50 cm allowed to be retained.
- August 15 to August 28, no fishing for salmon. This management measure was in place due to high water temperatures and concerns with potential impacts to co-migrating sockeye salmon.
- August 29 to December 31, the daily limit for wild or hatchery marked chinook salmon was four with only one over 62 cm allowed to be retained.

Fraser River Tributaries:

Due to adverse environmental conditions, an in-season angling closure was implemented in most rivers/streams from July 22 to September 13. There were several tributaries to the Fraser River in which chinook retention was permitted outside of the previously stated closed period. These included:

- Alouette River: daily limit of one chinook from July 1 to December 31;
- Chehalis River: daily limit of four with only one over 50 cm from June 1 until August 10 and a daily limit of four chinook with only one over 62 cm from September 16 until December 31; Chilliwack/Vedder River: daily limit of four with only one over 62 cm from July 1 until December 31;Coquitlam River: daily limit of one chinook from July 1 to December 31;
- Harrison River, there was no chinook fishery on the Harrison River in 2015 due to a low forecast of terminal abundance.

Tributaries to the Fraser River above Sawmill Creek in which chinook retention was authorized included:

Region 3 - Fraser River

- Fraser River: No fishing for salmon from January 1 until July 15. From July 16 to September 16, daily limit of four chinook per day, none over 50 cm, except for the following two exemptions:

1) Bridge River downstream of the Road 40 Bridge and the Fraser River from the Bridge River to the B.C. Railway Bridge north of Lillooet, daily limit of one chinook during the following time frames and from 06:00 to 21:00 hours daily:

- Tuesday, June 16 to Thursday, June 18;
- Sunday, June 21 to Thursday, June 25; and

- Sunday, June 28 to Thursday, July 2.

2) Closed from July 22 to December 31 to all salmon fishing due to concerns related to high water temperatures.

Region 3 - Fraser River Tributaries

- Clearwater and North Thompson: July 16 to July 21, catch and release of chinook only. July 22 to August 6, no fishing for salmon. August 7 to August 21, daily limit of one chinook with a monthly limit of two chinook from the two rivers combined.
- Kamloops Lake and the Thompson River from Kamloops Lake downstream to Goldpan: August 28 to September 22, daily limit of four chinook, only one over 50 cm.
- Thompson River: Goldpan to the Fraser, August 29 to September 22, daily limit of four chinook, none over 50 cm.
- South Thompson River: August 22 to September 22, daily limit of four chinook, only two greater than 50 cm. There is a monthly quota of six chinook from the South Thompson River.

Region 5A

- Cariboo River: July 25 to August 16, daily limit of one chinook between 30 cm and 77 cm.
- Chilko River: July 25 to August 16, daily limit of one chinook between 30 cm and 77 cm.
- Quesnel River: July 15 to September 1, daily limit of one chinook between 30 cm and 77 cm.

Region 7

- Bowron River: July 15 to August 15, daily limit of one chinook between 30 cm and 77 cm.
- Nechako River: August 15 to August 27, daily limit of one chinook between 30 cm and 77 cm.

Region 8

Note: there is a monthly limit of four chinook in Region 8.

- Mabel Lake and Lower Shuswap River: September 1 to September 13, daily limit of four chinook per day, only two greater than 50 cm. The open area in Mabel Lake was smaller than usual this year due to an area that remained closed off the mouth of Middle Shuswap River due to concern for co-migrating Middle Shuswap chinook.
- Middle Shuswap River: did not open in 2015 due to high water temperature concerns.

Table 5-1: Preliminary Catch and Effort Estimates for Southern B.C. Inside Recreational ISBM Fisheries in 2015.

Fishing Area	Survey Period	Chinook Kept	Chinook Released	Effort (Boat Trips)
Strait of Georgia	Jun - Oct	51,483	36,655	72,689
Johnstone Strait	Jun - Aug	12,127	9,138	14,273
Juan de Fuca Strait	Feb- Oct	30,558	20,913	52,631
WCVI Inshore	Jun-Sep	31,753	14,877	26,038

Fraser River	Jul - Oct	13,186	1,702	n/a
TOTAL		**139,107**	**83,285**	**165,631**

5.3.3 Commercial

5.3.3.1 Commercial Harvest

In 2015 there were commercial fisheries in Barkley Sound and Nootka Sound which targeted ISBM chinook.

Area B Seine

No seine fisheries occurred for WCVI ISBM chinook in 2015.

Area D Gill Net

In 2015, due to the expected abundant return of 3 year old Robertson Creek chinook commercial gill net fisheries were approved in early September. These fisheries were designed to target mainly male chinook 77 cm or less and protect larger egg bearing females. The fisheries occurred in Subarea 23-1, upper Alberni Inlet, targeting chinook returns to Robertson Creek Hatchery. The fisheries occurred on September 10, 11, 17 and 18 for 12 hours each opening. The fishery was not successful, with a total catch of 438 pieces. It was an open fleet fishery however; the largest number of vessels participating in one opening was 16 vessels.

In 2015, gill net fisheries occurred in Tlupana Inlet targeting chinook returns to the Conuma River hatchery. There were both limited- effort and full fleet openings from August 9 to September 1 that occurred only at night. The total estimated catch was 9,615 chinook

Area E Gill Net

No Area E gill net fisheries occurred for ISBM chinook in 2015.

5.3.3.2 First Nation Commercial Harvest

West Coast Vancouver Island Economic Opportunity

In 2015 an agreement was reached which provided First Nations with an economic opportunity fishery. There was an opportunity for several limited commercial openings during daylight hours in 2015. These fisheries were combined coho and chinook fisheries using small mesh nets allowing fishers to target an abundance of small male chinook salmon. These fisheries were very successful for chinook and the total catch was 6,692 pieces.

The Department authorized an ISBM chinook salmon demonstration fishery in Area 25 for the T'aaq-wiihak Nations in 2015. This fishery targeted both the Conuma River and Burman River enhanced chinook returns using troll and gill net gear. Fishery openings occurred discontinuously from July 18 to September 1. A total of 54 chinook from the Conuma targeted fishery and 978 chinook from the Burman targeted fishery were sold.

Fraser River Economic Opportunity and Inland Demonstration Fisheries

Lower Fraser Area

In 2015, no sockeye-directed economic opportunity or demonstration fisheries took place in the Lower Fraser Area; therefore there was no incidental impact on chinook from these fisheries.

In mid-September limited economic opportunity/ demonstration fisheries to access available pink salmon TAC were initiated. In mid-October through early November limited economic opportunity/ demonstration fisheries to access available chum salmon TAC were initiated. Although the retention of chinook salmon was not authorized during these economic opportunity demonstration / fisheries, there was some by-catch retention reported. The total chinook harvested in pink and chum economic opportunity/demonstration fisheries was 22 with 1,481 released.

B.C.I

Economic opportunity and inland demonstration fisheries took place in the Fraser River in 2015, harvesting ISBM chinook in both the upper and lower reaches of the Fraser River.

An inland commercial fishing enterprise (CFE) operated by Riverfresh (Secwepemc Fisheries Commission), received an allocation for chinook in the B.C. Interior. They operated an 8 inch set gill net fishery from September 10 to September 22 on Kamloops Lake targeting South Thompson 4_1 chinook and Fraser pinks. Riverfresh was allocated 3,100 chinook and 9,200 Fraser pinks for the 2015 season. A total of 2,493 chinook were harvested.

5.3.4 Excess Salmon to Spawning Requirements (ESSR) Fisheries

WCVI ESSR Fisheries

First Nations were issued a joint Excess Salmon to Spawning Requirements (ESSR) licence for chinook at the Robertson Creek Hatchery facility. The total sold was 30,724 chinook (this total includes 1,615 jacks). An ESSR licence was issued for chinook at Nitinat Lake and the Nitinat Hatchery. The catch was 857 chinook. The total catch for both ESSR fisheries was 31,581 pieces.

Strait of Georgia ESSR Fisheries

ESSR harvest at the Big Qualicum hatchery included catch of 1,209 chinook.

Capilano Hatchery ESSR Fisheries

There were ESSR fisheries at the Capilano hatchery in 2015 that included chinook salmon. The total harvest of chinook salmon was 786 pieces (total includes 382 jacks).

Fraser River ESSR Fisheries

There were ESSR fisheries at the Chilliwack hatchery in 2015 that included chinook salmon. The total harvest of chinook salmon was 7,966 pieces (total includes 1,254 jacks).

There were ESSR fisheries at the Inch Creek and Chehalis hatcheries in 2015; however, no harvests of chinook salmon took place.

6 FRASER RIVER SOCKEYE

6.1 OBJECTIVES AND OVERVIEW

The 2015 Fraser sockeye forecast had an 80% prediction interval of 2.36M – 23.58M. From this distribution, the Fraser River Panel (FRP) adopted a run size forecast of 6.76M Fraser sockeye for planning purposes based on the 50% (p50) probability level forecast for all run timing aggregates with the exception of Early Stuart sockeye where the 25% probability level (p25) was used. The majority of the total return (~69%) was expected to be from the Summer run sockeye stock grouping. Pre-season planning focused on First Nations Food, Social and Ceremonial (FSC) fisheries, and providing opportunities on Summer run sockeye for the commercial and recreational fisheries, while staying within constraints to minimize impacts on less abundant stock groups and species of concern.

Pre-season plans incorporated provisions to meet escapement objectives and meet conservation objectives for stocks of concern while considering international and domestic objectives. Significant effort was placed on developing a pre-season plan for anticipated fisheries. The pre-season plan included the following assumptions and guiding principles in no particular order:

- The Fraser River Panel operated in accordance with Chapter 4, Annex IV of the Pacific Salmon Treaty, which came into effect prior to the 2015 season;
- The U.S. share of the annual Fraser River sockeye salmon total allowable catch (TAC), harvested in the waters of Washington State was set at 16.5% of the aggregate. To the extent practicable, the Fraser River Panel shall manage the United States fishery to implement a fishing plan that concentrates harvest on the most abundant management group (or groups; in 2015 the Summer run stock grouping). It is understood that the U.S. harvest may exceed 16.5% of the TAC for one or more of the less abundant management groups despite concentrating the harvest in this manner;
- For computing TAC by stock management groupings, the Aboriginal Fishery Exemption (AFE) of 400,000 Fraser River sockeye, shall be allocated to management groups as follows: The Early Stuart sockeye exemption shall be up to 20% of the Fraser River AFE, and the remaining balance of the latter exemption shall be based on the average proportional distribution of First Nations Food, Social and Ceremonial catch for the most recent three cycles and modified annually as required to address concerns for Fraser River sockeye stocks and other species, and as otherwise agreed to by the Fraser River Panel;
- Although the capability to assess in-season run size and marine migration timing was anticipated to be good for Late run sockeye, an in-season run size estimate for Cultus Lake sockeye would not be possible due to low abundance relative to co-migrating sockeye stocks. As a result the Cultus exploitation rate is assumed to be the same as the exploitation rate from the similarly timed Late run stocks (excluding the Birkenhead stock), caught seaward of the confluence of the Fraser and the Vedder rivers;
- The four stock aggregates identified under the Pacific Salmon Treaty Annex generally contain stocks with similar timing in the marine area. Recent trends in timing of some stocks, including Raft River and North Thompson (in the Early Summer run prior to 2012), and Harrison River (in the Late run prior to 2012) sockeye now differs substantially from the other stocks in their respective historical run timing groups. In 2015, Fisheries and Oceans

Canada continued to manage these stocks as part of the Summer run aggregate to better align these stocks with other stocks of similar run timing. Escapement plans, management adjustments and harvest rules have been adjusted to account for this change;

- Canada's escapement plan specified escapement requirements that varied with run size for each of the run timing aggregates;
- The Total Allowable Mortality (TAM) cap describes the upper range of the total mortality (including management adjustments and exploitation rate). For 2015 the Early Stuart, Early Summer, and Late run sockeye would all be managed to a TAM cap of 60% while the Summer run will be managed to a TAM cap of 65%;
- At low abundances, low abundance exploitation rates (LAERs) are implemented to protect 90% of the run timing aggregate (10% LAER) while allowing for fisheries on more abundant co-migrating run timing groups and/or species. The exception is the Late run aggregate where a 20% LAER has been implemented consistent with recent years' practice. If the return of Late run sockeye was at or above the p75 forecast, consideration would be given to increasing the Late run LAER up to 30% provided recovery objectives could be met.
- In 2015, Early Stuart sockeye window closures and other fishing restrictions were planned for commercial, recreational and First Nations fisheries to protect a significant proportion (90%) of the Early Stuart return. These measures included a rolling window closure based on run timing of the Early Stuart sockeye migration through various fishery areas. An additional 1 week closure window was implemented to protect the early timed Early Summers; and
- Conservation concerns for other sockeye stocks and species continued to impact the planning of sockeye fisheries in 2015. The stocks and species of concern in 2015 were: Cultus Lake sockeye, Nimpkish River sockeye, Sakinaw Lake sockeye, Interior Fraser River coho, Fraser Spring 4_2 chinook, Fraser Spring and Summer 5_2 chinook, and Interior Fraser River steelhead.

Management Actions

Initially, Fraser River sockeye harvest opportunities were restricted for all harvest groups based on the requirement for a moving window closure to protect Early Stuart and early-timed Early Summer sockeye. During the Early Stuart window closure time period in-season assessments indicated there was limited harvest impact available designated under the LAER provisions. As the season progressed, in-season information indicated that there was Early Summer TAC and it was anticipated that Summer run TAC would be available. Some directed harvest occurred by First Nations for FSC purposes both in the marine and in-river fisheries. U.S. fisheries also occurred in this time frame. On August 11th, substantially reduced run sizes were adopted that resulted in limited TAC on Early Summers and no TAC available for Summer run. On August 14th, the run size of Late run sockeye also dropped to levels that did not result in any TAC. With both Summer and Late Run sockeye in an LAER situation, only fisheries that were selective and directed at other species could be prosecuted. Although there was no TAC for Early Stuart, Summer, or Late run sockeye identified, in Canada there was directed harvest permitted in some of the more terminal areas in the B.C. Interior for FSC fisheries where First Nations had limited access to other species and stocks.

Total Allowable Catch

The TAC for Fraser sockeye is calculated using: run size estimates, the escapement plan, management adjustments, run timing, and estimates of test fishing catches. In-season, fisheries are planned using in-season information and are not conducted based on pre-season forecasts.

In 2015, fisheries were planned in Canada targeting the stock aggregates with available TAC while minimizing impacts on stocks of concern and considering LAER caps. Other stock aggregates that could constrain fisheries were harvested incidentally to levels identified in Canada's Escapement Plan.

The table below outlines final in-season estimates of Fraser River sockeye catch in Canada and the U.S.

Table 6-1: Final In-season Estimates of Fraser River Sockeye Catch in Canada & in the U.S.

Total Fraser Sockeye Caught [a]	**267,300**
Test fisheries (Panel approved)	37,900
Canadian Catch	**183,300**
Canadian First Nation FSC fisheries- Marine	39,800
Canadian First Nation FSC fisheries- Fraser	142,900
Canadian commercial fisheries (includes commercial selective & FN economic)	0
Canadian recreational fisheries	0
Canadian test fisheries (Albion)	500
United States Catch	**46,100**
U.S. non-Treaty Indian fisheries	11,000
U.S. Treaty Indian fisheries	33,100
U.S. Treaty Indian ceremonial fisheries	2,000

[a] Preliminary in-season catch as of October 6, 2015 rounded to the nearest 100 fish. Does not include non-Fraser sockeye.

The table below shows the pre-season and final in-season TAC and catch by aggregate.

Table 6-2: Final In-season Estimates of Fraser River Sockeye Catch as of October 6 2015 in Canada and the U.S.

Stock	Pre-season total TAC[a]	Final In-season total TAC[b]	Final In-season Catch[ac]
Early Stuart	1,500	800	800
Early Summer	150,500	73,5000	44,900
Summer	2,674,000	128,400	212,200
Late	257,000	35,200	9,400
Total	**3,081,500**	**237,900**	**267,300**

[a] TAC includes the Canadian Aboriginal Fisheries Exemption amount of 400,000 fish.
[b] Includes LAER of 10% for Early Stuarts and Summers, and 20% for Lates.
[c] Catch up to October 6, 2015 rounded to the nearest 100 fish.
Catches includes catch from test fisheries.

Table 6-3 outlines the catch for each country in fisheries managed through the FRP process.

Table 6-3: Final In-season Catch as of October 6, 2015.[a]
(See also Appendix 4 for most up to date catches)

	Sockeye		Pink	
	Total	**Fraser**	Total	**Fraser**
Canada	*184,800*	***183,300***	*42,000*	***29,800***
Commercial	-	-	-	-
FSC	183,900	182,800	41,400	29,300
mrne	41,000	39,800	15,600	3,500
LFrA	61,500	61,500	24,600	24,600
BCI	81,400	81,400	1,200	1,200
FN Demo (BCI)	-	-	500	500
Recreational (JuFu)	300	-	-	-
Charter (Albion TF)	500	500	-	-
United States	*47,300*	***46,100***	*672,600*	***334,700***
Commercial	*45,200*	***44,100***	*650,500*	***331,400***
C&S	*2,000*	***2,000***	*22,200*	***3,400***
FRP Test Fisheries	*41,700*	***37,900***	*122,600*	***49,200***
Total	*273,800*	***267,300***	*837,200*	***413,700***

[a]Preliminary in-season catch as of October 6, 2015 rounded to the nearest 100 fish. Does not include non-Fraser sockeye.

Fraser Sockeye Exploitation Rates

The table below outlines pre-season exploitation rate expectations based on the p50 forecast, pre-season MAs, 2015 Total Allowable Mortality (TAM) rules, and final in-season exploitation rate estimates based on final in-season estimates of run size and catch, along with the estimated final in-season exploitation rate after incorporating fishery induced mortalities.

Table 6-4: Potential Exploitation Rates

	Pre-season Allowable ER [a]	Final In-season Allowable ER*	Final In-season ER (Actual Estimate)[b]
Early Stuart	0%	10%	2%
Early Summer	20%	20%	12%
Summer	59%	10%	14%
Late	22%	20%	6%
Cultus [c]	22%	20%	6%

[a] ER is the max allowable ER based on 2015 TAM rules, pre-season (June) pMAs, and the p50 forecast
[b] ER is based on the final adopted in-season run size and in-season catch
[c] ER is assumed to be the same as similarly timed Late-run stocks
*In 2015, the Early Stuart, Summer, and Late run sockeye were all in a low abundance ER (or LAER) situation. As noted in the IFMP, the LAER is provided to allow for limited fisheries directed on co-migrating stocks or species.

6.2 STOCK STATUS

6.2.1 Pre-season Assessment

In addition to Canada's escapement plan, estimates of run size, diversion rate, run timing and assumptions about in-season environmental conditions are key inputs required to seed the pre-season Harvest Planning Model prior to observing in-season information. The main objective of the model is to identify potential fishing opportunities while attempting to meet conservation, international and domestic harvest objectives.

The 2015 sockeye run size forecasts were calculated using methods consistent with previous forecasts, which assess the performance of both long-term stock-recruit models by assuming average productivity and non-parametric models based on recent recruit per spawner data over the entire time series via jack knife analysis. The final forecast model for each stock was selected based on its ability to predict the stock's true returns over the full stock-recruitment time series. For further details, refer to the Canadian Science Advisory Secretariat (CSAS) Pacific Region Science Response: *Pre-season run size forecasts for Fraser River Sockeye (Onchorhynchus nerka) and Pink (O. gorbuscha) salmon in 2015.*

The pre-season run sizes adopted by the Panel were used for management purposes, until in-season updates of run size are available. For pre-season planning purposes, the FRP used the 50% probability level for all run timing groups and stocks with the exception of Early Stuart (p25). The run sizes adopted by the Panel for pre-season planning purposes and to start the 2015 fishing season were as follows: Early Stuart 16,000 (p25); Early Summer run 837,000; Summer run 4,675,000; and Late run 1,236,000, for a total of 6,778,000 Fraser sockeye. The total four

year old proportion of the 2015 forecast (78% of the total four plus five year old forecast at the 50% probability level) was below average (82%). This was attributed to the exceptional escapements for a number of stocks in the 2010 brood year, which contributes five year olds to the 2015 forecast.

Diversion Rate

The pre-season forecast of Fraser sockeye migrating through Johnstone Strait was 95%. The estimate is based on the relationship between the mean daily sea surface temperature measured at the Kains Island (Quatsino) lighthouse in May and June and the estimated post-season Northern Diversion Rate for 1977-2014.

For the purposes of pre-season planning, it is assumed that Northern Diversion increases over the course of the season. In addition, Early Stuart and Harrison sockeye are assumed to migrate predominately through the Juan de Fuca approach, regardless of migration timing or the overall diversion rate for Fraser Sockeye.

Timing Forecasts

Pre-season forecasts were provided by Canada for the 50% marine arrival times for the two sockeye salmon stocks (Early Stuart and Chilko River). The run timings used for pre-season planning purposes were derived from regressions based on Early Stuart forecast run timing and Chilko long term median run timing. The following Table 6-5 are the pre-season estimates of timing in Area 20 adopted by the FRP at the June meeting.

Table 6-5: Timing Estimates Used for Pre-Season Planning in Area 20

Stock	2015 Area 20 Timing
Early Stuart	July 8
Early Summers	August 1
Summer run	August 7
Late run	August 17

The following figure (Figure 6-1) graphically illustrates the relative run size forecasts and run timing overlaps expected in 2015.

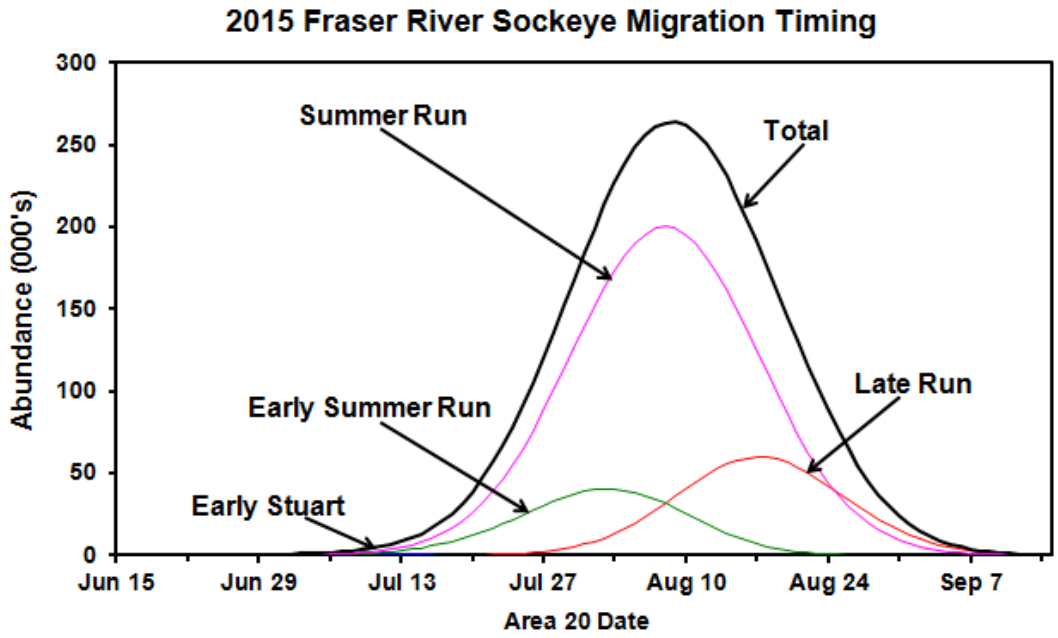


Figure 6-1: Relative Run Size Forecasts and Run Timing Overlaps Expected in 2015

Environmental Conditions and Management Adjustments

Management Adjustments (MAs) reflect a quantity of fish that are added to the spawning escapement targets for the purpose of increasing the likelihood of achieving the spawning escapement targets. The general concept is that more fish are needed to be counted going past Mission, than needed for spawning ground escapement and the anticipated catch above Mission, to account for the historic discrepancy between the number of fish estimated at Mission in-season (minus the actual catch above Mission) and the number of fish counted on the spawning grounds. This discrepancy may be due to a number of factors, including, but not limited to: critically high temperatures and/or discharge in the Fraser River, bias in estimates at Mission hydroacoustics and/or spawning ground escapement estimates, biased catch estimates, unreported catch, delayed mortality associated with escapes or releases from fishing gear, natural mortality, and/or predation. While all of these factors are included in the difference between estimates, generally the inputs used to estimate MAs are temperature and discharge rates in the Fraser River during the migration of Early Stuart, Early Summer and Summer run sockeye and the 50% migration timing at Mission for Late run sockeye. In some cases a MA for an aggregate may include alternatives such as observed medians when the temperature and discharge models are thought not to apply for some stocks. The Fraser Panel determines the pMA values used for in-season management.

For the Early Stuart, Early Summer run and Summer run sockeye, MA estimates can be updated in-season, as river conditions, environmental conditions, peak timing and run size information is acquired. In some years Late run sockeye MA estimates can be updated in-season based on peak in-river timing estimates. Management adjustments for all stock groups may also be adjusted in-season, based on information regarding the fish health of migrating sockeye.

In 2015 the final pre-season Early Stuart pMA was the median of all years from 1999 to 2014. The Early Summer run pMA was a Panel-adopted number that was in between the long term median and the model estimate. The Summer run pMA was the median of the long term dataset to 2014, weighted using a separate pMA of 0.39 for Harrison sockeye. The Late run pMA was the median of the odd year cycle lines since early migration timing began in 1996, weighted by a separate pMA for Birkenhead sockeye (0.18).

The pre-season MA was expressed as a percentage of the spawning escapement goal (pMA) and the number of sockeye this represents for 2015 pre-season run sizes are outlined in the table below.

Table 6-6: MA Estimates used for Pre-Season Planning in 2015

	Pre-season Run Size	**pMA**	**MA**
Early Stuarts	16,000	0.68	10,900
Early Summers	837,000	1.0	334,800
Summers	4,675,000	0.17	278,200
Late run	1,236,000	0.95	471,400

2015 Escapement Plan

The *Fraser River Sockeye Spawning Initiative* is a multi-year collaborative planning process to develop a long-term escapement strategy. The annual escapement strategy seeks a balance between long-term objectives and short-term practical considerations, and combines technical analyses with qualitative judgment. A plan is developed every year and is vetted through consultative processes prior to the fishing season. The annual allowable exploitation rate for each run timing aggregate is adjusted based on Panel adopted run sizes and pMAs. The table below represents the pre-season escapement plan for 2015, as reflected in the final Salmon Integrated Fisheries Management Plan (IFMP). Note that the Management Adjustments in Table 5-7 have been modified subsequent to the release of the IFMP by the Panel.

Table 6-7: 2015 Fraser River Sockeye Escapement Plan over the range of Pre-Season Run Size Estimates

Management		Pre-season Forecast Return				
Unit		p10	p25	p50	p75	p90
Early Stuart	forecast	92,000	137,000	211,000	331,000	507,000
	TAM Rule (%)	0%	21%	49%	60%	60%
	Escapement Target	92,000	108,000	108,000	132,400	202,800
	MA	61,600	72,400	72,400	88,700	135,900
	Esc. Target + MA	153,600	180,400	180,400	221,100	338,700
	LAER	10%	10%	10%	10%	10%
	ER at Return	0%	0%	15%	33%	33%
	Allowable ER	10%	10%	15%	33%	33%
	available for harvest	9,200	13,700	30,600	109,900	168,300
	2013 Performance					
	Projected S (after MA)	50,000	74,000	108,000	132,000	203,000
	BY Spawners	45,300	45,300	45,300	45,300	45,300
	Proj. S as % BY S	110%	163%	238%	291%	448%
	cycle avg S	210,300	210,300	210,300	210,300	210,300
	Proj. S as % cycle S	24%	35%	51%	63%	97%
Management		Pre-season Forecast Return				
Unit		p10	p25	p50	p75	p90
Early Summer	*lower ref. pt. (w misc)*	141,000	141,000	141,000	141,000	141,000
(w/o RNT)	*upper ref. pt. (w misc)*	351,000	351,000	351,000	351,000	351,000
	forecast (incl. misc)	73,000	130,000	253,000	468,000	844,000
	TAM Rule (%)	0%	0%	44%	60%	60%
	Escapement Target	73,000	130,000	141,000	187,200	337,600
	MA	37,200	66,300	71,900	95,500	172,200
	Esc. Target + MA	110,200	196,300	212,900	282,700	509,800
	LAER	10%	10%	10%	10%	10%
	ER at Return	0%	0%	16%	40%	40%
	Allowable ER	10%	10%	16%	40%	40%
	available for harvest	7,300	13,000	40,100	185,300	334,200
	2013 Performance					
	Projected S (after MA)	44,000	77,000	141,000	187,000	338,000
	BY Spawners	80,200	80,200	80,200	80,200	80,200
	Proj. S as % BY S	55%	96%	176%	233%	421%
	cycle avg S	91,000	91,000	91,000	91,000	91,000
	Proj. S as % cycle S	48%	85%	155%	205%	371%
Management		Pre-season Forecast Return				
Unit		p10	p25	p50	p75	p90
Summer	*lower ref. pt. (w misc)*	1,254,000	1,254,000	1,254,000	1,254,000	1,254,000
(w. RNT & Har)	*upper ref. pt. (w misc)*	3,136,000	3,136,000	3,136,000	3,136,000	3,136,000
	forecast	1,222,000	2,095,000	3,718,000	6,663,000	12,131,000
	TAM Rule (%)	0%	40%	60%	60%	60%
	Escapement Target	1,222,000	1,254,000	1,487,200	2,665,200	4,852,400
	MA	122,200	125,400	148,700	266,500	485,200
	Esc. Target + MA	1,344,200	1,379,400	1,635,900	2,931,700	5,337,600
	LAER	10%	10%	10%	10%	10%
	ER at Return	0%	34%	56%	56%	56%
	Allowable ER	10%	34%	56%	56%	56%
	available for harvest	122,200	715,600	2,082,100	3,731,300	6,793,400
	2013 Performance					
	Projected S (after MA)	1,000,000	1,254,000	1,487,000	2,665,000	4,852,000
	BY Spawners	796,200	796,200	796,200	796,200	796,200
	Proj. S as % BY S	126%	157%	187%	335%	609%
	cycle avg S	1,825,400	1,825,400	1,825,400	1,825,400	1,825,400
	Proj. S as % cycle S	55%	69%	81%	146%	266%
Management		Pre-season Forecast Return				
Unit		p10	p25	p50	p75	p90
Late	*lower ref. pt. (w misc)*	313,000	313,000	313,000	313,000	313,000
(w/o Har)	*upper ref. pt. (w misc)*	782,000	782,000	782,000	782,000	782,000
	forecast	167,000	293,000	583,000	1,133,000	2,126,000
	TAM Rule (%)	0%	0%	46%	60%	60%
	Escapement Target	167,000	293,000	313,000	453,200	850,400
	MA	111,900	196,300	209,700	303,600	569,800
	Esc. Target + MA	278,900	489,300	522,700	756,800	1,420,200
	LAER	20%	20%	20%	30%	30%
	ER at Return	0%	0%	10%	33%	33%
	Allowable ER	20%	20%	20%	33%	33%
	available for harvest	33,400	58,600	116,600	376,200	705,800
	2013 Performance					
	Projected S (after MA)	80,000	140,000	279,000	453,000	850,000
	BY Spawners	134,000	134,000	134,000	134,000	134,000
	Proj. S as % BY S	60%	104%	208%	338%	634%
	cycle avg S	104,200	104,200	104,200	104,200	104,200
	Proj. S as % cycle S	77%	134%	268%	435%	816%
Available for Harvest (TF, US, CDN)		172,100	800,900	2,269,400	4,402,700	8,001,700
Total projected spawners		1,174,000	1,545,000	2,015,000	3,437,000	6,243,000

6.2.2 In-season Assessment

In-season assessments in 2015 were challenging at times due to the following:

- Record low or near record low Fraser River discharge levels may have altered sockeye and other co-migrating salmon, migration patterns. This change would have impacts at the Mission and Qualark enumeration sites and thus increasing the uncertainty in estimates of sockeye passage for all stock groups;
- Test fishery catch per unit effort were both higher and lower in the marine area test fisheries than the in-river test fisheries, at different times during sockeye migration. This made it difficult to confirm appropriate expansion lines used to project sockeye returning to the Mission hydro-acoustic site;
- Record high or near record high Fraser River water temperatures observed during the entire migration period of sockeye increased uncertainty in MAs;
- The protracted return profile of all stock groupings increased the uncertainty in the timing and abundance for this group;
- It was difficult to determine whether Late run sockeye were displaying delay behaviour in-season given the low abundance of Late run sockeye relative to the abundance of co-migrating pink salmon; and
- Co-migrating pink and higher than typical abundances of chinook salmon made abundance estimates for sockeye difficult at both the Mission and Qualark assessment sites.

Migration and Timing

The final in-season Area 20 migration date (peak) was earlier for Early Stuart sockeye and Early Summer and later for Summer, and Late run sockeye when compared to the pre-season timing estimates (Table 6-8).

Table 6-8: Expected vs. Observed Timing by Stock Group

Stock	Area 20 Timing	
	Pre-season	**Final In-season***
Early Stuart	July 8	July 6
Early Summer	August 1	July 30
Summer run	August 7	August 11
Late run	August 17	August 21

* From October 6 meeting.

Fraser River Environmental Conditions and Management Adjustment

The Fraser River discharge was below average reaching record or near record lows throughout the migration of all Fraser sockeye stock groups. Water temperatures were well above average reaching record or near record highs for the entire sockeye migration. High water temperatures

can cause serious adverse effects on migratory fish. The figures below illustrate the observed in-season Fraser River discharges at Hope and temperatures at Qualark Creek as well as the corresponding estimated stock aggregate migration periods.

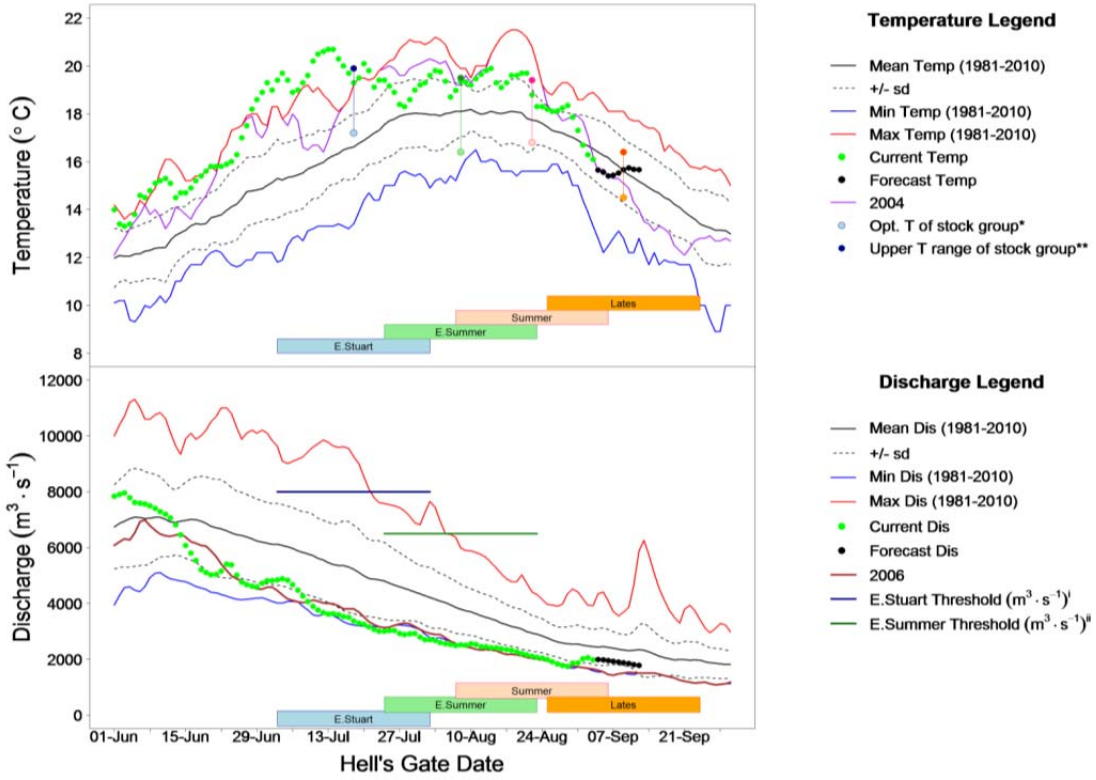


Figure 6-2: Fraser River Discharge at Hope and Temperature at Qualark Creek

Management Adjustment models can use environmental conditions and run timing as inputs. Due to the high temperatures observed in July and August the modelled estimates of Early Stuart and Summer run pMAs were significantly higher than pre-season adopted values. While the Panel adopted a higher pMA for Early Stuart, the Early Summer and Summer pMAs remained at the pre-season values based on in-season observations of fish migration and behaviour and in-season run sizes that curtailed fisheries (Table 6-9).

Table 6-9: Pre-season and In-season Management Adjustments

Stock	p50 Forecast	Pre-Season pMA	Pre-Season MA	Final In-season Run Size	Final In-Season pMA	Final In-Season MA[a]
Early Stuart	16,000[b]	0.68	10,900	32,100	4.18	133,800
Early Summer	837,000	1.00	334,800	373,000	1	160,000
Summer	4,675,000	0.17	385,000	1,459,200	0.17	246,000
Late run	1,236,000	0.95	471,400	165,800	0.95	190,000

[a] Final in-season MA as of September 11, 2015.
[b] Panel adopted the p25 Early Stuart pre-season forecast.

Run Size

As the season progressed, the FRP considered technical advice provided by the Pacific Salmon Commission and the Fraser River Panel Technical Committee members and bilaterally adopted run sizes that reflected in-season assessment information.

The final in-season run size estimate for Early Stuart was near the pre-season p50 forecast. The pre-season p50 forecasts for Early Summer, Summer and Late run management aggregates were considerably higher than the final in-season run sizes, particularly for Late run sockeye (see the Table below).

Table 6-10: Pre-Season Forecasts vs. Final In-Season Run Size Estimates

Stock	Pre-Season Forecast			Final In-Season Estimate (Oct 6)
	25% Probability	50% Probability	75% Probability	
Early Stuart	16,000	30,000	58,000	32,100
Early Summer	424,000	837,000	1,603,000	373,000
Summer	2,681,000	4,675,000	8,764,000	1,549,200
Late	703,000	1,236,000	2,210,000	165,800
Total	**3,824,000**	**6,778,000**	**12,635,000**	**2,120,100**

Diversion Rate

The annual diversion rate of sockeye through Johnstone Strait was lower than forecast (69% in-season vs. 95% preseason). The figure below outlines diversion rate estimates in 2015 relative to other cycle years.

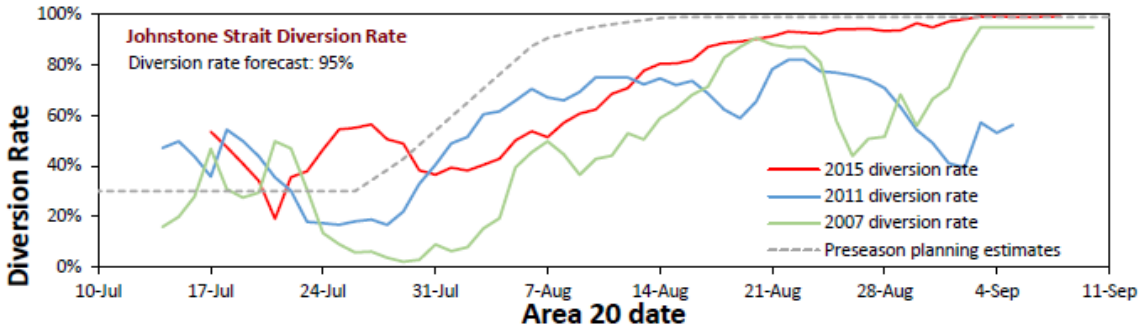


Figure 6-3: The 2015 Diversion Rate Compared to Recent Diversion Estimates for the 2015 Cycle.

6.2.3 Post Season

Sockeye Migration and Escapement Estimates

Early Stuart sockeye did experience difficult migratory conditions in the Fraser River. Water temperatures were well above the 1981-2010 mean temperature and were above the 1981-2010 maximum observed temperature throughout the majority of their migration period. Discharge levels during the majority of the Early Stuart migration period were well below the 1981-2010 mean and approached the 1981-2010 minimum levels.

The 2015 preliminary escapement estimate for Early Stuart sockeye is 10,084 which is more than 13 times the brood year escapement (758), and is 23% of the long term cycle average. It is also 31% of the in-season escapement target (32,100) but is 168% of the estimate of potential escapement as derived from the Mission hydro acoustic site, catches upstream, and the adopted pMA. Spawning success for Early Stuart sockeye in 2015 is an estimated 75.1% (24.9% pre-spawn mortality), well below the long term average of 88.6% successful spawners.

Early Summer run sockeye also experienced high water temperatures, well above the long term mean (1981-2010), for the duration of their migration times and reached historical maximum temperatures. Discharge levels throughout the entire migration period of Early Summer run sockeye were well below the historic averages and were at or near historical minimums. The high temperatures and low discharge levels persisted for the entire Summer run migration period. Late run sockeye migrating into the river experienced higher than average water temperatures early in their migration and near average to below average temperatures throughout the remainder, while discharge levels remained below historical means for the entire migration period.

The 2015 preliminary escapement estimate of 139,833 Early Summer sockeye is 65% of the brood year (216,337) and 95% of the cycle average of 146,481. This is the second largest Early Summer run sockeye spawning escapement on record for this cycle year. The estimated spawning success for the Early Summer run aggregate in 2015 is 94.3%, which is well above the

long term average of 89.5%. The Table below outlines the predicted escapement relative to the escapement goals at the final in-season sockeye run sizes. Spawning ground estimates for Summer run and Late run sockeye are currently not available.

Table 6-11: Preliminary Escapement Information to Date

Management Group	Escapement Goal @ final in-season run size [a]	Predicted Diff. Btw Estimates (DBE) [b]	Predicted Spawn. Escapement [bc]	Prelim. Spawn.
Early Stuart	32,100	-81%	6,100	10,100
Early Summer	149,200	-50%	164,100	139,800
Summer	1,448,000	-15%	1,143,800	Not Available
Late-run	165,800	-49%	80,300	Not Available
Total	***1,795,100***		***1,394,300***	

[a] Spawning Escapement Target based on adopted run size and Canada's escapement plan.

[b] DBEs are calculated from Fraser Panel adopted proportional MA values

[c] Predicted spawning escapement: Run Size - Catch to date + DBE. In-season estimates as of Oct 6 2015.

[d] Preliminary adult spawning escapement estimates (not including jacks). Preliminary Summer and Late spawning ground estimates will be available in Feb 2016.

Post-season Catch Estimates

The current estimates of catch in this report are final in-season estimates as of October 6, 2015 and will likely increase slightly when the post-season catch estimates are finalized. Preliminary post season estimates of catch by stock group will be available in January 2016.

6.3 FISHERIES

6.3.1 First Nations Food Social and Ceremonial and Treaty Fisheries

There were directed harvest opportunities for Fraser sockeye in First Nations FSC fisheries in both the marine and freshwater areas.

6.3.2 Recreational Fisheries

There were no recreational fisheries directed on Fraser River sockeye in 2015.

6.3.3 Commercial

6.3.3.1 Commercial Harvest

No directed commercial or recreational fisheries in Canada in 2015. Some small, incidental by-catch of Fraser sockeye occurred when conducting fisheries on other species (i.e. pink salmon fisheries).

6.3.3.2 First Nation Commercial Harvest

There were no First Nation commercial harvest opportunities directed on Fraser River sockeye in 2015.

6.3.4 Excess Salmon to Spawning Requirements (ESSR) Fisheries

There were no ESSR opportunities directed on Fraser River sockeye in 2015.

7 FRASER RIVER PINK

7.1 OBJECTIVES AND OVERVIEW

The escapement strategy for Fraser River pink salmon continues to be based on an interim escapement goal of 6M Fraser River pink salmon for run sizes between the lower and upper fisheries reference points; with an escapement target of 30% of the total return for run sizes above 20M and an exploitation rate that linearly increases from 0% to 15% at run sizes below the lower fisheries reference point. Table 7-1 below outlines total allowable mortality rules for the range of Fraser pink forecast run sizes.

In most years, concerns for co-migrating Late Run Fraser Sockeye are the main harvest constraint for International fisheries, with added Canadian domestic constraints due to Interior Fraser Coho.

7.2 STOCK STATUS

7.2.1 Pre-season Assessment

In 2015, the Fraser pink forecast was highly uncertain given the changes to the assessment methods through time with an 80% prediction interval of 7.66M – 27.78M. The Fraser River Panel (FRP) adopted the mid-point (p50) run size forecast of 14.46M Fraser pink for planning purposes. At this run size, the escapement goal is 6.0M.

The DFO forecast 50% date (peak timing) for Fraser pink salmon arriving to Area 20 was August 28 and the long term median diversion rate estimate through Johnstone Strait of 56% was used for pre-season planning purposes.

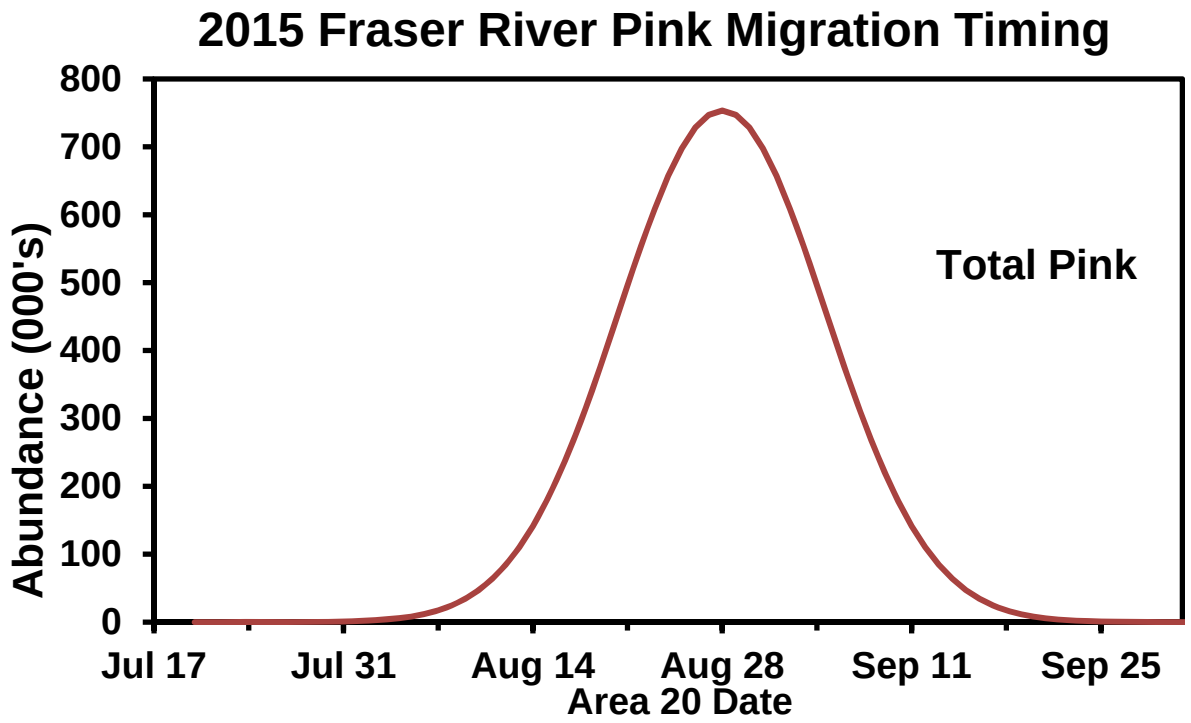


Figure 7-1: 2015 Fraser River Pink Migration Timing.

The total allowable mortality at the p50 pre-season run size forecast was 58%.

Table 7-1: 2015 Fraser River Pink Escapement Plan- Pre-season Run Size Estimates and Allowable Exploitation Rates.

Fraser Pinks

7,059,000	Lower Fishery Reference Point
20,000,000	Upper Fishery Reference Point
70%	Maximum Exploitation Rate

	Pre-season Forecast Return				
	p10	p25	**p50**	p75	p90
forecast	7,661,000	10,385,000	14,455,000	20,450,000	27,776,000
escapement target	6,000,000	6,000,000	6,000,000	6,135,000	8,333,000
allowable ER	22%	42%	58%	70%	70%

In 2015, there were pre-season concerns expressed by Canada and the US around sockeye by-catch in directed pink fisheries as there could be limited sockeye TAC available when pink fisheries were anticipated. Both parties agreed that pink fisheries would be undertaken while striving to stay within sockeye harvest constraints.

Due to conservation concerns for some co-migrating species, it was anticipated that, similar to previous years, alternative fishing gear may be employed to access Fraser Pink TAC. Alternative gears used in the past have included beach seines & shallow seines in the Fraser River.

7.2.2 In-season Assessment

The pre-season projection of peak timing date (August 28) was about 1 week later than the final in-season estimate (August 22). The final in-season annual diversion rate through Johnstone Strait was lower than the long term median of 56% and estimated to be 38%.

As the season progressed the Fraser River Panel (FRP) considered technical advice provided by the Pacific Salmon Commission (PSC) and the Fraser River Panel Technical Committee (FRPTC), and bilaterally adopted run sizes that reflected in-season assessment information. On September 8 the FRP adopted a final in-season run size estimate of 6.2M Fraser River pink, which was well below the p10 forecast level of 7.66M. The following table highlights the timeline of in-season run size changes that were adopted by the FRP.

Table 7-2: Timeline of Run Size Changes Adopted by FRP in 2015.

Stock	Preseason	Sept 1	Sept 8
Fraser Pink	14,455,000	**6,000,000**	**6,200,000**

7.2.3 Post Season

Standard in-season run size estimates for Fraser River pink salmon are based on marine area test fishery CPUE multiplied by historical expansion lines. A review of the Mission hydro acoustic data and DIDSON data will be analysed post-season to generate an alternative Fraser pink passage estimate at Mission. When added to catch estimates (seaward of Mission), this may provide an alternative to the test fishery based estimates of total pink salmon run size. This approach is supported given there is no comprehensive spawning ground assessment programs for Fraser pinks. The Fraser Panel adopted a preliminary post-season estimate of 5,781,300 pink salmon at the October post-season meeting.

Post-season catch estimates will be available in January 2016. The post-season catch of Fraser pinks will likely be close to the in-season estimates outlined below. Non-Fraser pink catch was estimated to be 423,500 pinks.

7.3 FISHERIES

The table below outlines preliminary Fraser pink catch estimates in Canada and the United States in 2015. (See also Appendix 5 for most up to date catches).

Table 7-3: Preliminary Fraser Pink Catch Estimates in Canada and US in 2015

Total Fraser Pink Caught [a]	**413,700**
Test fisheries (Panel approved)	49,200
Canadian Catch	**29,800**
Canadian commercial fisheries (includes commercial selective & First Nation economic and demonstration fisheries)	500
Canadian First Nation FSC fisheries	29,300
Canadian recreational fisheries	0
Canadian test fisheries (Albion)	0

United States Catch	**334,700**

[a] Preliminary in-season catch as of October 6, 2015 rounded to the nearest 100 fish. Does not include non-Fraser pink catch.

7.3.1 First Nations Food Social and Ceremonial and Treaty Fisheries

There were directed harvest opportunities for Fraser pinks in First Nations FSC fisheries in-river. There are no provisions for directed pink harvest for FSC-type purposes in any current Final Agreements.

7.3.2 Recreational Fisheries

There were Fraser River pink recreational harvest opportunities in 2015.

7.3.3 Commercial

7.3.3.1 Commercial Harvest

There was one Commercial fishery opening for pink salmon in 2015, but no salmon were retained.

7.3.3.2 First Nation Commercial Harvest

First Nations economic opportunity and demonstration fisheries occurred in 2015.

7.3.4 Excess Salmon to Spawning Requirements (ESSR) Fisheries

There were no ESSR opportunities directed on Fraser River pink salmon in 2015.

8 SOUTHERN B.C. COHO

8.1 OBJECTIVES AND OVERVIEW

Coho stocks in Southern B.C. are managed domestically and through international Abundance Based Management provisions which are outlined in the Pacific Salmon Treaty. Harvest levels are outlined in the Treaty's Southern Coho Management Plan, which provides maximum exploitation rates for treaty-defined Management Units (MUs) dependant on their categorical status as defined by the MU's country of origin. It is Canada's responsibility to ensure that coho management units covered by the Treaty are not harvested beyond the maximum exploitation rate as outlined in the Treaty in Canadian waters. Canada may also opt to take additional measures to reduce fisheries impacts below treaty-defined ER caps in domestic fisheries to further advance conservation and rebuilding objectives on Canadian stocks.

In Southern B.C., coho management measures in commercial and recreational fisheries are implemented based on their impacts to specific stocks. Southern B.C. coho management is primarily based on managing to exploitation rate limits on Interior Fraser River (IFR) Coho, with benefits accruing to Lower Fraser, Strait of Georgia, Johnstone Straits MUs. In outside Southern B.C. waters, WCVI coho stocks are a primary consideration in management.

Beginning in 1997, DFO implemented a number of fishery management measures to reduce the harvest impacts on Interior Fraser River coho, with more severe measures being implemented starting in 1998. From that time to 2013, Canadian fisheries impacting these stocks were curtailed to limit the exploitation rate to 2 to 3 percent, with an additional 10 percent permitted in U.S. fisheries (as per the Pacific Salmon Treaty management regime). In 2014, for one year only, an exploitation rate of up to 16% was permitted in Canadian fisheries. Despite some improvements to forecast returns and spawner abundances in some recent years, there is no evidence that IFR coho has departed from the 'low' productivity regime that has persisted since the 1994 return year. Current productivity is still well below that in the relatively high productivity period of 1978-1993. Spawner abundances in 2014 were well below recent years' levels and pre-season expectations based on projected fisheries impact and the forecast range highlighting continued uncertainties about stock productivity and/or fisheries impacts.

In 2015, an IFR coho exploitation rate of 10% or less was permitted in Canadian fisheries, with an additional 10% permitted in U.S. fisheries (as per the Pacific Salmon Treaty management regime). For Canadian fisheries, an exploitation rate "buffer" was applied to account for uncertainties in the estimate of fisheries impacts and differences in Canadian domestic and PST-related methodologies for assessing exploitation rates (with the latter typically being slightly higher). This meant that pre-season projections of planned Canadian fisheries impacts were kept below 8.5% as measured through domestic models. Coho management measures varied in Southern B.C. in 2015, depending on the area of harvest and impact on specific coho stocks.

The status of IFR coho stocks has generally remained poor in spite of the low overall exploitation rates. Escapement results for IFR coho in 2014 fell below the short-term recovery plan escapement goal of 20,000 and were well below the previous three years' escapements. Preliminary escapement results from 2015 are even lower than those observed in 2014.

The aggregate wild coho escapement (generation 2012-2014) to the Interior Fraser River watershed averaged 39,500 adults (geometric mean). This is an increase over previous generational averages since conservation measures were implemented in 1997-1998. In addition there have been improved returns of coho in Northern B.C., the west Coast of Vancouver Island and inside Strait of Georgia stocks in recent years.

Based on analysis of the returns and exploitation rate (ER) analysis, a decision was made to increase the ER from 3 percent to 10 percent or less for Canadian fisheries in Southern B.C. For Canadian fisheries, management measures were relaxed for FSC fisheries in the B.C. Interior and the lower Fraser including mainstem areas. In the marine recreational fishery, retention of additional enhanced coho and in some areas and times retention of one unmarked coho was allowed. Commercial fisheries, including First Nation economic, demonstration and commercial fisheries, were not permitted to retain coho in most southern B.C. waters. Additional fishing effort for more abundant stocks and species was permitted resulting in increased impacts on coho as release mortalities in these fisheries.

No additional management measures were in place in 2015 to protect Strait of Georgia coho stocks beyond measures put in place for Interior Fraser River coho.

Management measures in place for WCVI coho provided opportunities for increased recreational and commercial fisheries, with full harvest opportunities in WCVI areas where Interior Fraser coho were not considered to be impacted. These were largely terminal opportunities in portions of Area 23-27, where stock composition information showed that Interior Fraser River coho were not found.

In WCVI areas/times where Interior Fraser River coho are known to be prevalent, non-retention of unmarked coho remained in effect. Adjustments were made in the 2015 commercial troll fishery plans to allow unmarked coho retention on the WCVI once Interior Fraser River coho were considered to have moved through the area after mid-September.

Preliminary coho catch estimates are outlined in Table 8-1. Coho catch and release information from all fisheries can be found in Appendix 6.

Table 8-1: Preliminary coho catch estimates of the recreational, First Nations (FSC, economic opportunity and ESSR), and commercial fisheries for Southern B.C. in 2015.

	Kept	**Released**
Recreational	52,729	87,872
First Nations*	2,850	118
Commercial**	19,574	11,898
ESSR	15,932	250
Total	**91,085**	**100,138**

*includes FSC and treaty fisheries

**includes FN Commercial harvest through demonstration fisheries, economic opportunities and harvest agreements

8.2 STOCK STATUS

8.2.1 Upper Fraser

Interior Fraser

Field programs to estimate escapements are still underway, and only very preliminary results are available for some systems. Early returns to the Interior Fraser River indicate that escapement may be again much lower than 2013 and 2014 returns and are likely well below levels observed in the 2012 parental brood escapements. Very preliminary data indicate returns to the entire Interior Fraser River may be below 15,000; however, preliminary estimates are not yet available for many systems, and near final estimates will not be available until early February, as most field studies are not yet completed. Where biological sampling was possible, spawner abundance was lower, observed sex ratios were highly skewed to males, and fecundities were also reduced below long term averages in females taken for brood stock suggesting further declines in stock productivity.

8.2.2 Lower Fraser

Escapement studies are currently underway, and many populations had not reached peak spawning at the time of writing. Preliminary escapement estimates for the surveyed systems should be available by late February 2016.

A hatchery coho indicator stock is provided by Inch Creek hatchery. Adult escapement is assessed annually and marine survival and exploitation rates are calculated, these estimates are not yet available. Adult coho visual surveys are conducted for a number of systems within the lower Fraser River as part of multi-species assessments; however estimates are not yet available as the field programs will not be complete until late January or early February 2016. Early hatchery information from the Lower Fraser also indicates a decline in fecundity.

8.2.3 Strait of Georgia

Coho salmon have been in a low productivity regime since the early 1990s. Marine survivals have been less than replacement levels for several years, but have been slowly increasing since the late 2000s. Updated estimates are not yet complete. Early results indicate a large decrease in abundance this year.

Hatchery stocks

The preliminary 2015 coho escapement estimates of monitored hatcheries generally show a large decrease in abundance over the previous year. Escapements to northern Strait of Georgia stocks (Puntledge, Qualicum, and Lang) are lower than the previous year and lower than the five year average. Generally escapements are similar to the low abundance period of 1995-2007. Escapements to southern Strait of Georgia stocks are not monitored outside of Goldstream River, where results will not be available until January. Early results indicate an escapement below the five year average.

Wild stocks

In the past, both Black Creek and Myrtle Creek have served as indicators of Strait of Georgia Coho. Myrtle Creek was discontinued as an indicator in 2014.

Black Creek

The 2015 Black Creek adult project is on-going; escapement to date has been below average with water levels very low through the end of October. The majority of adult Coho moved past the fence over the course of two consecutive weekends (Oct 30-Nov 1 and Nov 7-8) that correlated with rain events. The preliminary escapement estimate (mark recapture) of 3,436 adults is a decrease from last year's estimate (4,991) and shows a regression from the relatively strong return in 2013; and a moderate decrease from the brood year 2012 (5,317). This adult return indicates a decline in marine conditions during the 2014-2015 marine residence for Strait of Georgia Coho salmon.

8.2.4 West Coast Vancouver Island

In most recent years, spawning abundances for wild WCVI coho populations are near historic levels. However, the overall production of WCVI coho is likely much lower than historic levels – i.e. less fish are caught in fisheries because low fishery impacts are maintaining spawning levels. Hatchery production has also been reduced. Data are not finalized for 2015; however preliminary results suggest a significant decline in spawning abundance (and overall WCVI coho abundance) relative to the large production observed in 2014.

8.2.5 Johnstone Strait and Mainland Inlet

The Keogh River plays an important role as the wild coho indicator stock for the upper Johnstone Strait area. Smolt production in 2014 was around 67,000, slightly above the long term average of 63,000. Preliminary indications from the resulting adult escapement in 2015 are that marine survival declined significantly relative to the steady improvements we had seen in previous years. Preliminary estimates of 650 adult coho returns in 2015 are the lowest on record since 1998. Smolt production from the Keogh in 2015 of approximately 112,000 was the highest production since the inception of the program in 1977 and well above the long term average. This strong smolt production will hopefully buffer the poor marine condition anticipated to persist through 2015 and 2016. The expectation in 2016 will be for below average returns

The marine survival indicator for Area 13 is the Quinsam River Hatchery. Consistent with the indication of poor marine conditions seen to the north, the Quinsam coho return declined compared with the very strong returns over the previous two years, and equivalent in size to the 2012 brood year in both adult and jack components with approximately 6,400 adults and 2,200 jacks returning.

Preliminary extensive escapement reports for coho in many systems are indicating moderate to low abundances, a decline from last year and slightly below average. The building trend of the past few years looks to have reverted back to average to below average escapements and indications are that poor coho returns will likely continue in 2016.

8.3 FISHERIES

8.3.1 First Nations Food Social and Ceremonial and Treaty Fisheries

B.C. Interior

FSC fisheries in the area target sockeye, chinook or pink salmon. In 2015, any coho caught as by-catch could also be retained. Directed opportunities were permitted, subject to abundance, in the following tributaries to the Thompson River: Deadman River, Dunn Creek, Fennel Creek, Raft Creek, Lemieux Creek, Louis Creek, Eagle River and Salmon River. Preliminary catch reports indicate 55 coho were retained in directed FSC fisheries in the Thompson River system. One coho was encountered and retained for FSC purposes in the Kamloops Lake chinook and pink demonstration fishery.

Lower Fraser

There were no coho directed fisheries in the Lower Fraser in 2015. Total coho retained in Lower Fraser River FSC fisheries targeting other species of salmon in 2015 was 391 and 117 coho were released. Retention of both hatchery-marked and wild coho was authorized in Lower Fraser FSC fisheries.

Strait of Georgia FSC Fisheries

Data are still being compiled on various First Nations catches in the Strait of Georgia. There were no coho reported caught in FSC fisheries at the time of this report.

WCVI FSC and Treaty Fisheries

There were FSC gill net and hook and line openings during the summer and fall season. The Maa-nulth domestic harvest was 1,067 coho. The remainder of WCVI First Nation's reported catch was 850 coho. The combined harvest was 1,917 coho.

Johnstone Strait

Data are still being compiled on various First Nations catches in the Johnstone Strait with the total preliminary catch estimated at 486 coho caught in FSC fisheries.

8.3.2 Recreational Fisheries

Tidal Recreational Fisheries

Tidal recreational fisheries can be categorized as occurring in: mixed stock areas, where multiple stocks are found concurrently in the same fishing area, and in terminal areas where local single stocks dominate the catch. Areas where mixed stocks occur typically have more restrictive management measures in place that are designed to protect Interior Fraser coho stocks. In terminal areas, opportunities are provided based on abundance forecasts. The table below outlines the areas in Southern B.C. and the general coho regulations pertaining to them.

Table 8-2: Southern B.C. coho fishery regulations in 2015.

Mixed stock fishing area	*Daily Limit (marked or unmarked)*	*Size Limit*	*Coho Season*
Johnstone Strait	2, 1 may be unmarked	30 cm.	June 1 – Dec 31
Northern Georgia Strait	2 marked	30 cm.	June 1 – Sep 10
Northern Georgia Strait	2, 1 may be unmarked	30 cm.	Sep 11 – Dec 31
Southern Georgia Strait	2 marked	30 cm.	June 1 – Sep 30

Southern Georgia Strait	2, 1 may be unmarked	30 cm.	Oct 1 – Dec 31
Juan de Fuca Strait	2 marked	30 cm.	Jun 1 – Sep 30
Juan de Fuca Strait	4, 1 may be unmarked	30 cm.	Oct 1 – Dec 31
WCVI – Inshore	4	30 cm.	June 1 – Dec 31
WCVI – Offshore	2 marked	30 cm.	June 27 – Aug 31
WCVI – Offshore	4 marked	30 cm.	Sep 1 – Sep 10
WCVI – Offshore	4	30 cm.	Sept 11 – Dec 31

* for specific management measures in specific areas refer to the information provided in the Fishery Notices.

The table below outlines coho catch and release information for recreational coho fisheries in Southern B.C. The WCVI coho fisheries use the surfline as a boundary between distinguishing coho catch in the mixed-stock fishery (offshore) and catch in the terminal area (inside the surfline).

Table 8-3: Preliminary Recreational coho kept catch and released estimates for Southern B.C. in 2015.

Area	Kept	Released
WCVI – Inshore (20W – 27)	18,091	11,932
WCVI – Offshore (21 – 127)	7,716	17,699
Strait of Georgia (13-19 May – Sep*)	7,216	27,562
Fraser River**	23	35
Juan de Fuca (19-20 Feb – Oct)	11,083	25,811
Johnstone Strait (11-12 Jun-Aug)	8,600	4,833
TOTALS	**52,729**	**87,872**

** Fraser R. data represents in-season preliminary info. to September 15, 2015 for the Fraser R. mainstem fishery only; Chilliwack and Nicomen fishery estimates are not yet available.

Non-Tidal Recreational Fisheries

Region 1: Vancouver Island Tributaries

Freshwater restrictions were in effect in most tributaries on Vancouver Island due to drought like conditions in 2015. Rivers on the southern half of Vancouver Island (Regions 1-1 to 1-6) were closed to angling on July 8 and the remaining portions of Region 1 (Regions 7-13) closed to angling August 1. Region 1 rivers were re-opened on September 11 due to improved water flows and near-normal temperatures.

Northern Vancouver Island

Typical Non-tidal openings for coho are available on:

- Cayeghle River (including the Colonial River) from April 1 to March 31 for one per day;
- Campbell/Quinsam River from October 1 to December 31 for four per day, two of which could be marked over 35 cm;

- Cluxewe River from April 1 to March 31 for two per day, hatchery marked only;
- Kokisilah River from April 1 to March 31 for one per day, maximum size limit of 35 cm;
- Nahwitti River from April 1 to March 31 for one per day; and
- Quatse River from June 15 to March 31 for two per day, hatchery marked only.

Anglers are restricted to the use of barbless hooks. The Campbell/Quinsam fishery was the only fishery of the above that was monitored by creel survey during 2015.

Strait of Georgia

During 2015 there were limited non-tidal openings throughout the Strait of Georgia:

- Qualicum River from October 16 to December 31 for four per day, two of which could be over 35 cm;
- Chemainus River from October 15 to March 31 for one per day, maximum size limit of 35 cm; and
- Nanaimo River from October 15 to March 31 for one per day, maximum size limit of 35 cm.

West Coast Vancouver Island

- Somass/Stamp River from September 11 to December 31 the daily limit was two, marked or unmarked. The Somass/Stamp Rivers were not monitored by creel survey during 2015. A single barbless hook restriction is in effect all year and there is a bait restriction in the Upper Somass and Stamp from May 1 to October 31.
- Nitinat River from October 15 to December 31 the daily limit for coho was two, marked or unmarked. The 2 week closure between October 1 and October 14 provides protection to chinook salmon during the peak spawning period. The Nitinat River was not monitored by creel survey during 2015. The area above Parker Creek is closed to fishing. A single barbless hook restriction is in effect all year and there is also a bait restriction in effect.
- Conuma River from September 11 to December 31 the daily limit was two coho, marked or unmarked. The Conuma River was not monitored by creel survey during 2015.
- Washlawlis River and Waukwass River and other West Coast Rivers are open year-round with a daily limit of one coho, marked or unmarked. Barbless hooks are required. No creel survey information is collected. Other rivers receiving some directed effort for coho stocks are the Wakeman, Artlish, Zeballos, Tahsis, Burman, Ash, Taylor, Pacheena, Toquart and Leiner. The quota for all west coast streams unless identified above is zero.

Fraser River and Tributaries

During 2015, the retention of two hatchery-marked coho per day was permitted once the majority of the Interior Fraser wild coho population had migrated through the area. The opening dates by area were as follows:

- From the CPR Bridge at Mission, B.C. upstream to the Highway #1 Bridge at Hope - October 13 to December 31.
- From the Highway #1 bridge at Hope to Sawmill Creek - October 18 to December 31.
- There are no directed coho openings in the Fraser River or tributaries upstream of Sawmill Creek.

Due to adverse environmental conditions, an in-season angling closure was implemented in most rivers/streams from July 22 to September 13, 2015. The following tributaries to the Fraser River were open during the dates stated below except during this July to September closure:

- Alouette and Coquitlam Rivers from October 1 to December 31 for one per day.
- Kanaka Creek from November 1 to November 30 for one per day.
- Chilliwack River/Vedder and the Chehalis River for four per day from July 1 to December 31.
- Harrison River for four per day from September 1 to December 31.
- Nicomen Slough, Norrish Creek and the Stave River for four per day from January 1 to December 31 with only two over 35 cm.

During 2015, there were limited non-tidal openings for hatchery-marked coho on the following systems which enter Boundary Bay:

- Little Campbell River and the Serpentine River one per day from October 1 to December 31.
- Nicomekl River one per day from September 14 to December 31.

8.3.3 Commercial

8.3.3.1 Commercial Harvest

In 2015, Southern B.C. commercial fisheries were regulated so that impacts on coho, particularly Interior Fraser coho stocks, were minimized. Retention of coho by-catch in most of these fisheries was not permitted, including the Fraser River, with the exception of a few terminal seine and gill net fisheries targeting chinook and sockeye where Interior Fraser River coho were not prevalent.

Area G troll AABM chinook fisheries were permitted to retain all coho by-catch from September 15 until December 31, 2015.

For the 2014/2015 (October 1, 2014 to September 30, 2015) AABM chinook fishing periods, the estimated total coho retained was 16,501 and releases during this period were estimated at 1,883 coho salmon. The majority of the coho harvest (10,422 pieces) occurred in October 2014.

WCVI Terminal Area Coho

In 2015, commercial gill net fisheries occurred in Alberni Inlet and Nootka Sound targeting sockeye, chum and chinook terminal returns. Retention of both hatchery and wild coho were permitted.

The total WCVI coho by-catch in commercial gill net fisheries was 278 pieces retained and 49 released.

In addition, there were targeted coho and chinook` fisheries in September in upper Alberni inlet in Subarea 23-1. These fisheries were designed to target coho and small male chinook. The fisheries were restricted to 6 and 1/4 inch mesh. The openings were 12 hours in duration overnight and they occurred Sept 10, 11, 17 and 18. The fisheries were not successful. The fleet size was small with the largest daily participation being 16 vessels. The total coho catch was 57 pieces.

The total retained coho catch in WCVI Area D gill net fisheries for both by-catch and directed fisheries was 335 pieces in 2015.

8.3.3.2 First Nation Commercial Harvest

B.C. Interior

There were no economic opportunity fisheries or First Nation commercial demonstration fisheries in the B.C. Interior (Fraser River above Sawmill Creek) targeting coho in 2015.

Lower Fraser

There were no directed coho fisheries authorized in 2015; however hatchery marked coho were authorized to be retained in both pink and chum salmon economic opportunity and demonstration fisheries, and all wild coho were to be released. In total, 526 hatchery marked coho were retained and 2,867 coho were released from all economic opportunities, demonstration and harvest agreement.

Strait of Georgia

There were no economic opportunity fisheries or First Nations' commercial demonstration fisheries in the Strait of Georgia targeting coho in 2015.

WCVI

In 2015 an agreement was reached with the First Nations for an economic opportunity fishery targeting coho (Area 23). The TAC for this fishery was 3,000 pieces. The fisheries were moderately successful. There were two gill net fisheries in September for a total catch of 1,044 pieces.

T'aaq-wiihak Salmon Demonstration Fishery

The Department authorized both an AABM and ISBM chinook salmon demonstration fishery for the T'aaq-wiihak Nations in 2015. Coho by-catch, both wild and hatchery, was permitted to be retained after September 15th in the AABM fishery and the whole season in the ISBM fishery. A total of 574 coho were retained and sold in the AABM fishery and 7 coho in the ISBM fishery.

Johnstone Strait

There were no economic opportunity fisheries or First Nation commercial demonstration fisheries in Johnstone Strait targeting coho in 2015.

8.3.4 Excess Salmon to Spawning Requirements (ESSR) Fisheries

B.C. Interior

There were ESSR no fisheries in the B.C. Interior (Fraser River above Sawmill Creek) targeting coho in 2015.

Lower Fraser

There were several ESSR fisheries in the Lower Fraser Area for First Nations. These were conducted at Capilano, Chilliwack, and Inch Creek Hatcheries for a total catch of 11,284 coho. Chehalis, Tenderfoot, and Weaver Creek Hatcheries reported no coho harvest for ESSR in 2015.

Strait of Georgia ESSR Fisheries

There was an ESSR harvest at the Big Qualicum hatchery included 2,528 coho. An ESSR fishery for chum on the Cowichan River encountered and released an estimated 250 coho salmon.

WCVI ESSR Fisheries

Two First Nations were issued a joint ESSR Licence for coho at the Robertson Creek Hatchery facility. The total catch was 2,120 coho. An ESSR Licence for Nitinat Lake and the Nitinat Hatchery was also issued, but no harvest occurred.

The total catch WCVI for the ESSR fisheries was 2,120 coho.

Johnstone Strait

There were no ESSR fisheries in Johnstone Strait targeting coho in 2015.

9 JOHNSTONE STRAIT CHUM

9.1 OBJECTIVES AND OVERVIEW

The Johnstone Strait chum fisheries primarily target chum that spawn in Johnstone Strait, Strait of Georgia, and Fraser River areas. In order to improve the management of Johnstone Strait chum fisheries and to ensure sufficient escapements, a 20% fixed exploitation rate strategy was implemented in 2002 in Johnstone Strait. Of the 20% exploitation rate, 15% is allocated to the commercial sector and the remaining 5% is set aside for test fisheries, First Nations FSC, recreational harvesters, and to provide a buffer to commercial exploitation. Since the implementation of this management strategy, annual fisheries have been planned well in advance of the chum return.

The pre-season commercial fishing plan was developed based on expectation of effort, exploitation levels by gear group, and historical run timing (peak estimated as October 9). The fishing plan was developed to achieve the commercial allocation sharing guidelines of 77% for seine, 17% for gill net and 6% for troll. Adjustments to the fishing plan are made in-season, if warranted.

As outlined in Chapter 6 of the Pacific Salmon Treaty, commercial chum fisheries in Johnstone Strait are suspended when an abundance estimate of less than 1 M chum salmon migrating through Johnstone Strait is identified. This did not occur in 2015 and all fisheries proceeded as scheduled.

In 2015, the Area B (seine) and Area D (gill net) were competitive derby fisheries, and the Area H (troll) fleet was managed using an individual transferable effort (ITE) demonstration fishery.

Chum catch and release information from all fisheries can be found in Appendix 7.

9.2 STOCK STATUS

Mixed Stocks

The main components of the Inside South Coast (ISC) chum return include both Fraser and non-Fraser stocks. These stocks are typically dominated by four year old fish which were from an average 2011 brood return that out-migrated to the ocean in 2012. It was quite apparent that other salmon species that also out-migrated in 2012 encountered improved survival conditions (i.e. pink and coho returns in 2013). One concern preseason was that the lower than average fish size of the 2011 brood would have some negative affect on the survival of the 4 year old returns in 2015. The preseason expectation for ISC chum suggested near target returns to the area but was highly uncertain.

The Johnstone Strait test fishery, which ran from September 15th through November 4th, provided timing and abundance information for the 2015 return, which is important in assessing the performance of the 20% fixed exploitation rate strategy. It also provided an index of abundance, used to determine the likelihood of the number of returning chum being over the 1.0 million critical level (requirement for commercial openings). Catch per unit effort in the test fishery was higher than what was encountered in 2010 and it was determined that the ISC index of abundance was likely above the 1.0 million critical level (Figure 9-1). As expected, the age

composition derived from the test-fishery and commercial samples was dominated by 4 year olds but the 3 year old composition was also high and grew substantially as the season progressed. Test fishery catches can be found in Appendix 11.

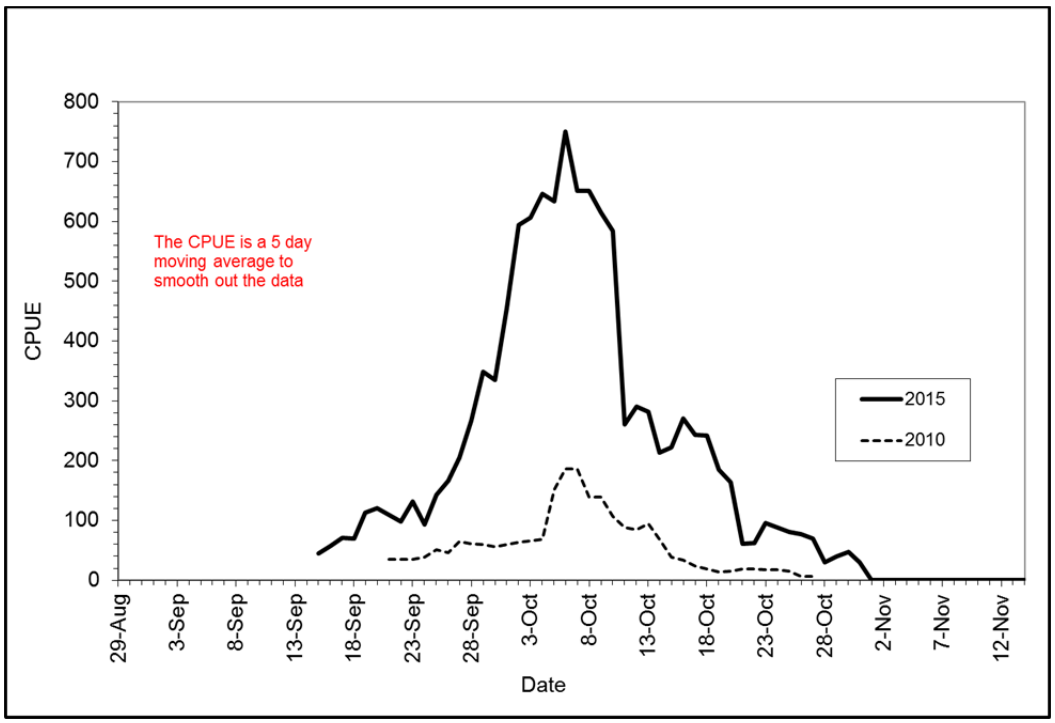


Figure 9-1. 2015 Johnstone Strait Chum Test Fishery Catch per Unit Effort (CPUE) comparison to 2010 (lowest chum return in recent years)

Preliminary information on escapements and catches to date suggest returns were average to below average in most Inner South Coast chum populations. In-season information is still being collected and analyzed regarding total stock size.

Terminal returns

Preliminary information on the status of summer run chum in the Johnstone Strait area indicated varied returns. Assessments of terminal fall chum, such as the Nimpkish, have been hampered with high river flows during October/November and little information is available at this time on the status of those stocks.

9.3 FISHERIES

9.3.1 First Nations Food Social and Ceremonial and Treaty Fisheries

First Nations fisheries for chum were not restricted. The preliminary estimated catch by First Nations in the Johnstone Strait area is 18,372 chum salmon.

9.3.2 Recreational Fisheries

Tidal Recreational Fisheries

The marine recreational daily limits for chum are four with a possession limit of eight salmon. Chum opportunities are typically opened at full limits in the Johnstone Strait area, but may be

reduced based on run-size estimates of Fraser River chum, which compose the majority of the chum caught in this area. Peak participation in the recreational chum fishery typically occurs over the Thanksgiving weekend, and activity is usually driven by abundance. The total recreational catch in Johnstone Strait area was estimated to be approximately 100 chum this season. The majority of the recreational chum salmon fishing effort and catch occurs in Area 13 which is included in the Strait of Georgia catch estimate.

Non-tidal Recreational

There are no chum retention fisheries in non-tidal waters in the Johnstone Strait area.

9.3.3 Commercial

9.3.3.1 Commercial Harvest

The commercial chum fisheries in Johnstone Strait were planned for September 28 to November 1, 2015. The total commercial chum catch from Johnstone Strait during chum directed fisheries is estimated at 492,841 pieces. Area and gear restrictions, including the mandatory use of revival tanks, were in place for commercial chum fisheries. Catch monitoring included requirements for catch reporting and mandatory logbooks.

A description of each fishery is provided below:

Area B Seine

In 2015, there were two commercial seine openings for chum salmon in portions of Areas 12 and 13. The first opening took place on October 5 for twelve hours. The second opening took place on October 19 for 11 hours. The second opening was originally scheduled for ten hours but the fishery was extended an additional one hour due to lower than expected effort in the second opening.

The chum catches for the first and second openings were estimated at 238,415 pieces and 114,087 pieces respectively; for a total catch of 352,502 chum.

Area D Gill net

In 2015, there were three commercial gill net openings for chum salmon in portions of Areas 12 and 13. Each opening was for 41 hours in duration. The first opening was from 16:00 hours on October 2 to 09:00 hours on October 4, the second opening was from 16:00 hours on October 16 to 09:00 hours on October 18, and the third opening was from 16:00 hours on October 25 to 09:00 hours on October 27. Each opening proceeded as planned pre-season.

The estimated chum catches for the three Area D gill net fisheries were 36,809 pieces, 40,639 pieces and 14,347 pieces respectively; for a total estimated catch of 91,795 chum.

Area H Troll

In 2015, the Area H troll ITE demonstration fishery was divided into two fishing periods: September 28 to October 13 (period 1) and October 15 to November 1 (period 2); with a one day closure between the two periods on October 14, and closures during the Area B seine fisheries on October 5 and 19 (except Subarea 13-3). Each licence was initially allocated three boat days during the first fishing period and two boat days during the second fishing period. Initially, boat

days could be transferred between licence holders within each fishing period, but not between fishing periods. Fishing was hampered due to severe weather on October 9th and 10th, so it was decided that a maximum of one boat day per licence could be transferred from fishing period 1 into fishing period 2.

The catch for the first fishing period was 31,337 chum, and 17,207 chum for the second fishing period, for a total catch of 48,544 chum. Total effort for the Johnstone Strait fishery was 250 boat days; 126 in period 1 and 124 in period 2. Commercial catches and allocation are outlined in Table 9-1 and 9-2.

Table 9-1: Johnstone Strait Commercial Catch and Effort By Date and Gear Type.

Gear Type	Fishery Dates	Effort[a]	Catch
B – Seine	Oct 5	85	238,415
	Oct 19	73	114,087
D - Gill net	Oct 2-Oct 4	148	36,809
	Oct 16-Oct 18	168	40,639
	Oct 25-Oct 27	112	14,347
H – Troll	Sep 28-Oct 13	126	31,337
	Oct 15-Nov 1	124	17,207

[a] Number of vessels for seine and gill net, and boat days for troll.

Table 9-2: Johnstone Strait Fisheries Catch and Allocation

Gear Type	Total Catch	% of catch	J.S. Allocation Plan
Area B	352,502	71.5%	77%
Area D	91,795	18.6%	17%
Area H	48,544	9.8%	6%
Total Catch:	**492,841**		

9.3.3.2 First Nation Commercial Harvest

There was no First Nation commercial harvest targeting chum in Johnstone Strait in 2015.

9.3.4 Excess Salmon to Spawning Requirements (ESSR) Fisheries

There are no ESSR fisheries in Johnstone Strait targeting chum in 2015.

10 FRASER RIVER CHUM

10.1 OBJECTIVES AND OVERVIEW

Chum salmon return to the Fraser River from September through December, with the typical peak of migration through the lower river occurring from mid to late-October. Spawning locations are predominately located in the Fraser Valley downstream of Hope, B.C., with major spawning aggregations occurring within the Harrison River (including Weaver Creek and Chehalis River), the Stave River, and the Chilliwack River. No spawning locations have been identified upstream of Hells Gate.

The escapement objective for Fraser River chum is 800,000. Since 2001, this objective has been achieved in all but two years. Escapements in 2009 and 2010 did not meet the escapement goal, with approximately 460,000 and 550,000 returning to spawn in those years, respectively.

General Overview of Fisheries

Fraser River chum are typically harvested in Johnstone Strait, the Strait of Georgia, U.S. waters of Area 7 and 7A, and in the Fraser River.

Within the Fraser River area, chum directed fisheries include: First Nations FSC fisheries; recreational fisheries; and commercial fisheries. In recent years, significant conservation measures have been implemented in-river during the Fraser River chum migration period, in order to protect co-migrating stocks of concern (including Interior Fraser coho and Interior Fraser steelhead). Depending on the fishery, these measures have included both time and area closures, as well as gear restrictions. These conservation measures have restricted Fraser River commercial chum fishing opportunities in recent years.

Catch data from all chum fisheries can be found in Appendix 7.

10.2 STOCK STATUS

The number of adult chum returning to the Fraser River each fall is estimated in-season with a Bayesian model based on Albion test fishing catch.

For fishery planning purposes, DFO provided a provisional in-season update on October 20 of 1.567 M chum. This estimate assumed that the peak date of the run was no later than October 21.

A subsequent estimate of Fraser River chum abundance was provided on October 22. The estimated terminal return on that date was 1.78 M (80% probability interval of 1.01 to 2.70 M), with a 50% migration date through the lower river of October 24th. This peak date is later than that observed in recent years (average peak date from 1997-2012 is October 18).

Additional in-season estimates were not provided, as subsequent test fishing information was consistent with a run size of 1.78 M.

Fraser River chum salmon return to numerous spawning locations in the lower Fraser River and its tributaries. Spawning escapement for Fraser River chum salmon is currently assessed for four of the six largest chum producing systems, as well as for a number of smaller tributaries. The largest observed escapement of Fraser River chum (greater than 3 M fish), was seen in 1998. However since 1998, Fraser Chum salmon escapement, for the annually assessed systems,

trended downward to a low in 2010. The escapement decline was halted and reversed with an estimated 1.1 M spawners reported in 2011. Spawning escapement has remained stable through 2014 (2012-2014 estimated escapement averaged 1.2 M spawners).

Current year escapement assessment programs are still ongoing, and preliminary estimates of escapement are not available. However, lower Fraser River harvest estimates and observations of spawners to-date seem consistent with the lower range of the 2015 Albion-based in-season 80% probability interval of 1.01 to 2.70 M chum salmon.

10.3 FISHERIES

10.3.1 First Nations Food Social and Ceremonial and Treaty Fisheries

FSC gill net fisheries commenced October 3 (below Mission) and October 9 (above Mission), following closures to protect co-migrating Interior Fraser River coho. The estimated catch from the FSC fisheries below Sawmill Creek was 36,273.

10.3.2 Recreational Fisheries

In 2015, some of the major Fraser River watershed recreational salmon fisheries impacting chum salmon were assessed, including significant salmon fisheries occurring in the lower Fraser River mainstem and the Chilliwack River (a tributary to the Fraser River in the lower Fraser Valley).

The lower Fraser River mainstem recreational fishery was open to the retention of chum salmon from September 5 to December 31 (with a daily limit of two). In 2015, this mainstem fishery was assessed from September 5 to September 30. Similar to 2014, this assessment was truncated in October (from 2007 through 2012, this recreational fishery was assessed to October 15 in all years, and November 30 in 2007 and 2012). Preliminary estimates of kept and released chum salmon are 55 and 17, respectively. Fraser mainstem catch estimate analysis is ongoing and complete results are not available at this time.

The Chilliwack River recreational fishery was open to the retention of chum salmon from July 1 to December 31 (with a daily limit of one). This Chilliwack River fishery was assessed from September 15 to November 15 in 2015; catch estimate analysis is ongoing and Chilliwack results are not available at this time.

The Harrison River, Stave River and Nicomen Slough recreational fisheries were open to the retention of chum salmon year round (daily limit of two). In 2015, no assessment was conducted on the Harrison River or Stave River fisheries. The Nicomen Slough fishery was assessed from October 9 to November 6; catch estimate analysis is ongoing and Nicomen results are not available at this time.

10.3.3 Commercial

10.3.3.1 Commercial Harvest

Test Fishery

The Fraser River chum test fishery at Albion operated every other day from September 1 until October 19, alternating days with the Albion chinook test fishery. From October 21 until November 12, the chum net fished every day, and then every other day from November 13 until

November 23. In 2015, the total number of chum harvested during the Albion chum test fishery was 8,603, and an additional 1,728 pieces were harvested during the the Albion chinook test fishery.

Area E

Commercial fisheries in the lower Fraser River (below Mission) remained closed during the Interior Fraser River coho window closure, and further closures were in place until later in October to meet the Interior Fraser steelhead management objective. Two Area E Gill Net commercial openings took place in the Fraser River (Area 29) during the 2015 chum season, consisting of a ten hour fishery on October 23 and a ten hour fishery on October 27, for a total estimated harvest of 125,463 chum salmon retained and 67 chum salmon released.

There were no Area E fisheries for Fraser sockeye or pink in 2015 and therefore there is no by-catch retention of chum salmon to report.

Area B

Area B seine was also provided a limited opportunity in Area 29 that took place on October 27 and 28 for a total estimated harvest of 4,513 chum salmon retained and 0 chum released.

Area B seine had a one day limited participation Fraser River pink assessment fishery in Area 29 and no by-catch retention of chum was reported.

Area H

Area H was provided an opportunity in Area 29 that took place from October 22 to October 30 with a total estimated harvest of less than 30 chum retained and 0 chum released.

10.3.3.2 First Nation Commercial Harvest

Fraser River First Nations commercial chum fisheries for gill net and beach seine were conducted between October 22 and November 7. There were 122,309 chum salmon harvested in economic opportunity, harvest agreement and First Nation commercial demonstration fisheries.

10.3.4 Excess Salmon to Spawning Requirements (ESSR) Fisheries

There were several ESSR chum fisheries in the Lower Fraser Area for First Nations. These were conducted at Chehalis, Chilliwack, and Inch Creek Hatcheries for a total chum catch of 15,666. Capilano, Tenderfoot, and Weaver Creek Hatcheries reported no chum harvest for ESSR in 2015.

11 STRAIT OF GEORGIA CHUM

11.1 OBJECTIVES AND OVERVIEW

Strait of Georgia chum fisheries consist of terminal opportunities for chum returning to their natal spawning streams. Many of the potential terminal fishing areas have enhancement facilities and/or spawning channels associated with the rivers. Terminal fishery strategies consist of monitoring and assessing stocks (escapement and returning abundance), with the objective of ensuring adequate escapement and providing harvest opportunities where possible. Stock assessments may include test fisheries, escapement enumeration and over flights. In some areas where stocks receive considerable enhancement or where stocks have above average productivity, limited fishing may occur prior to major escapement occurring.

A productivity analysis was conducted in 2014 in order to review escapement targets in the major chum systems of the Strait of Georgia. The results of this analysis have led to new interim escapement targets in Big Qualicum, Little Qualicum and Nanaimo Rivers.

11.2 STOCK STATUS

Historically, chum returns have been highly variable relative to brood year escapements. For 2015, the forecast for Jervis Inlet chum abundance was below the target level, the Cowichan was forecast to be around the target level (ranging from below to above), and the Mid-Island systems, Nanaimo River and Goldstream chum abundance, were forecast to be above the target level but highly uncertain.

Conditions for returning chum migration and spawning were marginal at the beginning of the migration period in October, but rain events in mid-October and throughout November increased water levels so that migration was unimpeded. Monitoring programs to assess spawning escapements of chum are mostly completed now and data are currently being compiled. To date, returns for the Jervis Inlet systems, Cowichan and the Mid-Island systems were below the expected range and did not reach the target escapements (Table 11-1). The Nanaimo and Goldstream chum abundances were just below the lower expected range but exceeded escapement targets (Table 11-1).

Table 11-1: Strait of Georgia Chum Preliminary Spawning Escapements

	Target Escapement Target	2015 forecast Expected range	Preliminary 2015 Escapement	% of target
Jervis Inlet	110K	50K – 75K	30K	27%
Mid-Island	240K	280K – 420K	172K	72%
Puntledge	*60K*		*37K*	*62%*
Little Qualicum	*85K (interim)*		*72K*	*85%*
Big Qualicum	*85K (interim)*		*63K*	*74%*
Nanaimo	40K *(interim)*	65K – 98K	61K	152%
Cowichan	160K	140K – 209K	120K	75%
Goldstream	15K	39K – 59K	34K	226%

11.3 FISHERIES

11.3.1 First Nations Food Social and Ceremonial and Treaty Fisheries

The preliminary estimated FSC catch by First Nations in the Strait of Georgia is estimated to be approximately 6,416 chum.

11.3.2 Recreational Fisheries

Tidal Recreational

Marine recreational chum fisheries are subject to the normal salmon daily and possession limits (limit of four per day and possession of eight), and are typically open throughout the area. The majority of the recreational effort directed at chum salmon in the Strait of Georgia occurs in the lower portions of the Discovery Passage area, particularly in the waters around Campbell River. The annual Brown's Bay chum derby which took place on the weekend of October 24-25 is usually the most active chum recreational fishery in the area. A marine accident cancelled the derby in 2015 and the chum catch during the derby was minimal.

Marine chum fisheries also occur in the approach waters of the Puntledge, Qualicum, Nanaimo and Cowichan Rivers on Vancouver Island, as well as in Howe Sound. Marine recreational catch for the Strait of Georgia was estimated from the creel survey to be 1,721 chum.

Non-tidal recreational

Chum retention fisheries in the Strait of Georgia took place in 2015 in the Cowichan, Nanaimo, Qualicum, Little Qualicum and the Puntledge Rivers on Vancouver Island. Recreational freshwater opportunities are typically based on escapement estimates from hatchery operations, and where escapement goals are expected to be met, opportunities are provided. Daily and possession limits are typically half of those provided in marine waters, with daily limits on most rivers being 2/day and 4 in possession. Catch monitoring programs did not take place in 2015 on these systems. Chum catch and effort from these freshwater fisheries is expected to be minimal.

11.3.3 Commercial

11.3.3.1 Commercial Harvest

Strait of Georgia commercial chum fisheries for troll, gill net and seine were conducted in Areas 14, 17, 18 and 19 between October 29 and November 18. The total commercial chum catch from the Strait of Georgia is estimated at 236,097 pieces (see Table 11-3 below). A description of each fishery is provided in the following table.

Chum catch and release information from all fisheries can be found in Appendix 7.

Table 11-3: Strait of Georgia Commercial Chum Catch by Date and Gear Type

Fishery Date	Gear type	Area	Effort (boat days)	Catch
Oct 29-Nov 18	GN	17	258	18,133
Nov 2-4	GN	14	203	12,812
Nov 2 and 3	TR	14	2	<10
Nov 5-Nov 18	SN	17	6	176
Nov 7	GN	18	78	22,117
Nov 11	SN	18	37	182,857

11.3.3.2 First Nations Commercial Harvest

There was no First Nation commercial harvest targeting chum in the Strait of Georgia in 2015.

11.3.4 Excess Salmon to Spawning Requirements (ESSR) Fisheries

An ESSR occurred at the Community Economic Development Program (CEDP) hatchery on the Cowichan River. The total harvested was 16,400 chum salmon.

An ESSR Licence was issued for chum, coho and chinook at the Big Qualicum River hatchery, which resulted in the harvest of 15 chum.

12 WEST VANCOUVER ISLAND CHUM

12.1 OBJECTIVES AND OVERVIEW

Commercial chum salmon fisheries normally occur on the WCVI from late September to early November in years of chum abundance. The majority of chum fishing on WCVI takes place adjacent to Nitinat Lake (Area 21), in Nootka Sound, Tlupana and Esperanza Inlets (Area 25). In some recent years there have been limited-fleet gill net fisheries in Barkley Sound (Area 23), Clayoquot Sound (Area 24), Nootka Sound and Esperanza Inlet (Area 25).

Fisheries for WCVI chum employ a two-tiered strategy for controlling removals; either a constant harvest rate strategy or a surplus-to-escapement goal strategy.

Fixed Harvest Rate Strategy (fisheries targeting natural origin stocks, hatchery stocks at low abundance):

For those fisheries where a significant component of the target stock is from naturally spawning populations, a constant harvest rate strategy of 10-20% is implemented. The maximum harvest rate is set a precautionary level relative to stock-recruit derived optimal exploitation rates for WCVI chum; which are in the order of 30-40%. This approach allows limited harvest while protecting the biodiversity of chum stocks and permitting rebuilding when the population is low. In areas of low quality data or only naturally spawning stocks, including Barkley (Area 23), Clayoquot (Area 24), Esperanza Inlet (Area 25) and Kyoquot Sound (Area 26), the maximum allowable harvest rate is 10 to 15%. In Nootka Sound, up to 20% harvest is permitted given the prevalence of hatchery stock in the area. The harvest rate is controlled by limiting effort (i.e. number and duration of openings and, in some areas, the number of permitted vessels) and limiting fishing areas to approach areas only (i.e. to those areas where fish are migrating not holding).

Note: since 2013, a fixed harvest rate strategy has also been used to harvest Nitinat Hatchery chum when the stock abundance is considered above the lower fishery reference point but below the target fishery reference point. The maximum harvest rate for the Nitinat stock is 25% when it is below the target fishery reference point.

Surplus-to-Escapement Goal Strategy (fisheries targeting hatchery stocks at high abundance):

For fisheries that target primarily hatchery surpluses, the allowable harvest rate may be determined by the escapement goal when it is determined the stock is abundant (e.g. it is established that escapement is above the target reference point for fisheries). These fisheries occur only in ‘terminal areas’, defined as an area in close proximity to the origin watershed of the target stock where little or no interception of other stocks occurs. Surplus to escapement goal fisheries for Conuma Hatchery stock occur within the Tlupana Inlet portion of Area 25. Surplus to escapement goal fisheries for Nitinat Hatchery stock occur in Area 21 near the mouth of Nitinat Lake or in Area 22 in Nitinat Lake. All Nitinat (and Conuma) hatchery chum are thermally marked, which allows for assessment of the hatchery contribution to fisheries and spawning.

12.2 STOCK STATUS

The current stock status is considered poor. Over the last three brood cycles, naturally spawning populations have been below target abundance in many years despite the precautionary harvest regime. In addition, hatchery production levels have declined in recent years partially as a result of low abundance (i.e. hatcheries have not been able to achieve brood-stock targets in some years). Therefore, in recent years, overall catches have declined relative to historic levels. There was some improvement observed for the Nitinat Hatchery stock in 2015.

12.3 FISHERIES

12.3.1 First Nations Food Social and Ceremonial and Treaty Fisheries

Somass First Nations FSC catch was 842 chum. Maa-nulth domestic harvest was reported as 3 chum. The remaining WCVI NTC First Nations harvest was 1,401 chum. The total combined catch for the WCVI First Nations was 2,246 chum.

12.3.2 Recreational Fisheries

Tidal Recreational

The WCVI recreational fishery is open year-round with a daily limit of four and possession of eight chum. Anglers are restricted to the use of barbless hooks and there is a minimum size limit of 30 cm. In both offshore and inshore areas of WCVI, recreational catch of chum is very low (estimated at less than 100 for all areas combined).

Non-tidal recreational

Chum retention fisheries took place in the Nitinat River on Vancouver Island (October 15-Dec 31). Recreational freshwater opportunities are typically based on escapement estimates from hatchery operations, and where escapement goals are expected to be met, opportunities are provided. Chum returns to the WCVI were generally low in most systems in 2015, and as a result recreational freshwater opportunities weren't available. Daily and possession limits are typically half of those provided in marine waters, with daily limits on most rivers being two per day and four in possession. Catch monitoring programs did not take place in 2015 on this river system. Chum catch and effort from this fishery is expected to be minimal.

12.3.3 Commercial

12.3.3.1 Commercial Harvest

There were two commercial fisheries on the WCVI that targeted chum in 2015: Nitnat gill net and seine, and Nootka gill net.

Nitinat

In 2015 the fishery started with a limited entry assessment fishery consisting of 20 gill net vessels. The fishery was designed to simulate a commercial style fishery and the CPUE in comparison to previous years was used to determine run size. This fishery occurred on September 28 and 29. The assessment fishery results suggested a run size larger than the pre-season forecast which allowed for full fleet fisheries for both gill net and seine. These fisheries

occurred over the next four weeks. Area B seine caught 58,580 chum and Area E gill nets caught 110,535 chum.

Nootka

A limited effort gill net chum fishery occurred in Nootka Sound in 2015. Effort was limited to a maximum of four vessels fishing two days per week. The total catch for the Area D gill nets was 1,428 chum.

12.3.3.2 First Nation Commercial Harvest

In 2015, an agreement was reached with First Nations for an economic opportunity fishery targeting chum (Area 23). The pre-season forecast was 17,000 which was below the lower reference point of 45,000 and no commercial surplus was identified in-season, therefore there was no economic opportunity fishery for chum in 2015.

In 2015 the Department authorized ISBM and AABM chinook salmon demonstration fisheries for the T'aaq-wiihak Nations that allowed the retention of chum by-catch. Less than 10 chum were sold in the T'aaq-wiihak salmon demonstration fishery and they were all from the ISBM fishery.

12.3.4 Excess Salmon to Spawning Requirements (ESSR) Fisheries

An ESSR for chum at Nitinat Lake and Nitinat hatchery occurred in 2015. The catch was 20,140 in the lake and 47,721 from brood capture. The total catch for these fisheries was 67,861 chum.

13 APPENDICES

APPENDIX 1: CATCHES IN CANADIAN TREATY LIMIT FISHERIES, 1996 TO 2015 (PRELIMINARY)

Fisheries/Stocks	Species	2015	2014	2013	2012	2011	2010	2009	2008	2007	2006	2005	2004	2003	2002	2001	2000	1999	1998	1997	1996
Stikine River (all gears)	Sockeye	60,046	42,800	36,146	30,352	55,623	50,543	48,049	33,614	59,237	101,209	85,890	84,866	58,784	17,294	25,600	27,468	38,055	43,803	65,559	74,281
	Coho	5,619	4,992	4,835	5,748	4,703	4,952	5,061	2,398	47	72	276	275	190	82	233	301	181	726	401	1,404
	Chinook-lg	4,157	3,308	3,415	4,573	2,307	1,766	2,330	7,860	10,576	15,776	18,997	3,857	1,396	1,362	1,480	3,086	2,916	2,164	4,483	2,471
	Chinook-jk	1,537	759	1,594	1,213	1,165	1,001	714	1,067	1,735	2,078	2,177	2,574	1,052	578	103	628	1,264	423	286	421
Taku River (commercial gill net)	Sockeye	19,747	17,872	21,163	30,209	24,012	20,211	11,057	19,445	16,564	21,093	21,932	19,860	32,730	31,053	47,660	28,009	20,681	19,038	24,003	41,665
	Coho	7,886	14,568	10,374	8,689	6,102	10,349	5,649	4,866	5,399	9,180	6,860	5,954	3,168	3,082	2,568	4,395	4,416	5,090	2,594	5,028
	Chinook-lg	868	2,472	738	1,909	2,333	4,658	7,031	1,184	862	7,312	7,534	2,074	1,894	1,561	1,458	1,576	908	1,107	2,731	3,331
	Chinook-jk	0	657	N/A	478	514	697	1,183	330	337	198	821	334	547	291	118	87	257	227	84	144
Alsek River (all gear)	Sockeye	1,084	1,140	508	1,786	2,110	1,716	717	0	1,340	1,327	594	2,122	2,795	2,255	1,177	745	554	585	520	1,361
	Coho	0	0	29	N/A	29	7	3	34	1	0	71	127	192	289	99	52	28	112	5	65
	Chinook	87	39	73	85	214	294	125	7	41	19	114	185	228	2,194	277	142	412	346	530	1,098
Areas 3 (1-4)* (commercial net)****	Pink	80,266	450,671	1,249,570	118,164	160,757	30,686	404,460	8,330	1,740,270	228,378	878,552	402,459	667,103	876,631	473,318	127,000	2,162,280	61,000	329,000	987,000
Area 1 (commercial troll)****	Pink	41,551	31,775	84,216	57,013	52,221	19,948	60,402	29,295	61,276	34,854	39,430	27,751	98,347	41,418	175,000	28,295	25,000	0	261,000	732,000
North Coast** (troll + sport)	Chinook	158,903	221,001	115,914	120,305	122,660	136,613	109,470	95,647	144,235	215,985	243,606	241,508	191,657	150,137	43,500	32,048	70,701	144,650	145,568	26,900
		106,703 + 52,200	172,001 + 49,000	69,264 + 46650	80,256 + 40050	74,660 + 48000	90,213 + 46400	75,470 + 34,000	52,147 + 43500	83,235 + 61000	151,485 + 64500	174,806 + 68,800	167,508 + 74,000	137,357 + 54,300	103,037 + 47,100						
West Coast Vancouver Island (troll + sport + FN)	Chinook	113,293	178,558	108,710	130,719	206,569	137,660	125,488	143,817	139,150	145,970	195,791	210,875	179,706	165,824	102,266	89,139	28,540	10,855	59,796	3677
		60,572 + 48,775 + 3,946	127,177 + 48,365 + 3,655	43,043 + 61,712 + 3955	62,573 + 61,822 + 4300	123,930 + 78,350 + 4289	79,123 + 52,698 + 5839	53,191 + 68,775 + 3381	89,704 + 50,319 + 3794	87,921 + 46,229 + 5,000	103,978 + 36,992 + 5,000	143,614 + 52,177	168,837 + 42,038	152,677 + 27,029	134,308 + 31516	78,302 + 23964	64,216 + 24923	6,906 + 21634	6,678 + 4177	53,396 + 6400	4 + 3673
Fraser River Canadian Commercial Catch	Sockeye	0	7,945,474	2,124	0	443,000	9,305,104	0	16,942	0	4,633,623	137,000	1,993,800	1,042,986	2,182,700	295,000	953,000	54,000	1,295,000	8,737,000	1,019,000
	Pink	452	0	2,855,441	0	4,751,800	0	1,442,840	0	333,300	68,325	338,000	0	1,149,189	0	579,000	0	3,000	0	3,660,000	0
Fraser River U.S. Commercial Catch	Sockeye	44,100	691,000	4,609	105,100	266,000	1,970,000	0	49,800	3,900	701,300	0	192,200	244,000	434,600	240,000	494,000	41,000	707,000	1,578,000	257,000
	Pink	334,700	0	3,057,222	0	2,893,400	0	2,726,230	0	377,600	0	0	0	773,000	0	427,000		3,000	0	1,565,000	0
West Coast Vancouver Island (commercial troll)	Coho	18,126	32,992	5,499	1,988	0	458	0	369	1,424	2,399	5,989	0	0	0	0	0	0	0	0	761,000
Johnstone Strait (commercial catch)***	Chum	492,841	318,984	597,003	391,324	751,560	62,510	510,708	298,931	494,944	800,363	787,226	1,089,100	1,026,029	700,000	236,000	161,000	41,411	1,820,000	104,593	101,971

*AREA 5-11 CATCHES INCLUDED PRIOR TO 1995 AND EXCLUDED FROM 1995-1998 INCLUSIVE. NOT PART OF 1999 ANNEX IV PROVISIONS.

** NORTH COAST CATCH EXCLUDES TERMINAL EXCLUSION CATCHES OF 6,000 ('91), 6,100 ('92), 7,400 ('93), 6,400 ('94), 1,702 ('95), 16,000 ('96), 5,943 ('97), and 2,182 in 1998. NO TERMINAL EXCLUSION IN THE 1999 AGREEMENT - COVERED UNDER THE AABM ARRANGEMENT; CENTRAL COAST AREAS NOT PART OF 1999 ANNEX IV PROVISIONS.

*** CANADIAN CATCH INCLUDES COMMERCIAL, FSC AND TEST-FISH CATCHES IN AREAS 11-13 FOR 1991-94 INCLUSIVE, AND IN AREAS 12-13 FOR 1995 TO 2004 INCLUSIVE. 2002-PRESENT, CATCHES FROM FISHERIES MANAGED TO FIXED HARVEST RATE OF 20%.

****ALL PINK CATCHES FOR ALL YEARS (1995-2012) IN AREAS 3(1-4) AND AREA 1 HAVE BEEN UPDATED TO REFLECT FINAL ESTIMATES.

NOTE 1: WCVI CHINOOK CATCHES FROM 1995-1998 ARE REPORTED BY CALENDAR YEAR; CATCHES FROM 2008-1999 ARE REPORTED BY CHINOOK YEAR (OCT-SEPT)

NOTE 2: 1999 CATCHES ARE REPORTED ACCORDING TO FISHERIES/STOCKS UNDER THE 1999 ANNEX IV PROVISIONS.

APPENDIX 2: PRELIMINARY 2015 SOUTH COAST AABM CHINOOK CATCH BY FISHERY AND AREA

AABM Chinook

PST Regime	Fishery	Month	Numbers	
			Kept	Released
WCVI-AABM Commercial	Area G Troll *	Oct-14	213	92
		Nov-14	56	34
		Dec-14	0	0
		Jan-15	186	33
		Feb-15	612	187
		Mar-15	731	132
		Apr-15	3,841	232
		May-15	27,405	1,159
		Jun-15		
		Jul-15		
		Aug-15	13,953	156
		Sep-15	7,341	412
First Nations Commercial Harvest	T'aaq-wiihak	May - Sep	6,234	996
Total			**60,572**	**3,433**
Recreational	Sport	WCVI - Inshore (20W-27)	7,215	4,051
	Sport	WCVI - Offshore (121-127)	41,560	24,279
Total			**48,775**	**28,330**
First Nations FSC and Treaty	Johnstone Strait		0	0
	Strait of Georgia		0	0
	WCVI Offshore		3,946	0
	WCVI Inshore		0	0
	Fraser River		0	0
Total			**3,946**	**0**
All Total			**113,293**	**31,763**

APPENDIX 3: PRELIMINARY 2015 SOUTH COAST ISBM CHINOOK CATCH BY FISHERY AND AREA

ISBM CHINOOK				
			Numbers	
Fishery	Gear	Fishery (Area)	Kept	Released
Commercial	Area G Troll	WCVI Chinook	0	0
	Area H Troll	Fraser Sockeye (12,13)	0	0
	Area H Troll	Fraser Sockeye (29)	0	0
	Area H Troll	Fraser Pink (12, 13, 29)	0	0
	Area H Troll	JST Chum (12,13)	0	19
	Area H Troll	Fraser Chum (29)	0	0
	Area H Troll	MVI Chum (14)	0	0
	Area B Seine	Barkley Sockeye (23)	0	148
	Area B Seine	Fraser Sockeye (12,13)	0	0
	Area B Seine	Fraser Sockeye (16)	0	0
	Area B Seine	Fraser Sockeye (29)	0	0
	Area B Seine	Mainland Pink (12, 13, 16)	0	7
	Area B Seine	Howe Sound Pink (28)	0	17
	Area B Seine	Fraser Pink (12, 13, 29)	0	21
	Area B Seine	Nitinat Chum (21, 121)	0	0
	Area B Seine	JST Chum (12,13)	4	38
	Area B Seine	Fraser Chum (29)	0	0
	Area B Seine	MVI Chum (14-19)	0	2
	Area D Gillnet	Barkley Sockeye (23)	0	0
	Area D Gillnet	Barkley Chum (23)	0	0
	Area D Gillnet	Somass Chinook (23)	438	9
	Area D Gillnet	Clayoquot Chum (24)	0	0
	Area D Gillnet	Tlupana Chinook (25)	9,615	1
	Area D Gillnet	Nootka Chum (25)	0	0
	Area D Gillnet	Fraser Sockeye (11,12,13,14)	0	0
	Area D Gillnet	JST Chum (12,13)	0	22
	Area D Gillnet	MVI Chum (14)	0	0
	Area E Gillnet	Fraser Sockeye (29)	0	0
	Area E Gillnet	Fraser Chum (29)	104	129
	Area E Gillnet	Nitinat Chum (21, 121)	0	5
	Area E Gillnet	MVI (Area 17-19)	0	2
Commercial Harvest Total			**10,161**	**420**
First Nations Commercial	T'aaq-wiihak HA	WCVI ISBM Chinook (25)	1,032	0
	T'aaq-wiihak HA	WCVI AABM Chinook (24-26, 124-126)	0	0
	Maa-nulth HA	Henderson Sockeye (23)	0	0
	Harvest Agreement	Fraser River	0	0
	EO	Johnstone Strait	0	0
	EO	Strait of Georgia	0	0
	EO	WCVI	6,692	0
	EO	Fraser River	22	606
	Demo	Johnstone Strait	0	0
	Demo	Strait of Georgia	0	0
	Demo	WCVI	0	0
	Demo	Fraser River	2,493	875
First Nations Commercial Total			**10,239**	**1,481**
Total Combined Commercial Catch			**20,400**	**1,901**
Recreational	Sport	Juan de Fuca (19,20)	30,558	20,913
	Sport	Strait of Georgia (13-19,28,29)	51,483	36,655
	Sport	Johnstone Strait (11-12)	12,127	9,138
	Sport	WCVI - Inshore (20W-27)	31,753	14,877
	Sport	Fraser River	13,186	1,702
Total Recreational Catch			**139,107**	**83,285**
First Nations FSC and Treaty		Johnstone Strait	261	4
		Strait of Georgia	4	0
		WCVI	2,019	0
		Fraser River	23,712	163
Total First Nations FSC Catch			**25,996**	**167**
ESSR		Johnstone Strait	0	0
		Strait of Georgia*	1,209	0
		WCVI	31,581	0
		Fraser River	8,752	0
Total First Nations ESSR Catch			**41,542**	**0**
TOTAL - ALL FISHERIES			**227,045**	**85,353**

APPENDIX 4: PRELIMINARY 2015 SOUTH COAST SOCKEYE CATCH BY FISHERY AND AREA

SOCKEYE*

Fishery	Gear	Fishery (Area)	Numbers			
			Non-Fraser Kept	Unknown Origin	Fraser Kept	All Stocks Released
Commercial	Area G Troll	WCVI AABM Chinook (23-27, 123-127)	0	0	0	2
	Area H Troll	Fraser Sockeye (12,13)	0	0	0	0
	Area H Troll	Fraser Sockeye (29)	0	0	0	0
	Area H Troll	Fraser Pink (12, 13, 29)	0	0	0	0
	Area H Troll	JST Chum (12,13)	0	0	0	8
	Area H Troll	Fraser Chum (29)	0	0	0	0
	Area H Troll	MVI Chum (14)	0	0	0	0
	Area B Seine	Barkley Sockeye (23)	536,003	0	0	4,744
	Area B Seine	Fraser Sockeye (12,13)	0	0	0	0
	Area B Seine	Fraser Sockeye (16)	0	0	0	0
	Area B Seine	Fraser Sockeye (29)	0	0	0	0
	Area B Seine	Mainland Pink (12, 13,16)	0	0	0	11
	Area B Seine	Howe Sound (28)	0	0	0	1
	Area B Seine	Fraser Pink (12, 13, 29)	0	0	0	0
	Area B Seine	Nitinat Chum (21, 121)	0	0	0	0
	Area B Seine	JST Chum (12,13)	0	10	0	23
	Area B Seine	Fraser Chum (29)	0	0	0	0
	Area B Seine	MVI Chum (14-19)	0	0	0	0
	Area D Gillnet	Barkley Sockeye (23)	329,381	0	0	42
	Area D Gillnet	Barkley Chum (23)	0	0	0	0
	Area D Gillnet	Somass Chinook (23)	124	0	0	2
	Area D Gillnet	Clayoquot Chum (24)	0	0	0	0
	Area D Gillnet	Tlupana Chinook (25)	0	0	0	0
	Area D Gillnet	Nootka Chum (25)	0	0	0	0
	Area D Gillnet	Fraser Sockeye (11,12,13,14)	0	0	0	0
	Area D Gillnet	JST Chum (12,13)	0	1	0	2
	Area D Gillnet	MVI Chum (14)	0	0	0	0
	Area E Gillnet	Fraser Sockeye (29)	0	0	0	0
	Area E Gillnet	Fraser Chum (29)	0	0	0	4
	Area E Gillnet	Nitinat Chum (21, 121)	0	0	0	0
	Area E Gillnet	MVI Chum (Area 17-19)	0	0	0	0
Commercial Harvest Total			**865,508**	**11**	**0**	**4,839**
First Nations Commercial	T'aaq-wiihak HA	WCVI ISBM Chinook (25)	0	0	0	0
	T'aaq-wiihak HA	WCVI AABM Chinook (24-26, 124-126)	0	0	0	3
	Maa-nulth HA	Henderson Sockeye (23)	0	0	0	0
	Harvest Agreement	Fraser River	0	0	0	0
	EO	Johnstone Strait	0	0	0	0
	EO	Strait of Georgia	0	0	0	0
	EO	WCVI	309,531	0	0	0
	EO	Fraser River	0	0	6	299
	Demo	Johnstone Strait	0	0	0	0
	Demo	Strait of Georgia	0	0	0	0
	Demo	WCVI	0	0	0	0
	Demo	Fraser River	0	0	2	552
First Nations Commercial Total			**309,531**	**0**	**8**	**854**
Total Combined Commercial Catch			**1,175,039**	**11**	**8**	**5,693**
Recreational	Sport	Juan de Fuca (19,20)	0	212*	0	1,323
	Sport	Strait of Georgia (13-19,28,29)	0	84*	0	2,991
	Sport	Johnstone Strait (11-12)	0	14*	0	100
	Sport	WCVI - Inshore (20W-27)	88,232	0	0	646
	Sport	WCVI - Offshore (121-127)	0	225	0	63
	Sport	Fraser River	0	0	37	4,169
Total Recreational Catch			**88,232**	**225**	**37**	**9,292**
First Nations FSC and Treaty		Johnstone Strait	1,632	0	39,847	0
		Strait of Georgia	0	0	0	0
		WCVI	39,390	0	4	0
		Fraser River	0	0	143,248	5,494
Total First Nations FSC and Treaty Catch			**41,022**	**0**	**183,099**	**5,494**
ESSR		Johnstone Strait	0	0	0	0
		Strait of Georgia	0	0	0	0
		WCVI	793	0	0	0
		Fraser River	0	0	0	0
ESSR Catch			**793**	**0**	**0**	**0**
TOTAL - ALL FISHERIES			**1,305,086**	**236**	**183,144**	**20,479**

***Fraser/Non-Fraser stock compositions are not final**

APPENDIX 5: PRELIMINARY 2015 SOUTH COAST PINK CATCH BY FISHERY AND AREA

PINK

Fishery	Gear	Fishery (Area)	Numbers	
			Kept	Released
Commercial	Area G Troll	WCVI AABM Chinook (23 - 27, 123 - 127)	25	46
	Area H Troll	Fraser Sockeye (12,13)	0	0
	Area H Troll	Fraser Sockeye (29)	0	0
	Area H Troll	Fraser Pink (12, 13, 29)	0	0
	Area H Troll	JST Chum (12,13)	24	12
	Area H Troll	Fraser Chum (29)	0	0
	Area H Troll	MVI Chum (14)	0	0
	Area B Seine	Barkley Sockeye (23)	1	9
	Area B Seine	Fraser Sockeye (12,13)	0	0
	Area B Seine	Fraser Sockeye (16)	0	0
	Area B Seine	Fraser Sockeye (29)	0	0
	Area B Seine	Mainland Pink (12, 16)	95,198	0
	Area B Seine	Howe Sound Pink (28)	136,964	0
	Area B Seine	Fraser Pink (12, 13, 29)	0	27
	Area B Seine	Nitinat Chum (21, 121)	0	0
	Area B Seine	JST Chum (12,13)	145	4
	Area B Seine	Fraser Chum (29)	0	0
	Area B Seine	MVI Chum (14-19)	0	0
	Area D Gillnet	Barkley Sockeye (23)	174	41
	Area D Gillnet	Barkley Chum (23)	0	0
	Area D Gillnet	Somass Chinook (23)	0	0
	Area D Gillnet	Clayoquot Chum (24)	0	0
	Area D Gillnet	Tlupana Chinook (25)	0	0
	Area D Gillnet	Nootka Chum (25)	0	0
	Area D Gillnet	Fraser Sockeye (11,12,13,14)	0	0
	Area D Gillnet	JST Chum (12,13)	114	4
	Area D Gillnet	MVI Chum (14)	0	0
	Area E Gillnet	Fraser Sockeye (29)	0	0
	Area E Gillnet	Fraser Chum (29)	2	4
	Area E Gillnet	Nitinat Chum (21, 121)	2	0
	Area E Gillnet	MVI Chum (Area 17-19)	0	0
Commercial Harvest Total			**232,649**	**147**
First Nation Commercial	T'aaq-wiihak	WCVI ISBM Chinook (25)	0	0
	T'aaq-wiihak	WCVI AABM Chinook (24 - 26, 124 - 126)	0	877
	Maa-nulth HA	WCVI	0	0
	Harvest Agreement	Fraser River	0	0
	EO	Johnstone Strait	0	0
	EO	Strait of Georgia	0	0
	EO	WCVI	0	0
	EO	Fraser River	452	31
	Demo	Johnstone Strait	0	0
	Demo	Strait of Georgia	0	0
	Demo	WCVI	0	0
	Demo	Fraser River	38,973	64
Total First Nations EO Catch			**39,425**	**972**
Total Commercial Catch			**272,074**	**1,119**
Recreational	Sport	Juan de Fuca (19,20)	58,104	63,845
	Sport	Strait of Georgia (13-19,28,29)	28,155	17,832
	Sport	Johnstone Strait (11-12)	6,606	7,185
	Sport	WCVI - Inshore (20W-27)	3,551	8,998
	Sport	WCVI - Offshore (121-127)	2,533	9,203
	Sport	Fraser River	12,266	19,746
Total Recreational Catch			**111,215**	**126,809**
First Nations FSC and Treaty		Johnstone Strait	15,285	4,893
		Strait of Georgia	512	0
		WCVI	5	0
		Fraser River	25,585	7,461
Total First Nations FSC Catch			**41,387**	**12,354**
ESSR		Johnstone Strait	153,915	0
		Strait of Georgia	38,536	0
		WCVI	0	0
		Fraser River	0	0
Total First Nations ESSR Catch			**192,451**	**0**
TOTAL - ALL FISHERIES			**617,127**	**140,282**

APPENDIX 6: PRELIMINARY 2015 SOUTH COAST COHO CATCH BY FISHERY AND AREA

COHO

Fishery	Gear	Fishery (Area)	Numbers Kept	Numbers Released
Commercial	Area G Troll*	WCVI AABM Chinook (23 - 27, 123 - 127)	16,501	1,883
	Area H Troll	Fraser Sockeye (12,13)	0	0
	Area H Troll	Fraser Sockeye (29)	0	0
	Area H Troll	Fraser Pink (12, 13, 29)	0	0
	Area H Troll	JST Chum (12,13)	0	599
	Area H Troll	Fraser Chum (29)	0	0
	Area H Troll	MVI Chum (14)	0	0
	Area B Seine	Barkley Sockeye (23)	0	36
	Area B Seine	Fraser Sockeye (12,13)	0	0
	Area B Seine	Fraser Sockeye (16)	0	0
	Area B Seine	Fraser Sockeye (29)	0	0
	Area B Seine	Mainland Pink (12, 16)	0	63
	Area B Seine	Howe Sound Pink (28)	0	1
	Area B Seine	Fraser Pink (29)	0	5
	Area B Seine	Nitinat Chum (21, 121)	0	83
	Area B Seine	JST Chum (12,13)	576	2,160
	Area B Seine	Fraser Chum (29)	0	51
	Area B Seine	MVI Chum (14-19)	0	43
	Area D Gillnet	Barkley Sockeye (23)	266	49
	Area D Gillnet	Barkley Chum (23)	0	0
	Area D Gillnet	Somass Chinook (23)	57	0
	Area D Gillnet	Clayoquot Chum (24)	0	0
	Area D Gillnet	Tlupana Chinook (25)	0	0
	Area D Gillnet	Nootka Chum (25)	12	0
	Area D Gillnet	Fraser Sockeye (11,12,13,14)	0	0
	Area D Gillnet	JST Chum (12,13)	7	1,469
	Area D Gillnet	MVI Chum (14)	0	10
	Area E Gillnet	Fraser Sockeye (29)	0	0
	Area E Gillnet	Fraser Chum (29)	4	730
	Area E Gillnet	Nitinat Chum (21, 121)	0	74
	Area E Gillnet	MVI Chum (Area 17-19)	0	47
Commercial Harvest Total			**17,423**	**7,303**
First Nations Commercial	T'aaq-wiihak	WCVI ISBM Chinook (25)	7	0
	T'aaq-wiihak	WCVI AABM Chinook (24 - 26, 124 - 126)	574	1,728
	Maa-nulth HA	Henderson Sockeye (23)	0	0
	Harvest Agreement	Fraser River	0	11
	EO	Johnstone Strait	0	0
	EO	Strait of Georgia	0	0
	EO	WCVI	1,044	0
	EO	Fraser River	440	2,291
	Demo	Johnstone Strait	0	0
	Demo	Strait of Georgia	0	0
	Demo	WCVI	0	0
	Demo	Fraser River	86	565
Total First Nations EO Catch			**2,151**	**4,595**
Total Commercial Catch			**19,574**	**11,898**
Recreational	Sport	Juan de Fuca (19,20)	11,083	25,811
	Sport	Strait of Georgia (13-19,28,29)	7,216	27,562
	Sport	Johnstone Strait (11-12)	8,600	4,833
	Sport	WCVI - Inshore (20W-27)	18,091	11,932
	Sport	WCVI - Offshore (121-127)	7,716	17,699
	Sport	Fraser River	23	35
Total Recreational Catch			**52,729**	**87,872**
First Nations FSC and Treaty		Johnstone Strait	486	0
		Strait of Georgia	0	0
		WCVI	1,917	0
		Fraser River	447	118
Total First Nations FSC Catch			**2,850**	**118**
ESSR		Johnstone Strait	0	0
		Strait of Georgia	2,528	250
		WCVI	2,120	0
		Fraser River	11,284	0
Total First Nations ESSR Catch			**15,932**	**250**
TOTAL - ALL FISHERIES			**91,085**	**100,138**

*Area G coho harvest estimate is based on the chinook year (Oct 1, 2014 to Sept 30, 2015). Total coho retained includes 10,422 from 2014 with the remainder in 2015 fisheries.

APPENDIX 7: PRELIMINARY 2015 SOUTH COAST CHUM CATCH BY FISHERY AND AREA

Chum

Fishery	Gear	Fishery (Area)	Numbers	
			Kept	Released
Commercial	Area G Troll	WCVI AABM Chinook (23 - 27, 123 - 127)	996	25
	Area H Troll	Fraser Sockeye (12,13)	0	0
	Area H Troll	Fraser Sockeye (29)	0	0
	Area H Troll	Fraser Pink (12, 13, 29)	0	0
	Area H Troll	JST Chum (12,13)	48,544	0
	Area H Troll	Fraser Chum (29)	26	0
	Area H Troll	MVI Chum (14)	2	0
	Area B Seine	Barkley Sockeye (23)	0	0
	Area B Seine	Fraser Sockeye (12,13)	0	0
	Area B Seine	Fraser Sockeye (16)	0	0
	Area B Seine	Fraser Sockeye (29)	0	0
	Area B Seine	Mainland Pink (12,16)	0	14
	Area B Seine	Howe Sound Pink (28)	0	0
	Area B Seine	Fraser Pink (29)	0	0
	Area B Seine	Nitinat Chum (21, 121)	58,580	1
	Area B Seine	JST Chum (12,13)	352,502	0
	Area B Seine	Fraser Chum (29)	4,513	0
	Area B Seine	MVI Chum (14-19)	183,033	0
	Area D Gillnet	Barkley Sockeye (23)	10	2
	Area D Gillnet	Barkley Chum (23)	0	0
	Area D Gillnet	Somass Chinook (23)	0	3
	Area D Gillnet	Clayoquot Chum (24)	0	0
	Area D Gillnet	Tlupana Chinook (25)	18	0
	Area D Gillnet	Nootka Chum (25)	1,428	0
	Area D Gillnet	Fraser Sockeye (11,12,13,14)	0	0
	Area D Gillnet	JST Chum (12,13)	91,795	21
	Area D Gillnet	MVI Chum (14)	12,812	9
	Area E Gillnet	Fraser Sockeye (29)	0	0
	Area E Gillnet	Fraser Chum (29)	125,463	67
	Area E Gillnet	Nitinat Chum (21, 121)	110,535	0
	Area E Gillnet	MVI Chum (Area 17-19)	40,250	0
Commercial Harvest Total			**1,030,507**	**142**
First Nations Commercial	T'aaq-wiihak	WCVI ISBM Chinook (25)	6	0
	T'aaq-wiihak	WCVI AABM Chinook (24 - 26, 124 - 126)	0	1
	Maa-nulth HA	Henderson Sockeye (23)	0	0
	Harvest Agreement	Fraser River	7,792	0
	EO	Johnstone Strait	0	0
	EO	Strait of Georgia	0	0
	EO	WCVI	0	0
	EO	Fraser River	100,441	14
	Demo	Johnstone Strait	0	0
	Demo	Strait of Georgia	0	0
	Demo	WCVI	0	0
	Demo	Fraser River	14,076	586
Total First Nations EO Catch			**122,315**	**601**
Total Commercial Catch			**1,152,822**	**743**
Recreational	Sport	Juan de Fuca (19,20)	162	6
	Sport	Strait of Georgia (13-19,28,29)	1,721	50
	Sport	Johnstone Strait (11-12)	59	31
	Sport	WCVI - Inshore (20W-27)	30	0
	Sport	WCVI - Offshore (121-127)	49	7
	Sport	Fraser River	55	17
Total Recreational Catch			**2,076**	**111**
First Nations FSC and Treaty		Johnstone Strait	18,372	3
		Strait of Georgia	6,416	0
		WCVI	2,246	0
		Fraser River	36,273	59
Total First Nations FSC Catch			**63,307**	**62**
First Nations ESSR		Johnstone Strait	0	0
		Strait of Georgia	16,415	0
		WCVI	67,861	0
		Fraser River	15,666	0
Total First Nations ESSR Catch			**99,942**	**0**
TOTAL - ALL FISHERIES			**1,318,147**	**916**

APPENDIX 8: PRELIMINARY 2015 SOUTHERN B.C. COMMERCIAL CATCH TOTALS BY GEAR AND AREA

Commercial total, all species

License Group	Fishing Area	Adult Sockeye Kept	Sockeye Released	Coho Kept	Coho Released	Pink Kept	Pink Released	Chum Kept	Chum Released	Chinook Kept	Chinook Released
Area G Troll*	WCVI AABM Chinook (23-27,123-127)	0	2	16,501	1,883	25	46	996	25	54,338	3,433
Area H Troll	Fraser Sockeye (12,13)	0	0	0	0	0	0	0	0	0	0
Area H Troll	Fraser Sockeye (29)	0	0	0	0	0	0	0	0	0	0
Area H Troll	Fraser Sockeye (12, 13, 29)	0	0	0	0	0	0	0	0	0	0
Area H Troll	JST Chum (12,13)	0	8	0	599	24	12	48,544	0	0	19
Area H Troll	Fraser Chum (29)	0	0	0	0	0	0	26	0	0	0
Area H Troll	MVI Chum (14)	0	0	0	0	0	0	2	0	0	0
Area B Seine	Barkley Sockeye (23)	536,003	4,744	0	36	1	9	0	0	0	148
Area B Seine	Fraser Sockeye (12,13)	0	0	0	0	0	0	0	0	0	0
Area B Seine	Fraser Sockeye (16)	0	0	0	0	0	0	0	0	0	0
Area B Seine	Fraser Sockeye (29)	0	0	0	0	0	0	0	0	0	0
Area B Seine	Mainland Pinks (12, 13, 16)	0	11	0	63	95,198	0	0	14	0	7
Area B Seine	Howe Sound Pink (28)	0	1	0	1	136,964	0	0	0	0	17
Area B Seine	Fraser Pink (29)	0	0	0	5	0	27	0	0	0	21
Area B Seine	Nitinat Chum (21, 121)	0	0	0	83	0	0	58,580	1	0	0
Area B Seine	JST Chum (12,13)	10	23	576	2,160	145	4	352,502	0	4	38
Area B Seine	Fraser Chum (29)	0	0	0	51	0	0	4,513	0	0	0
Area B Seine	MVI Chum (14-19)	0	0	0	43	0	0	183,033	0	0	2
Area D Gillnet	Barkley Sockeye (23)	329,381	42	266	49	174	41	10	2	0	0
Area D Gillnet	Barkley Chum (23)	0	0	0	0	0	0	0	0	0	0
Area D Gillnet	Somass Chinook (23)	124	2	57	0	0	0	0	3	438	9
Area D Gillnet	Clayoquot Chum (24)	0	0	0	0	0	0	0	0	0	0
Area D Gillnet	Tlupana Chinook (25)	0	0	0	0	0	0	18	0	9,615	1
Area D Gillnet	Nootka Chum (25)	0	0	12	0	0	0	1,428	0	0	0
Area D Gillnet	Fraser Sockeye (11,12,13,14)	0	0	0	0	0	0	0	0	0	0
Area D Gillnet	JST Chum (12,13)	1	2	7	1,469	114	4	91,795	21	0	22
Area D Gillnet	MVI Chum (14)	0	0	0	10	0	0	12,812	9	0	0
Area E Gillnet	Fraser Sockeye (29)	0	0	0	0	0	0	0	0	0	0
Area E Gillnet	Fraser Chum (29)	0	4	4	730	2	4	125,463	67	104	129
Area E Gillnet	Nitinat Chum (21, 121)	0	0	0	74	2	0	110,535	0	0	5
Area E Gillnet	MVI Chum (Area 14-19)	0	0	0	47	0	0	40,250	0	0	2
T'aaq-wiihak Demo	WCVI AABM Chinook (24-26,124-126)	0	3	574	1,728	0	877	0	1	6,234	996
T'aaq-wiihak Demo	WCVI ISBM Chinook (25)	0	0	7	0	0	0	6	0	1,032	0
Maa-nulth HA	Henderson Sockeye (23)	0	0	0	0	0	0	0	0	0	0
Harvest Agreement	Fraser	0	0	0	11	0	0	7,792	0	0	0
EO	Johnstone Strait	0	0	0	0	0	0	0	0	0	0
EO	Strait of Georgia	0	0	0	0	0	0	0	0	0	0
EO	WCVI	309,531	0	1,044	0	0	0	0	0	6,692	0
EO	Fraser River	6	299	440	2,291	452	31	100,441	14	22	606
Demo	Johnstone Strait	0	0	0	0	0	0	0	0	0	0
Demo	Strait of Georgia	0	0	0	0	0	0	0	0	0	0
Demo	WCVI	0	0	0	0	0	0	0	0	0	0
Demo	Fraser River	2	552	86	565	38,973	64	14,076	586	2,493	875
TOTALS		**1,175,058**	**5,693**	**19,574**	**11,898**	**272,074**	**1,119**	**1,152,822**	**743**	**80,972**	**6,330**

*Area G coho harvest estimate is based on the chinook year (Oct 1, 2014 to Sept 30, 2015). Total coho retained includes 10,422 from 2014 with the remainder in 2015 fisheries.

APPENDIX 9: PRELIMINARY 2015 SOUTHERN B.C. RECREATIONAL CATCH TOTALS BY AREA

Fishing Area	Sockeye Kept	Sockeye Released	Coho Kept	Coho Released	Pink Kept	Pink Released	Chum Kept	Chum Released	Chinook ISBM Kept	Chinook ISBM Released	Chinook AABM Kept	Chinook AABM Released
Juan de Fuca (19,20)	212	1,323	11,083	25,811	58,104	63,845	162	6	30,558	20,913	-	-
Strait of Georgia (13-19,28,29)	84	2,991	7,216	27,562	28,155	17,832	1,721	50	51,483	36,655	-	-
Johnstone Strait (11-12)	14	100	8,600	4,833	6,606	7,185	59	31	12,127	9,138	-	-
WCVI - Inshore (20W-27)	88,232	646	18,091	11,932	3,551	8,998	30	-	31,753	14,877	7,215	4,051
WCVI - Offshore (121-127)	225	63	7,716	17,699	2,533	9,203	49	7	-	-	41,560	24,279
Fraser River	37	4,169	23	35	12,266	19,746	55	17	13,186	1,702	-	-
TOTAL	**88,804**	**9,292**	**52,729**	**87,872**	**111,215**	**126,809**	**2,076**	**111**	**139,107**	**83,285**	**48,775**	**28,330**

All totals are preliminary.
SOG includes a portion of Area 19 (19 GS).
JDF includes a portion of 19 and a portion of Area 20 (20 JDF).
WCVI Inshore contains a portion of 20W (West of Sherringham)
- estimates not yet available for some lower Fraser River recreational fisheries

APPENDIX 10: PRELIMINARY 2015 SOUTHERN B.C. FIRST NATIONS (FSC AND TREATY) AND ESSR CATCH ESTIMATES BY AREA

Fishery type	Fishing Area	Sockeye Kept	Sockeye Released	Coho Kept	Coho Released	Pink Kept	Pink Released	Chum Kept	Chum Released	Chinook ISBM Kept	Chinook ISBM Released	Chinook AABM Kept	Chinook AABM Released
First Nations FSC and Treaty	Johnstone Strait	41,479	0	486	0	15,285	4,893	18,372	3	261	4	0	0
	Strait of Georgia	0	0	0	0	512	0	6,416	0	4	0	0	0
	WCVI	39,394	0	1,917	0	5	0	2,246	0	2,019	0	3,946	0
	Fraser River	143,248	5,494	447	118	25,585	7,461	36,273	59	23,712	163	0	0
TOTAL		**224,121**	**5,494**	**2,850**	**118**	**41,387**	**12,354**	**63,307**	**62**	**25,996**	**167**	**3,946**	**0**

Fishery type	Fishing Area	Sockeye Kept	Sockeye Released	Coho Kept	Coho Released	Pink Kept	Pink Released	Chum Kept	Chum Released	Chinook ISBM Kept	Chinook ISBM Released	Chinook AABM Kept	Chinook AABM Released
ESSR	Johnstone Strait	0	0	0	0	153,915	0	0	0	0	0	0	0
	Strait of Georgia	0	0	2,528	250	38,536	0	16,415	0	1,209	0	0	0
	WCVI	793	0	2,120	0	0	0	67,861	0	31,581	0	0	0
	Fraser River	0	0	11,284	0	0	0	15,666	0	8,752	0	0	0
TOTAL		**793**	**0**	**15,932**	**250**	**192,451**	**0**	**99,942**	**0**	**41,542**	**0**	**0**	**0**

APPENDIX 11: PRELIMINARY 2015 SOUTH COAST TEST FISHERY CATCHES

Test-Fisheries	Start Date	End Date	Boat Days	Sockeye kept	Sockeye released	Coho kept	Coho released	Pink kept	Pink released	Chum kept	Chum released	Chinook kept	Chinook released	GRAND TOTAL
Albion Chinook Gillnet				438	72	5	0	30	0	1,728	0	2,052	0	**4,325**
Albion Chum Gillnet				28	11	65	0	100	0	8,603	0	606	0	**9,413**
Area 12 Chum Seine	15-Sep-15	4-Nov-15	66	187	38	40	754	802	23	42,544	41,249	0	61	**85,698**
Naka Creek Sockeye Gillnet	19-Jul-15	31-Jul-15	11	1,243	0	59	38	1,609	0	39	13	4	0	**3,005**
Area 13 Sockeye Seine	20-Jul-15	13-Sep-15	39	8,945	14,815	0	138	13,081	48,030	200	972	1	232	**86,414**
Area 23 Sockeye Seine	8-Jun-15	11-Aug-15	23	11,146	95,767	0	5	1	8	0	1	0	108	**107,036**
Blinkhorn Sockeye Seine	20-Jul-15	13-Sep-15	50	10,616	20,840	0	750	25,591	138,936	595	2,219	0	807	**200,354**
Round Island Sockeye Gillnet *	13-Jul-15	16-Aug-15	32	998	0	108	57	1,677	1	47	0	47	4	**2,939**
San Juan Sockeye Seine				8,161	685	0	2,413	47,209	38,392	0	243	9	2,178	**99,290**
San Juan Sockeye Gillnet				2,087	1	0	146	491	1	2	1	0	56	**2,785**
Whonnock Gillnet				2,042	12	12	0	1,087	15	176	1	1,425	12	**4,782**
Cottonwood Gillnet				1,517	12	0	10	349	3	15	2	179	13	**2,100**
Qualark Gillnet				1,482	8	2	0	567	70	0	0	254	304	**2,687**
Grand Total				**48,890**	**132,261**	**291**	**4,311**	**92,594**	**225,479**	**53,949**	**44,701**	**4,577**	**3,775**	**610,828**

* coho given to local First Nations

Note: Jacks included in all test fishing catches if encountered

Ocean conditions in the Northern California Current: warm water from the blob or El Niño is bad for Pacific NW salmon

Laurie Weitkamp
Northwest Fisheries Science Center
Newport Field Station
NOAA Fisheries

Today's talk

- Update on the warm blob and El Niño
- Recent physical & biological observations
- Latest NWFSC environmental indicators (stoplight table)
- Forecasts: Precipitation/temp/flow/SST

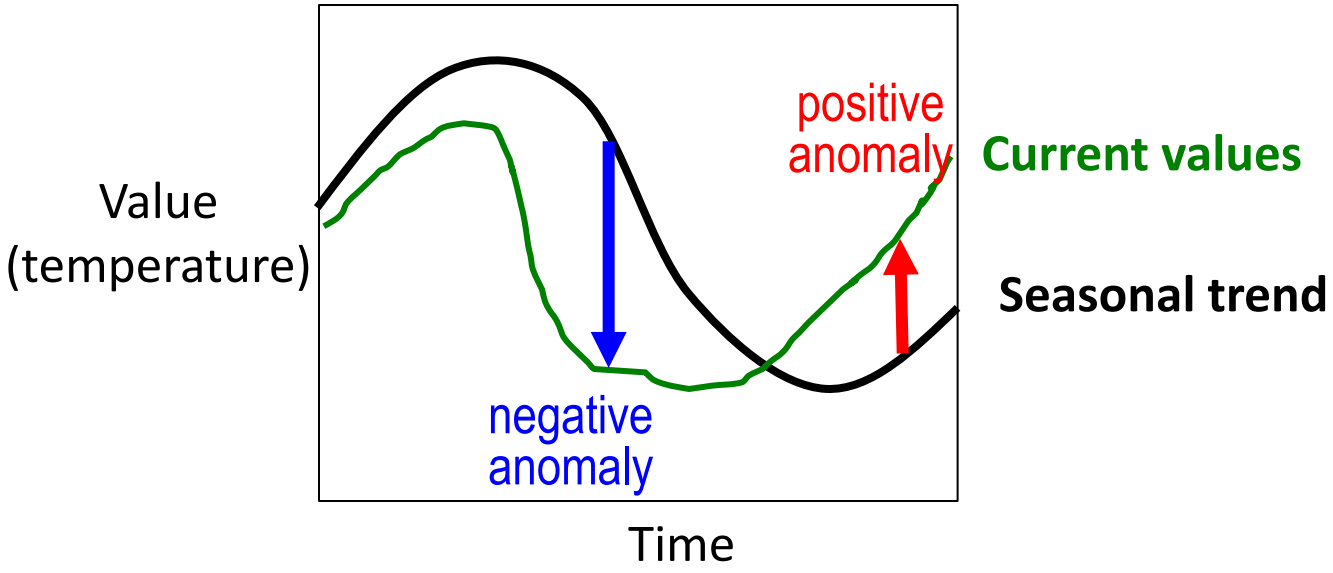
Bottom line:

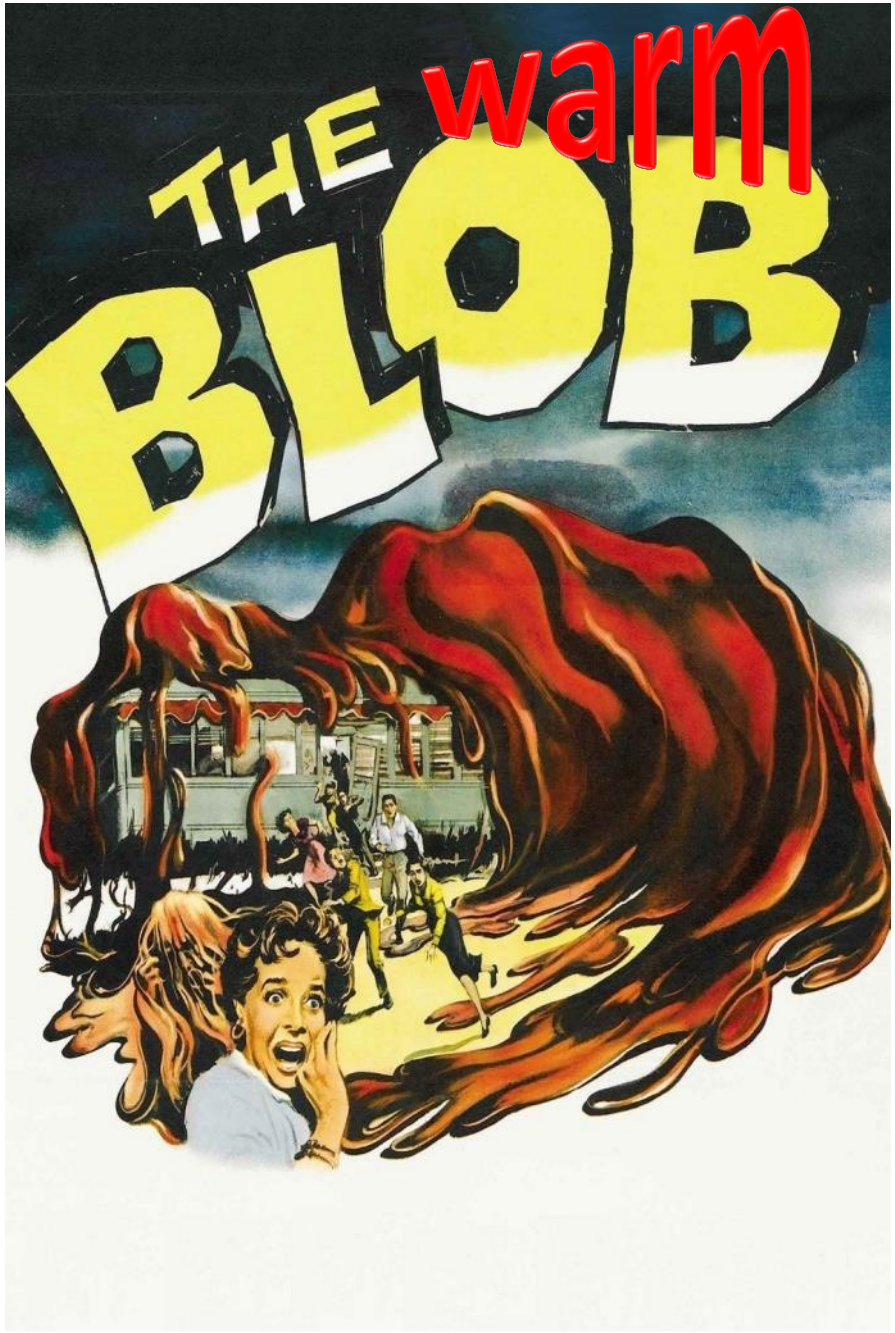
Warm blob offshore has faded but expect warm coastal conditions to continue due to the El Niño

- ☞ Predicted to be warm and dry spring on land
- ☞ Warm coastal water due to blob or El Niño not good for NW salmon

Terminology: Anomaly

Anomalies are values with the seasonal trend removed

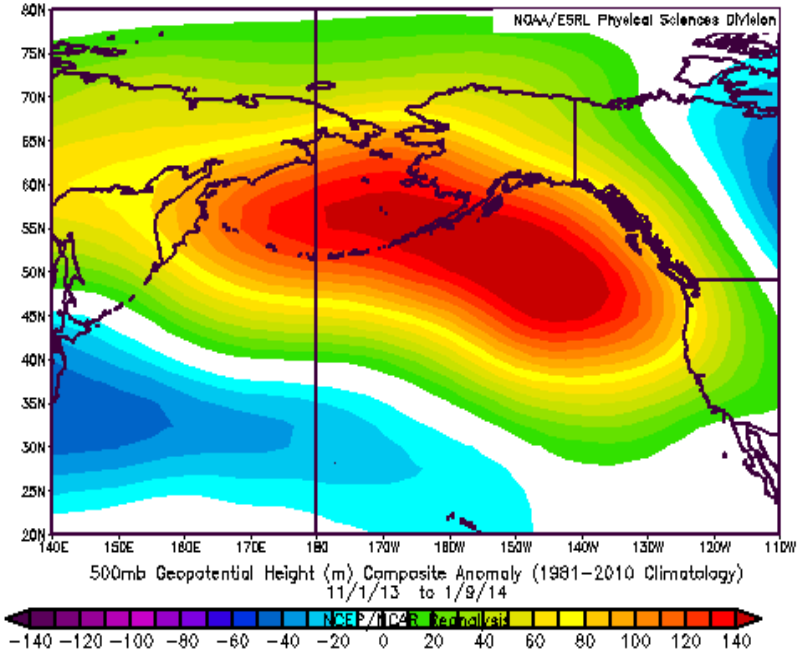



warm
THE
BLOB

Formation of the warm blob:

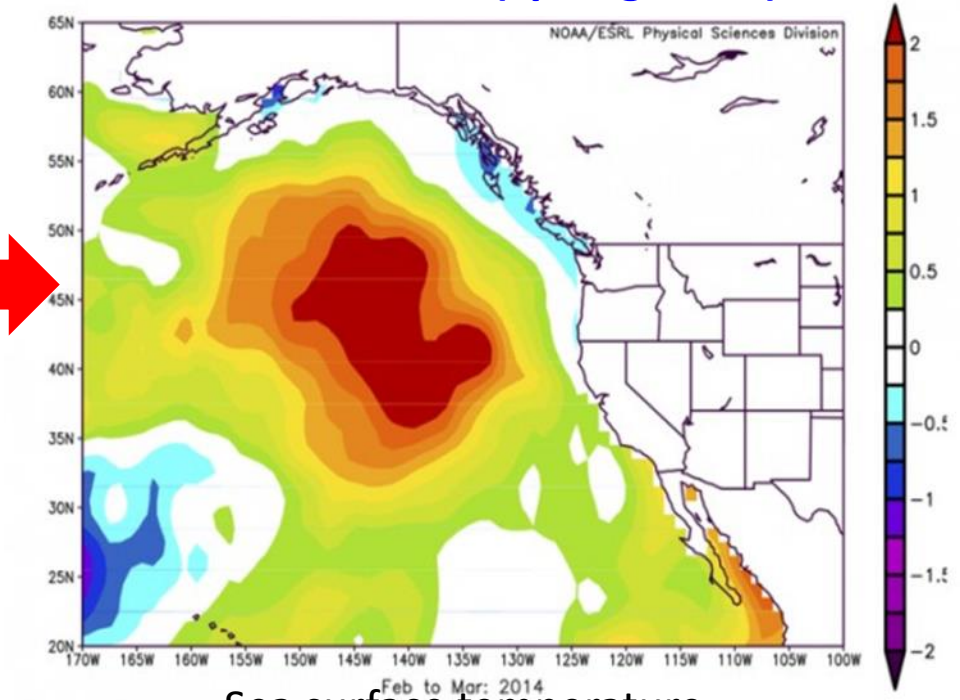
Unusually high pressure over the North Pacific in winter 2013/2014 blocked storms that normally redistribute ocean heat to atmosphere and deep water

Ridiculously resilient ridge (RRR):



Atmospheric pressure anomalies

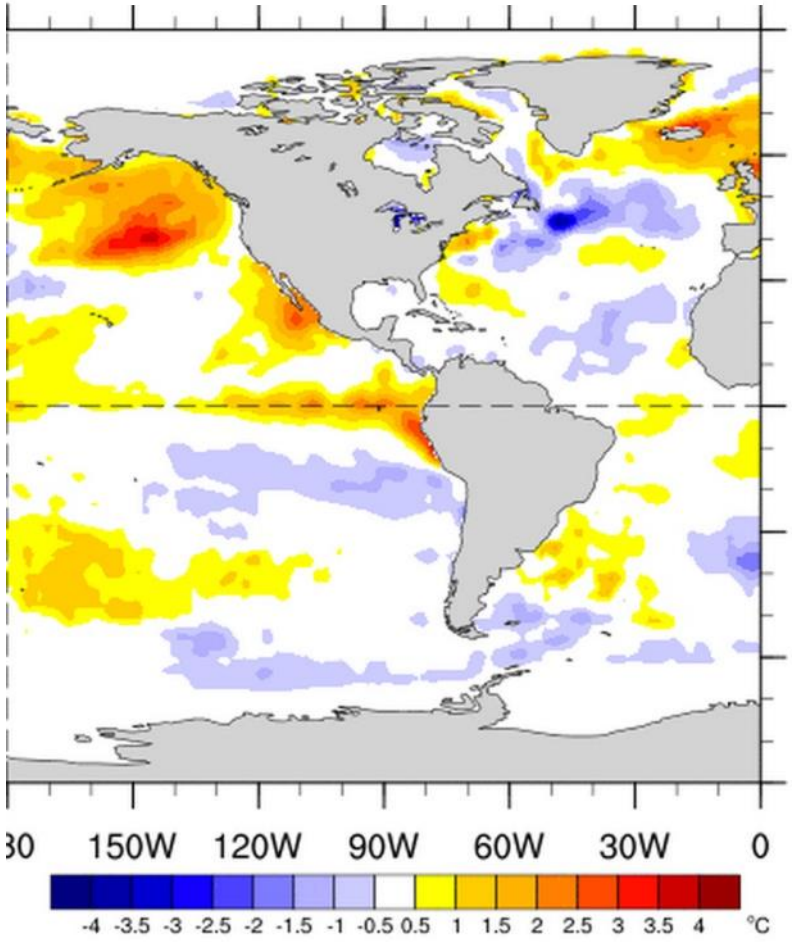
The warm blob (spring 2014)



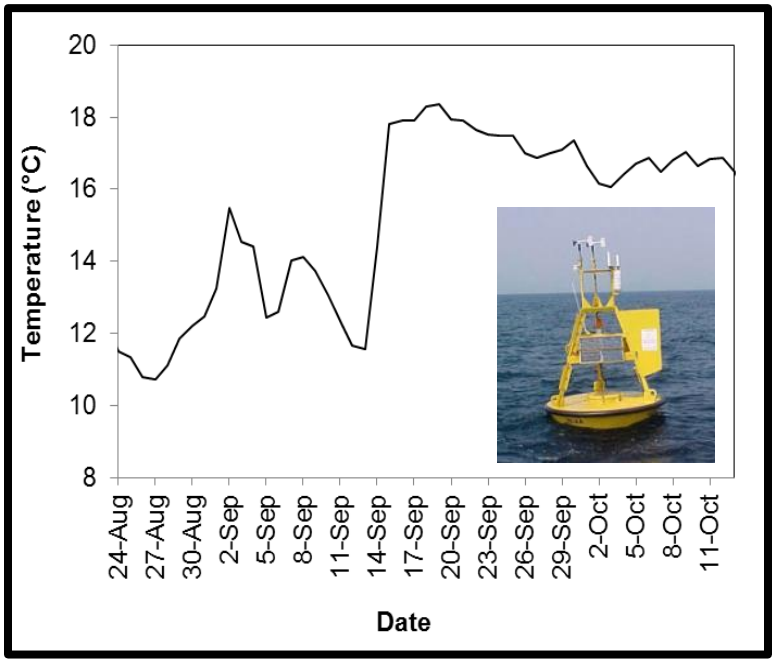
Sea surface temperature (SST) anomalies

The Warm Blob spreads across Gulf of Alaska by June, reaches Oregon Coast in September

June 2014

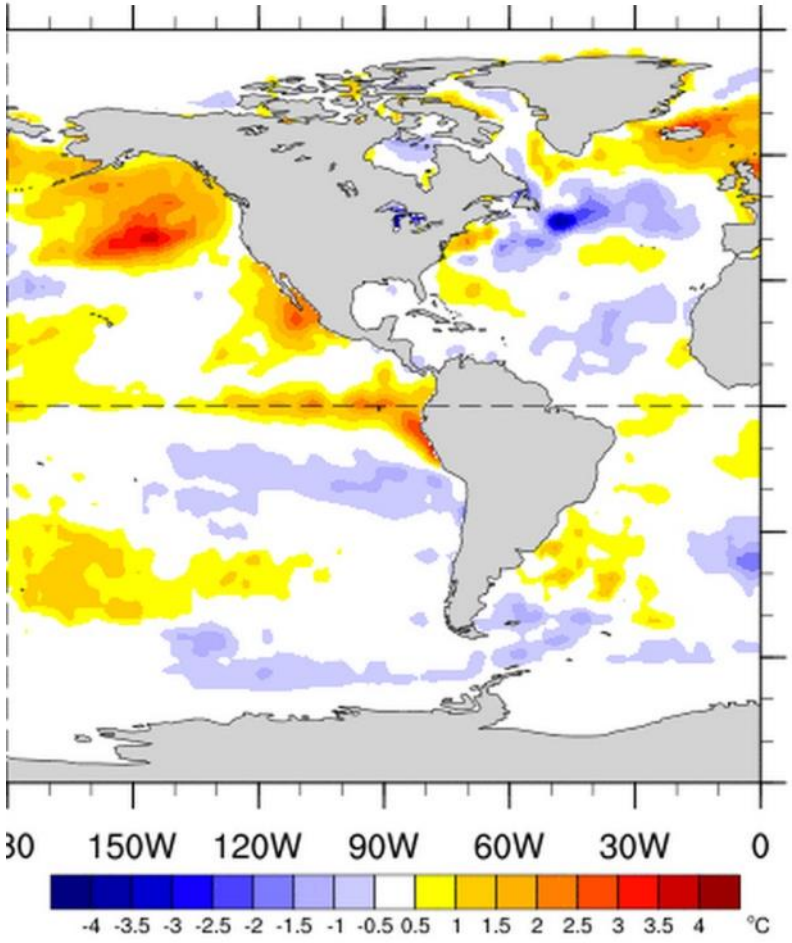


SST at Stonewall Bank
(17 miles W of Newport, OR)

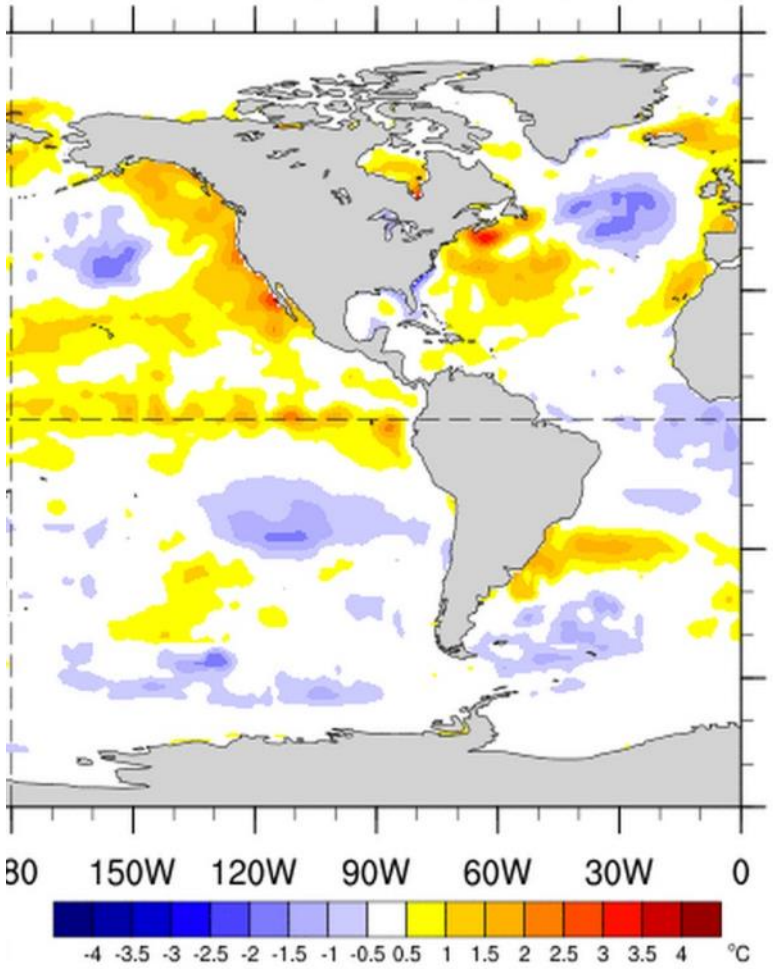


The Warm Blob spreads across Gulf of Alaska by June, reaches Oregon Coast in September

June 2014

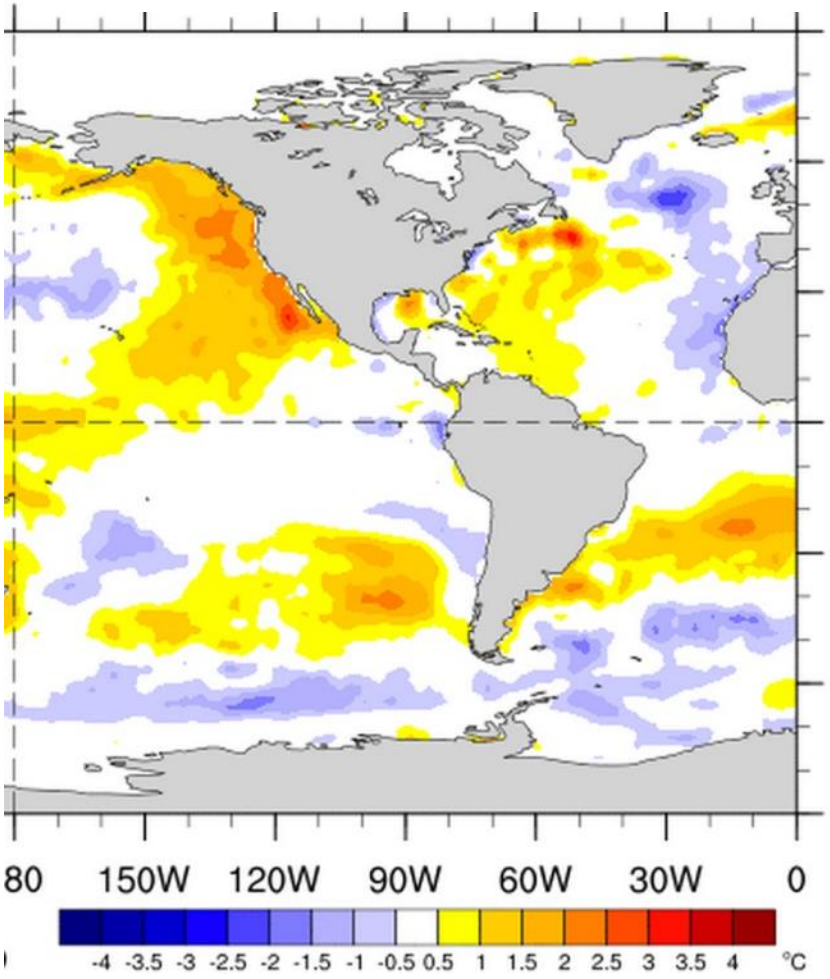


Nov 2014

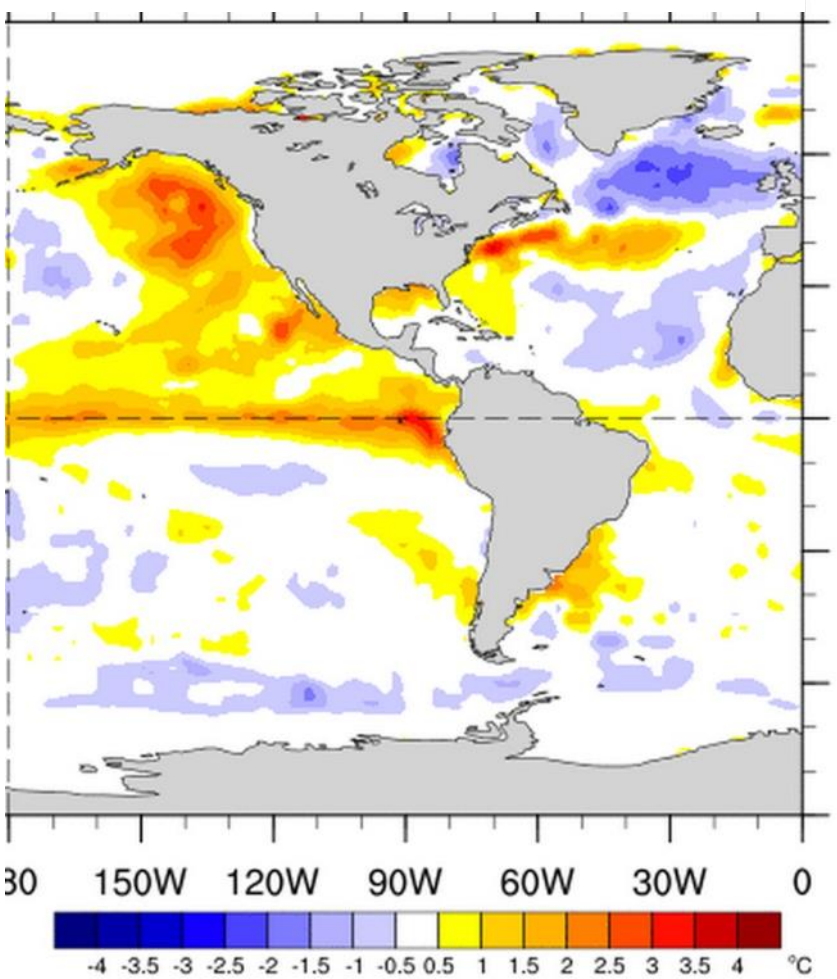


The Warm Blob remains across NE Pacific during 2015

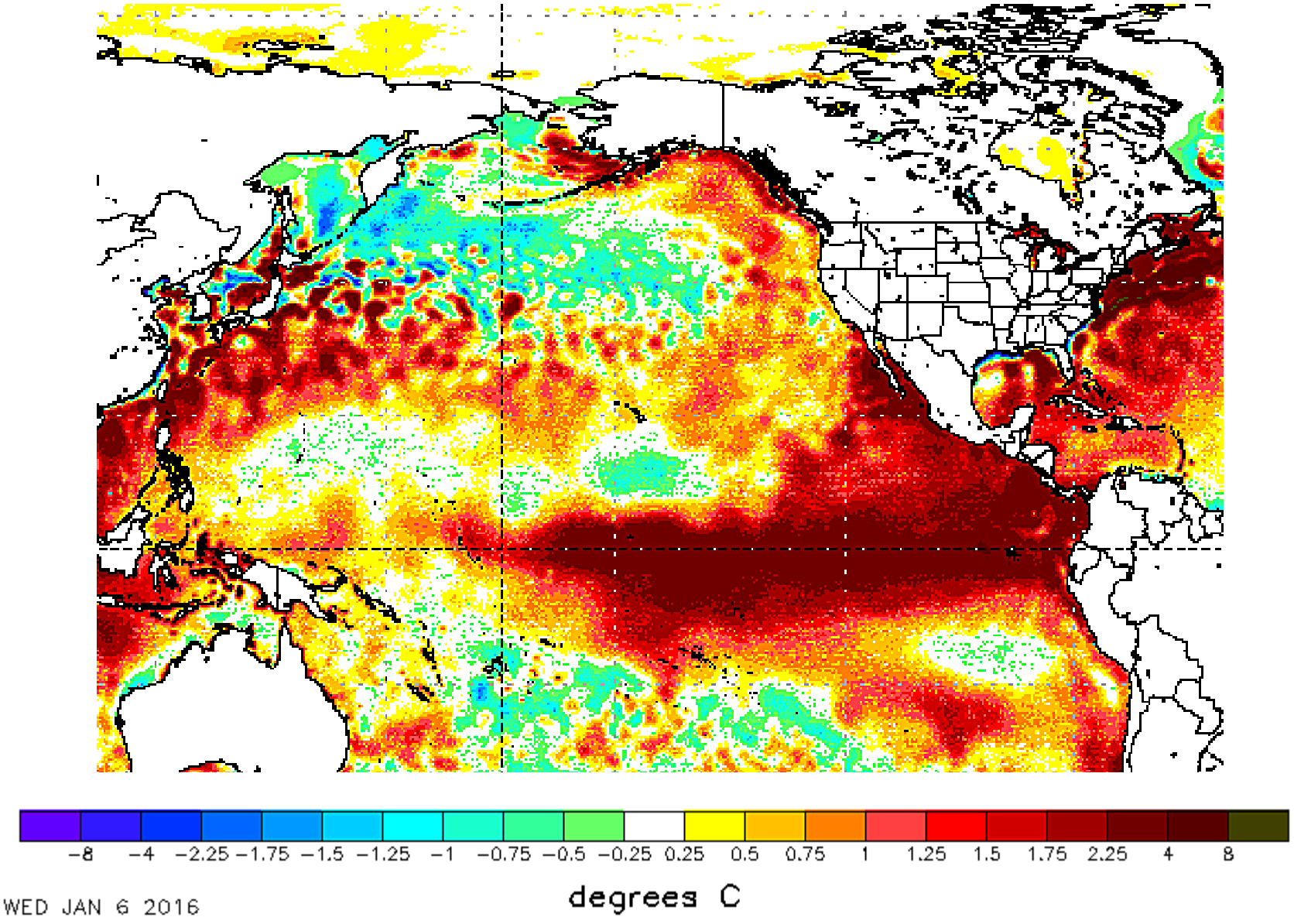
Feb 2015



June 2015

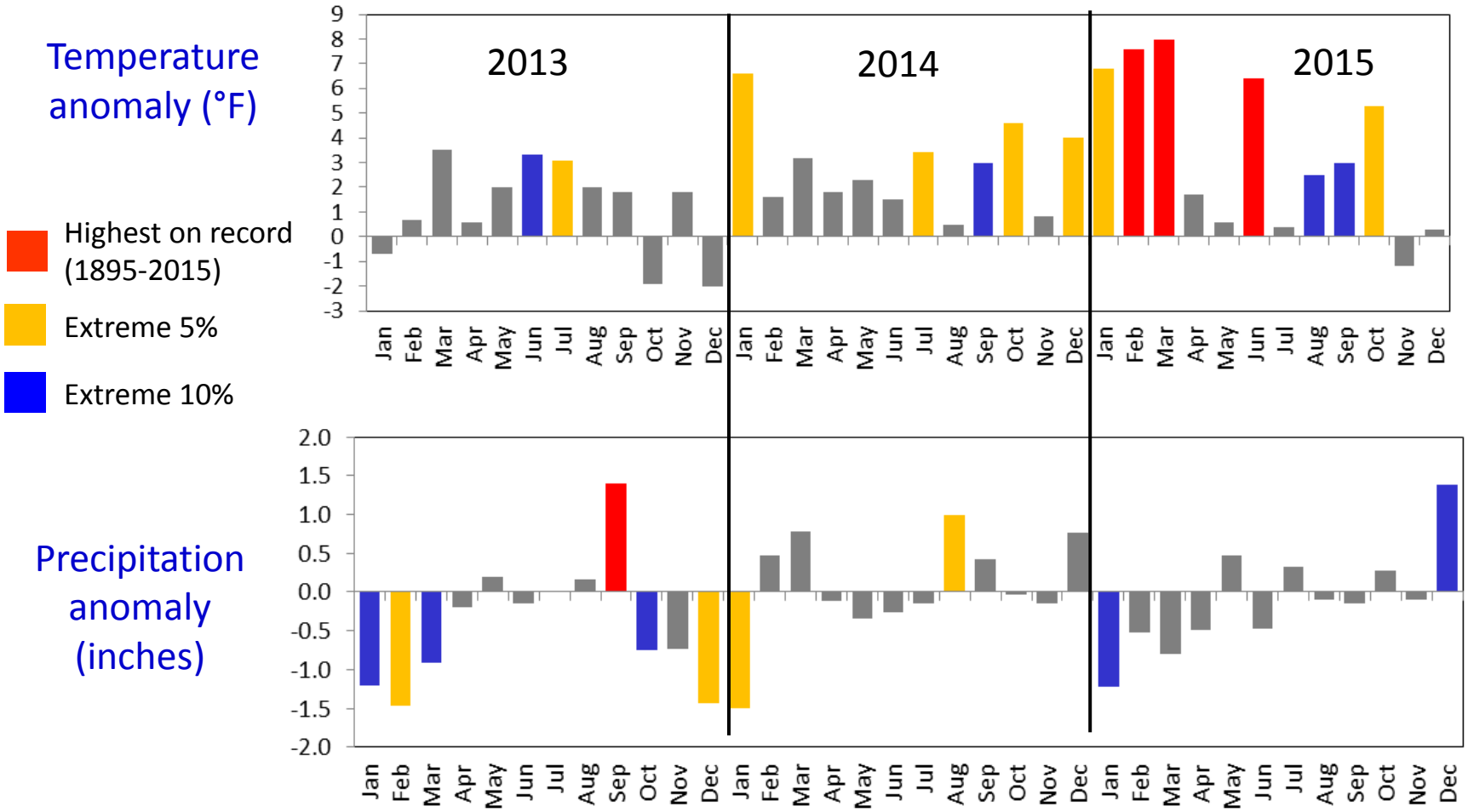


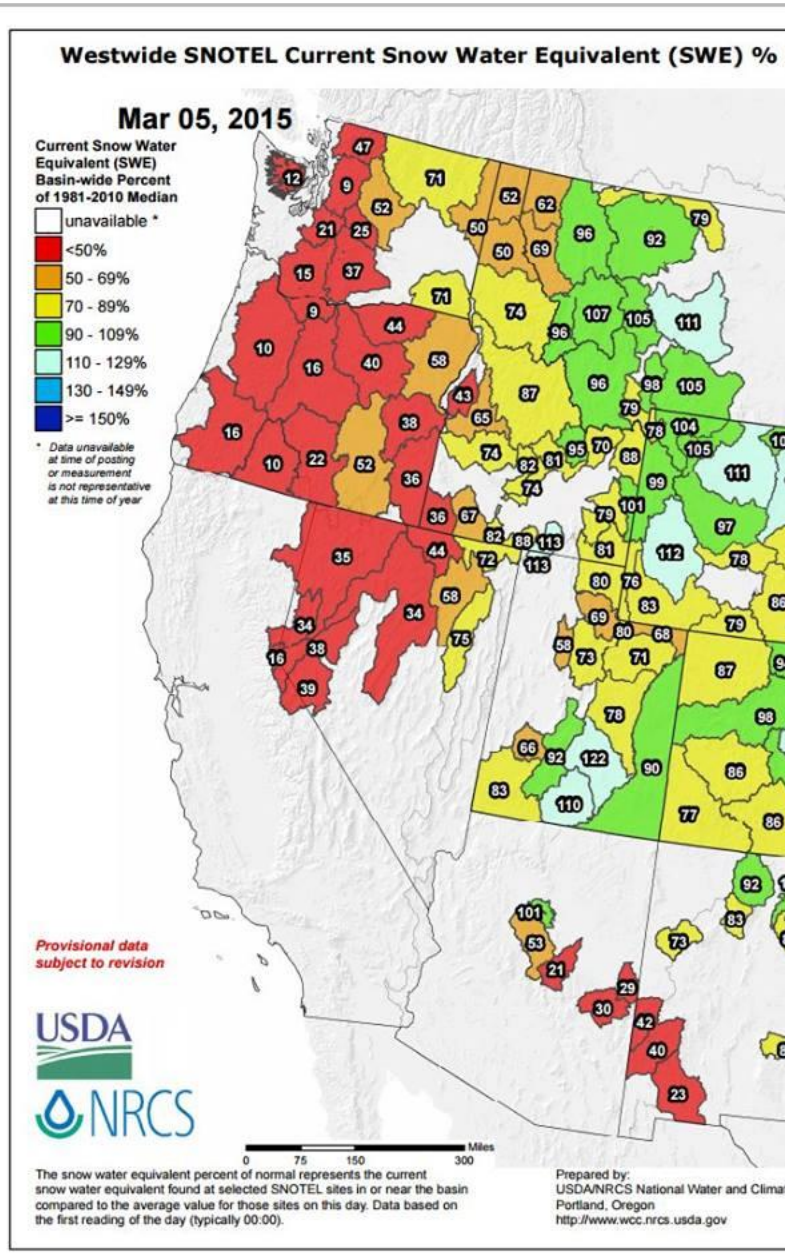
SST anomalies 7 Jan 2016

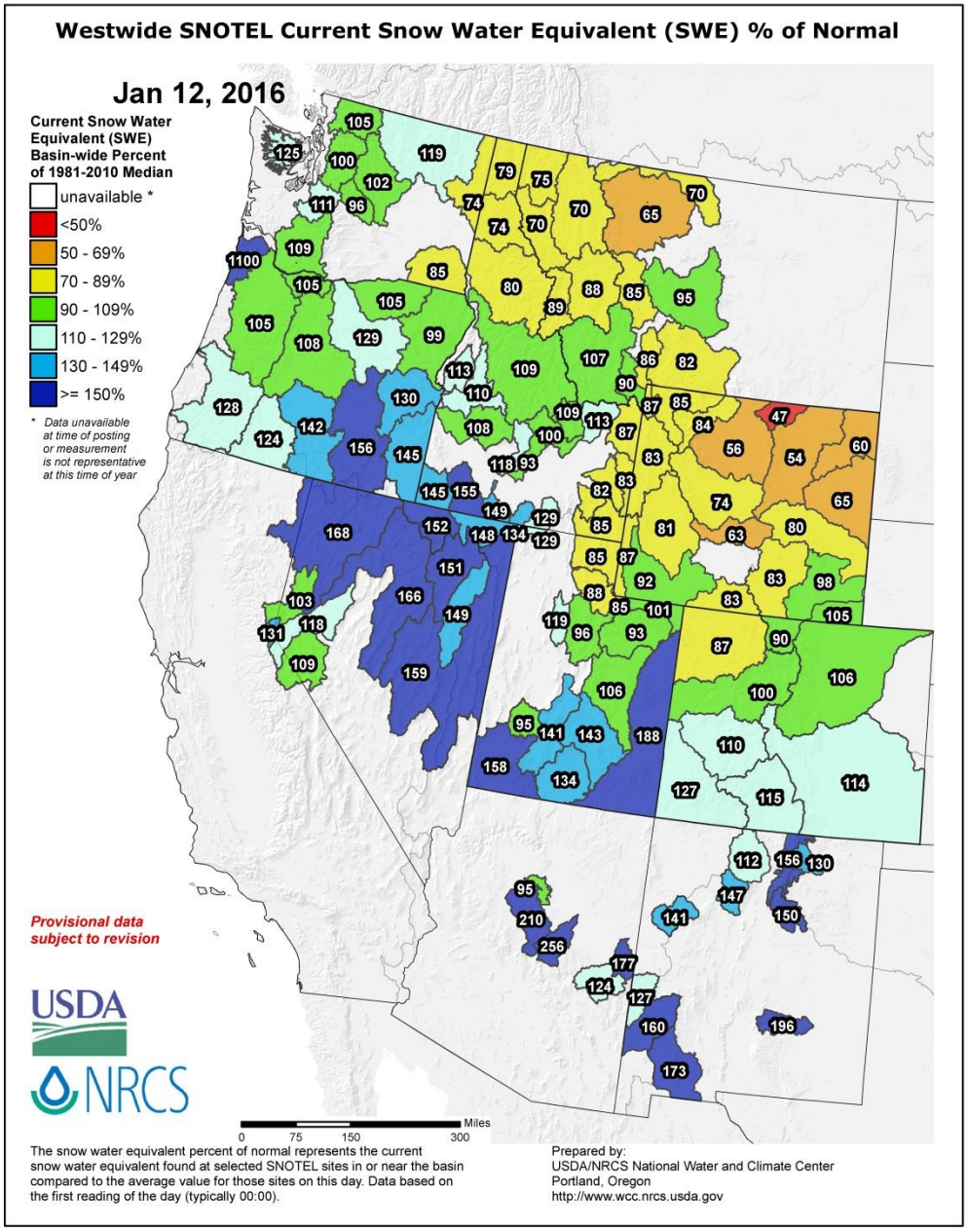


Warm ocean water has been affecting terrestrial environments

Average WA-OR-ID temperature and precipitation, 2013-2015




Westwide SNOTEL Current Snow Water Equivalent (SWE) %
Mar 05, 2015
Current Snow Water Equivalent (SWE) Basin-wide Percent of 1981-2010 Median
unavailable *
<50%
50 - 69%
70 - 89%
90 - 109%
110 - 129%
130 - 149%
>= 150%
* Data unavailable at time of posting or measurement is not representative at this time of year
Provisional data subject to revision
USDA
NRCS
0 75 150 300 Miles
The snow water equivalent percent of normal represents the current snow water equivalent found at selected SNOTEL sites in or near the basin compared to the average value for those sites on this day. Data based on the first reading of the day (typically 00:00).
Prepared by:
USDA/NRCS National Water and Clima
Portland, Oregon
http://www.wcc.nrcs.usda.gov


Westwide SNOTEL Current Snow Water Equivalent (SWE) % of Normal
Jan 12, 2016
Current Snow Water Equivalent (SWE) Basin-wide Percent of 1981-2010 Median
unavailable *
<50%
50 - 69%
70 - 89%
90 - 109%
110 - 129%
130 - 149%
>= 150%
* Data unavailable at time of posting or measurement is not representative at this time of year
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0 75 150 300 Miles
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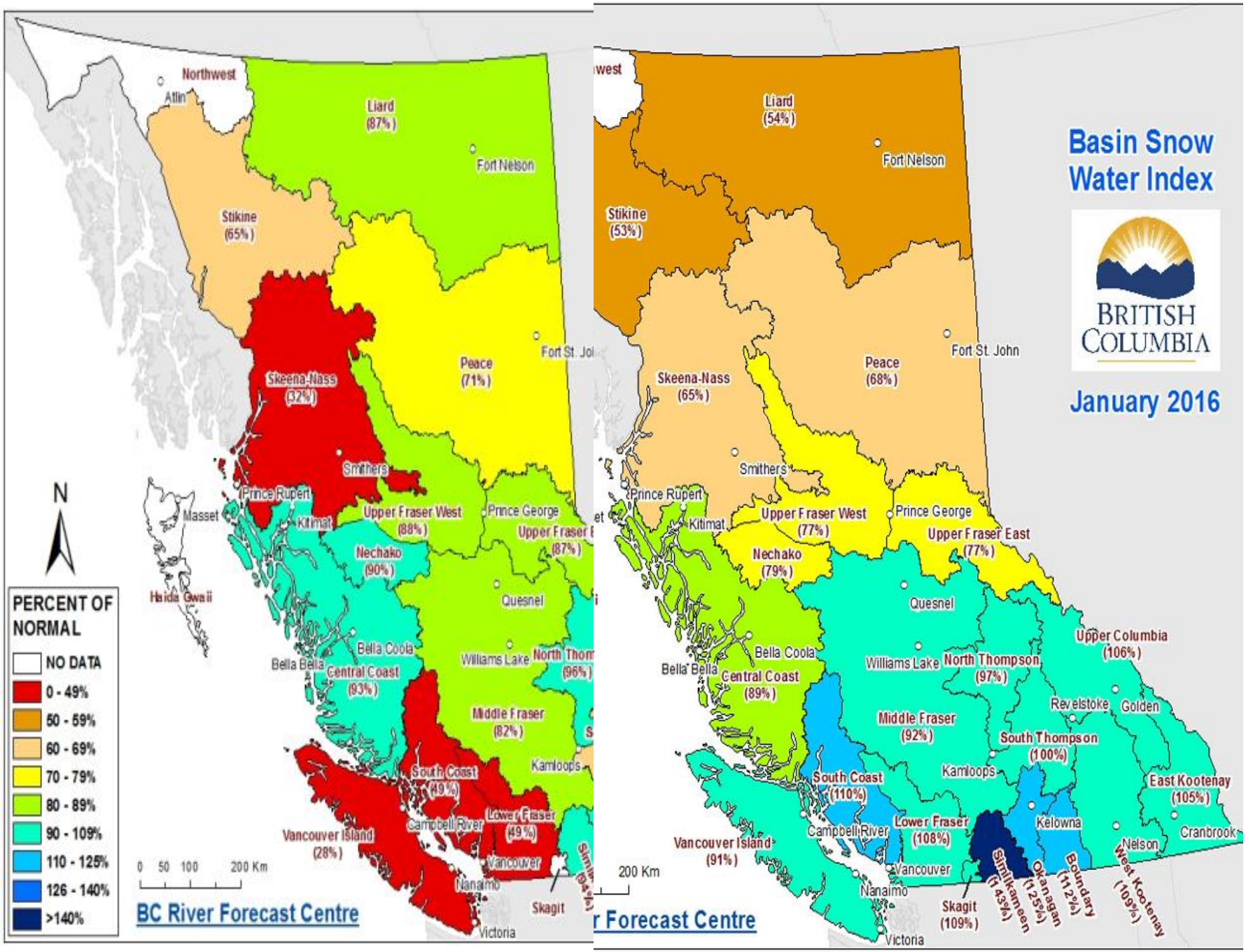
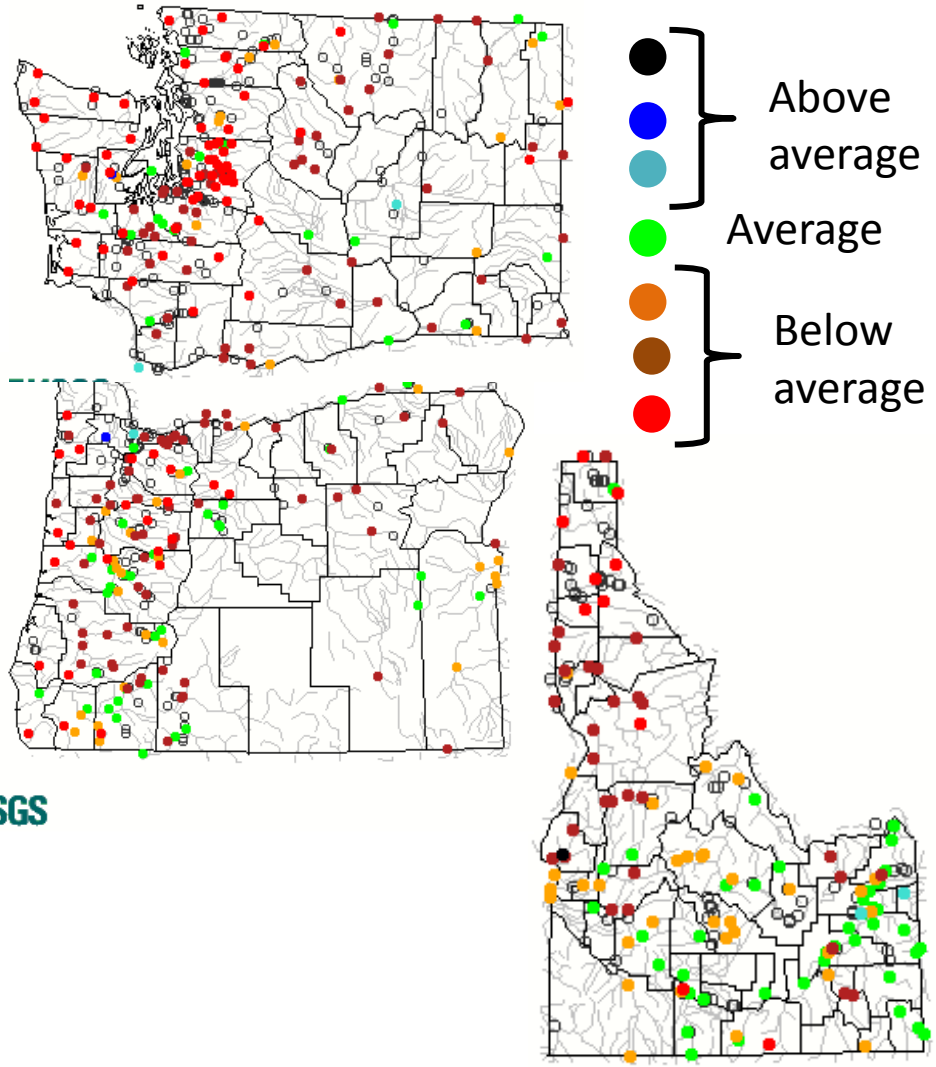
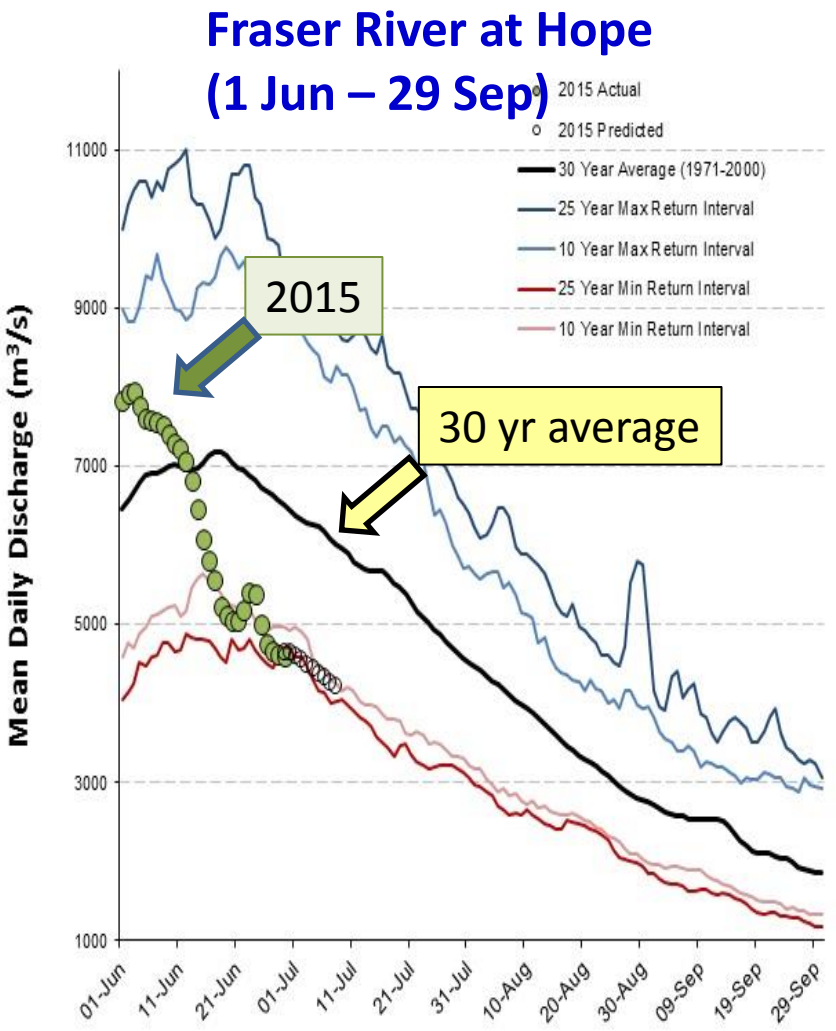
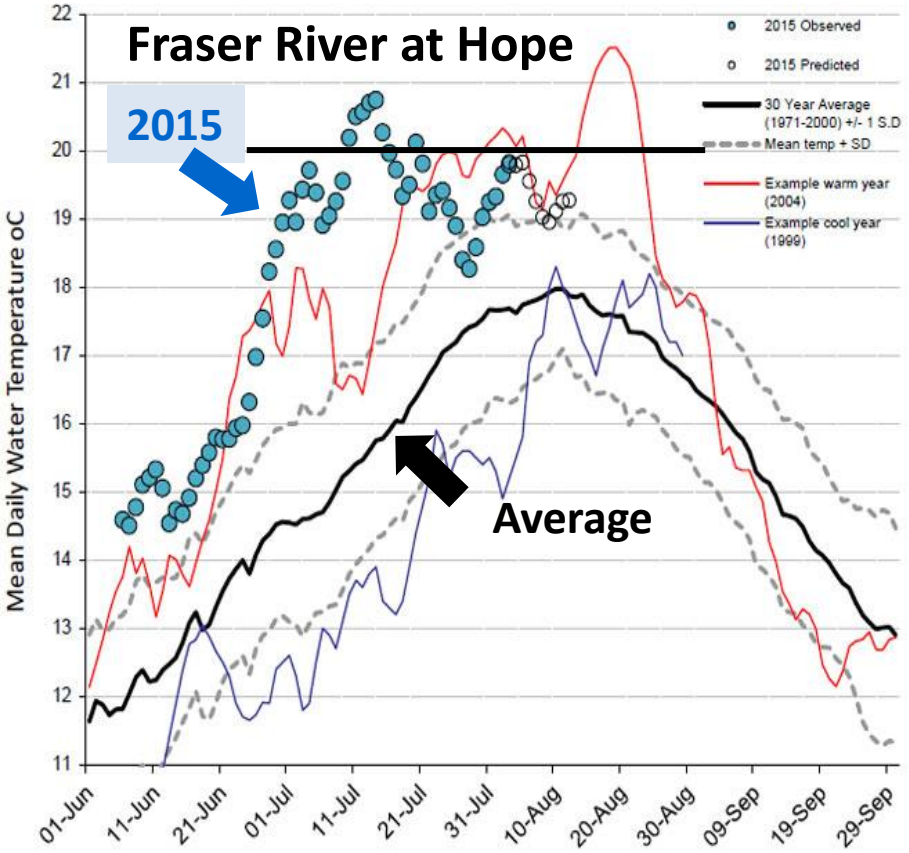

Basin Snow Water Index
BRITISH COLUMBIA
January 2016
PERCENT OF NORMAL
NO DATA
0 - 49%
50 - 59%
60 - 69%
70 - 79%
80 - 89%
90 - 109%
110 - 125%
126 - 140%
>140%
N
0 50 100 200 Km
200 Km
BC River Forecast Centre
Forecast Centre
Northwest
Atlin
Liard (87%)
Liard (54%)
Fort Nelson
Stikine (65%)
Stikine (53%)
Peace (71%)
Peace (68%)
Fort St. John
Skeena-Nass (32%)
Skeena-Nass (65%)
Smithers
Prince Rupert
Masset
Kitimat
Upper Fraser West (88%)
Upper Fraser West (77%)
Prince George
Upper Fraser East (77%)
Nechako (90%)
Nechako (79%)
Haida Gwaii
Quesnel
Bella Coola
Bella Bella
Central Coast (93%)
Central Coast (89%)
Williams Lake
North Thompson (97%)
Upper Columbia (106%)
Middle Fraser (82%)
Middle Fraser (92%)
Revelstoke
Golden
South Thompson (100%)
Kamloops
South Coast (49%)
South Coast (110%)
East Kootenay (105%)
Lower Fraser (49%)
Lower Fraser (108%)
Campbell River
Kelowna
Cranbrook
Vancouver Island (28%)
Vancouver Island (91%)
Vancouver
Nanaimo
Nelson
Similkameen (143%)
Okanagan (125%)
Boundary (112%)
West Kootenay (109%)
Skagit (109%)
Victoria

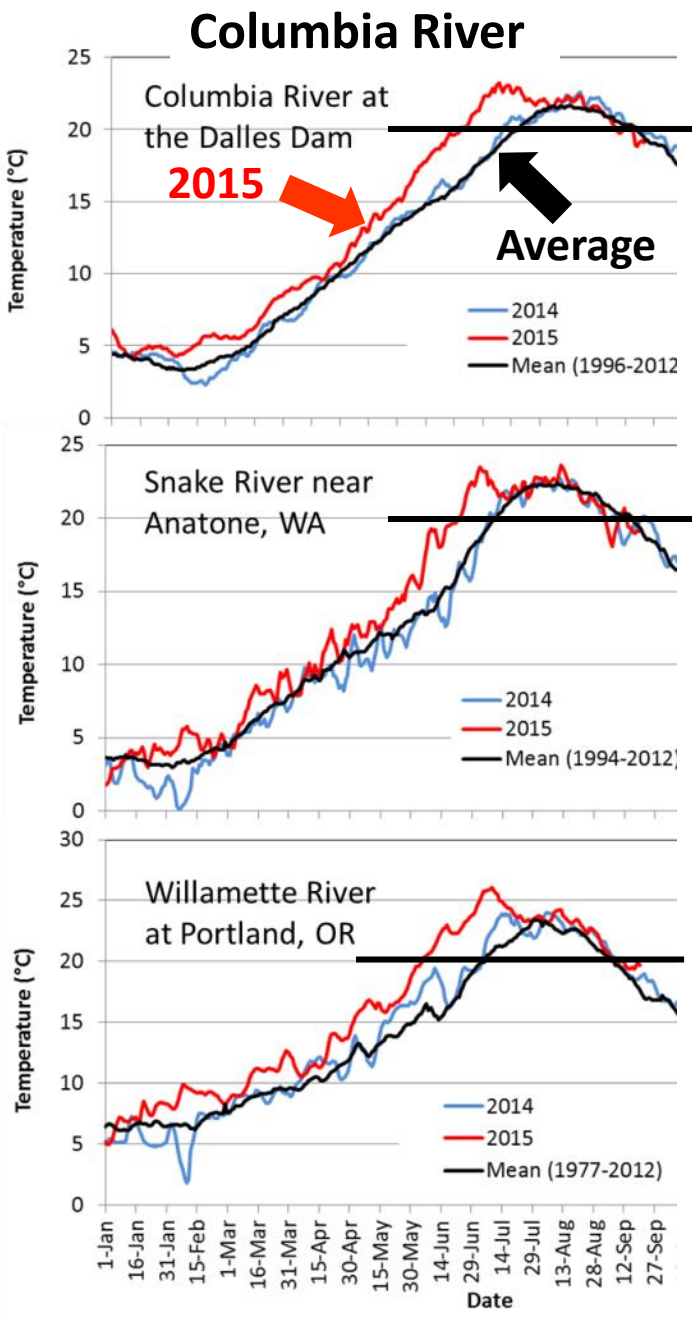
Summer 2015: Low snow pack and warm spring = low flows



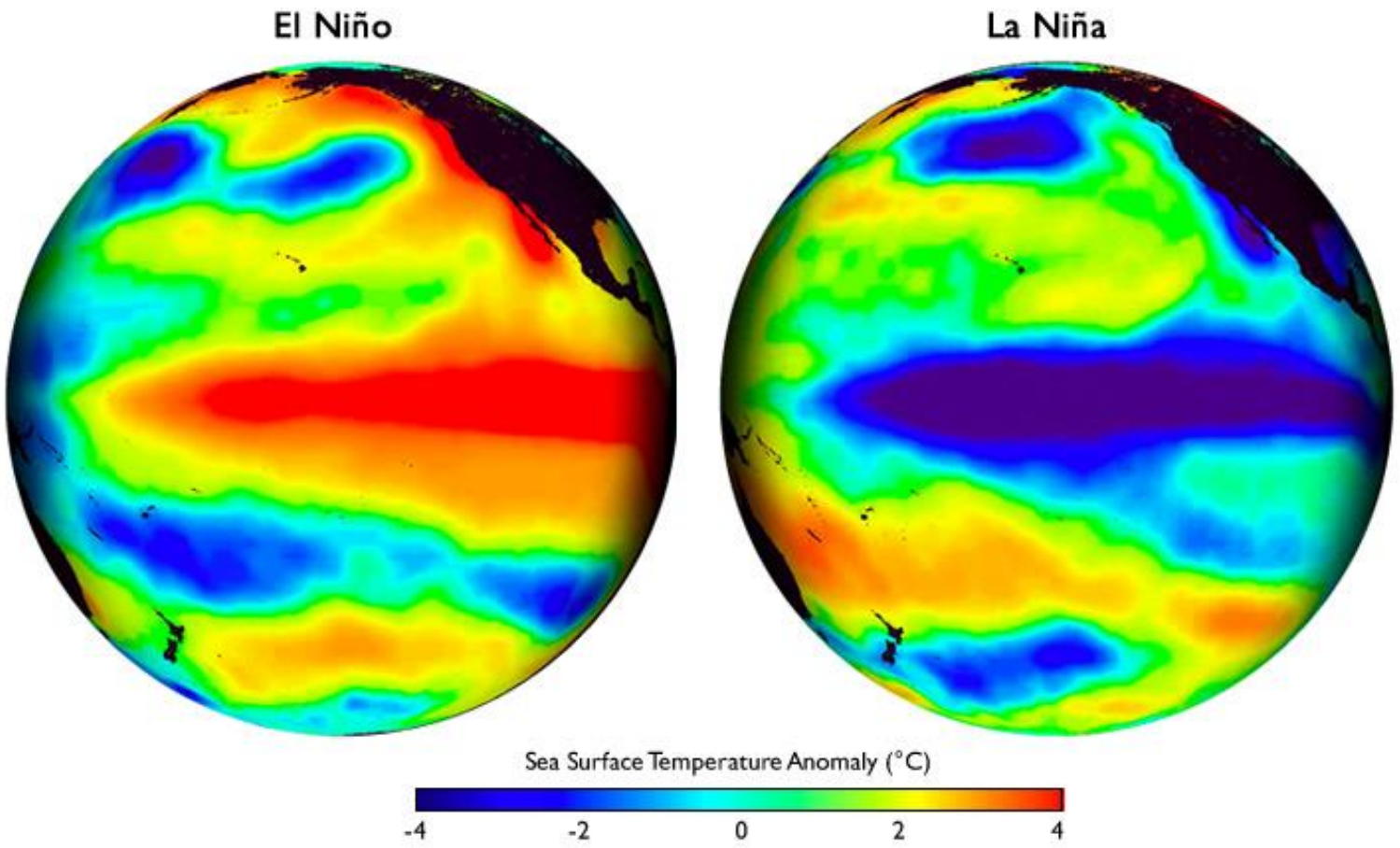


2015
Low river flow+ hot spring = high river temperatures & fish kills



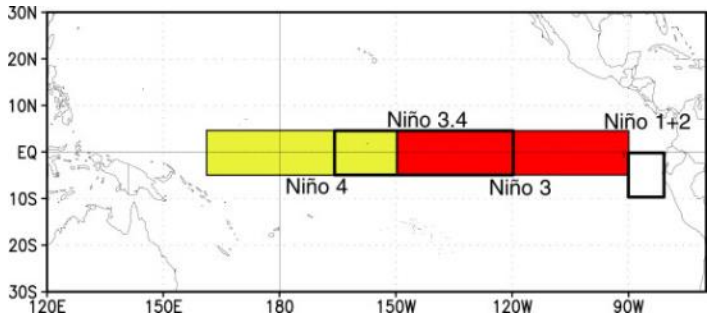


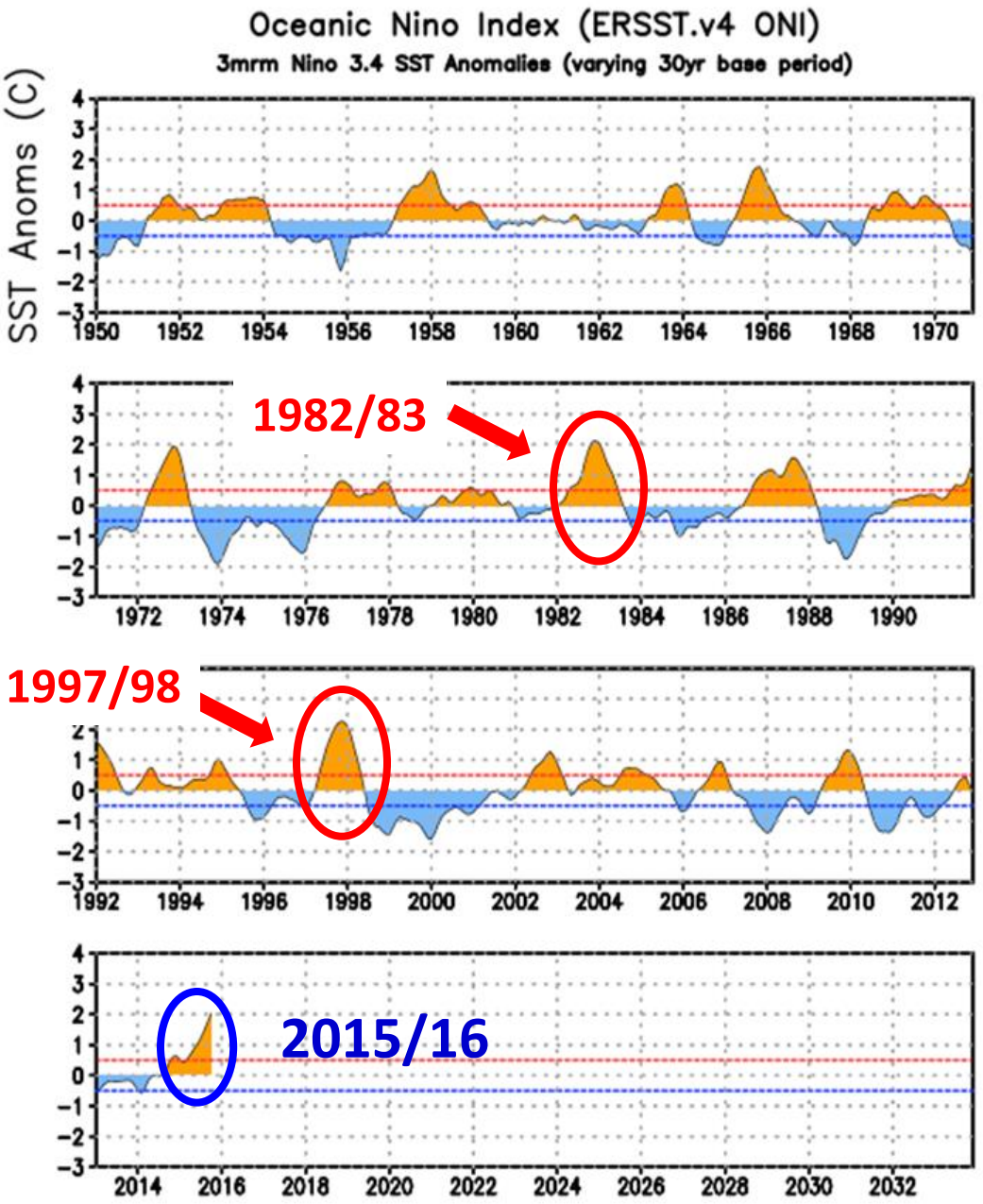
The 2015/16 El Niño



El Niños are measured as SST anomalies in the Nino 3.4 region.

Big El Niños in 1982/83 & 1997/98.





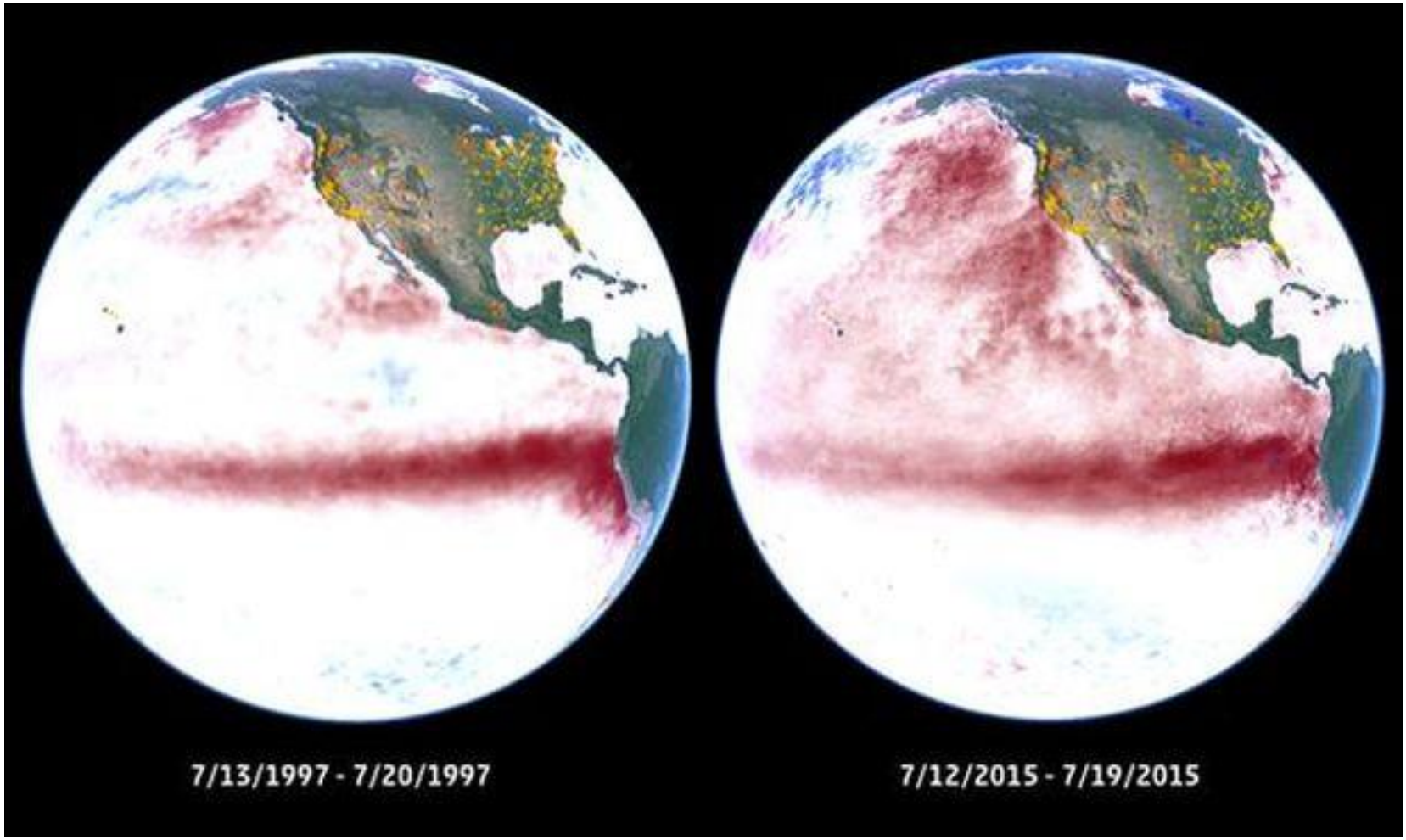
El Niño Forecast (11 Jan 2016)

El Niño conditions are present.

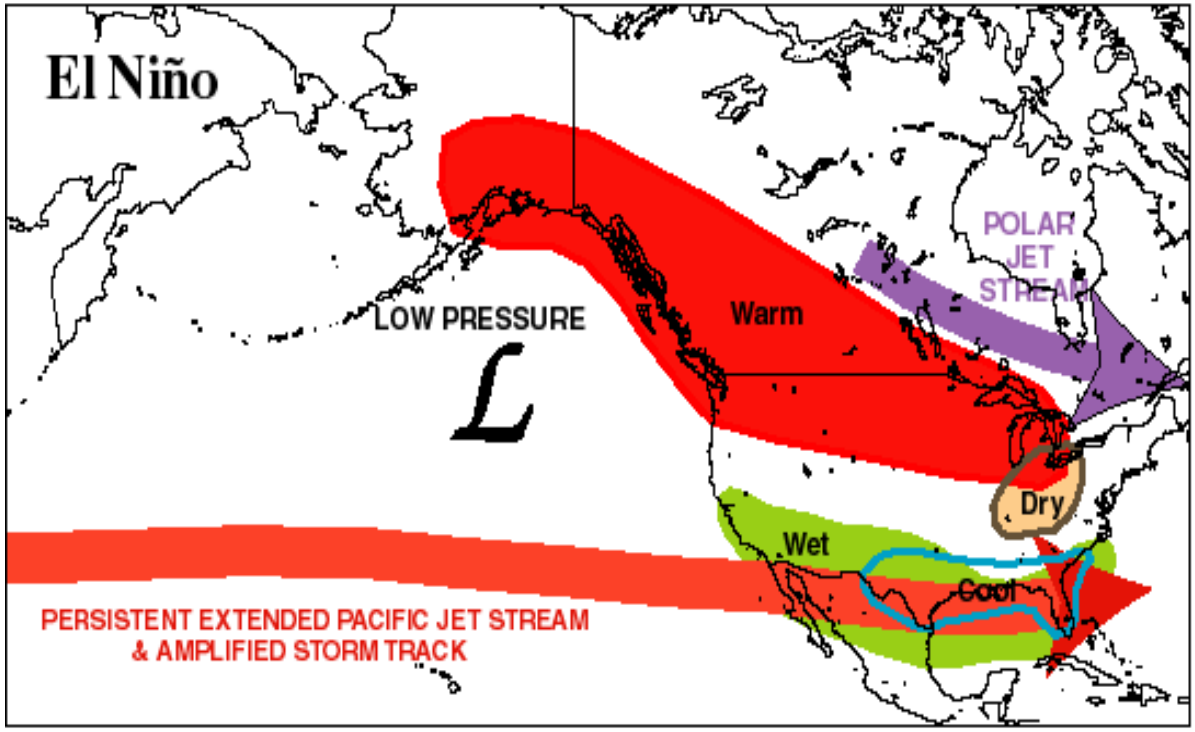
El Niño is expected to remain strong through the Northern Hemisphere winter 2015-16, with a transition to El Niño-neutral anticipated during the late spring or early summer 2016.

www.elnino.noaa.gov

This year's El Niño is different because North Pacific is already warm



Winter effects of El Niño events

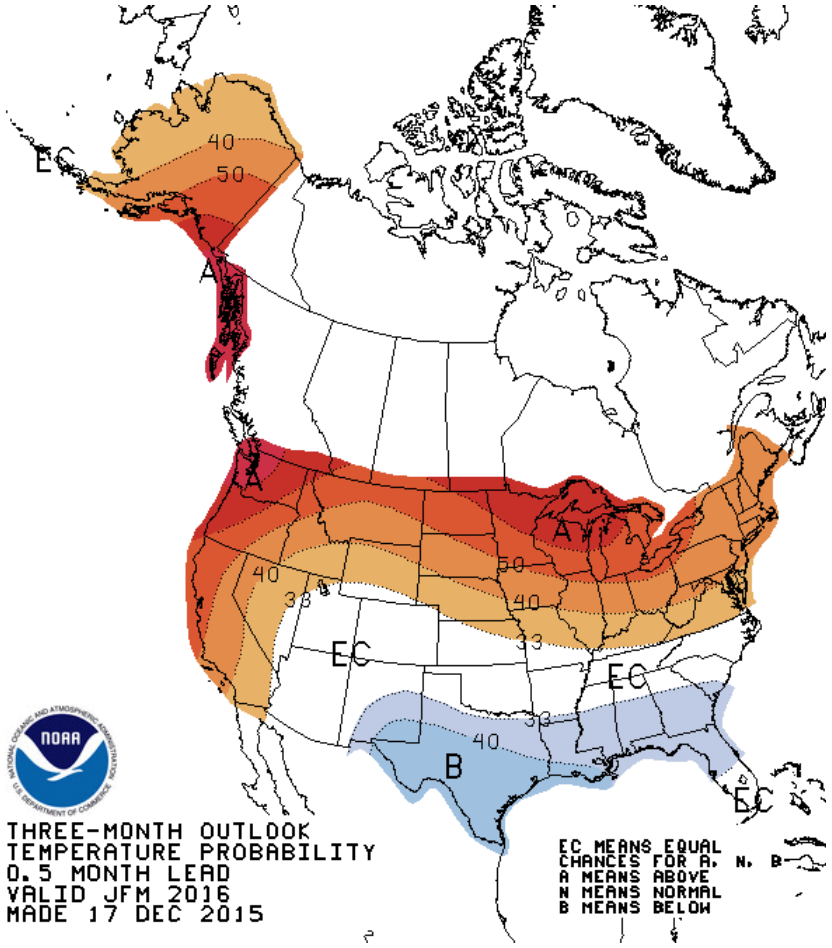


Climate Prediction Center/NCEP/NWS

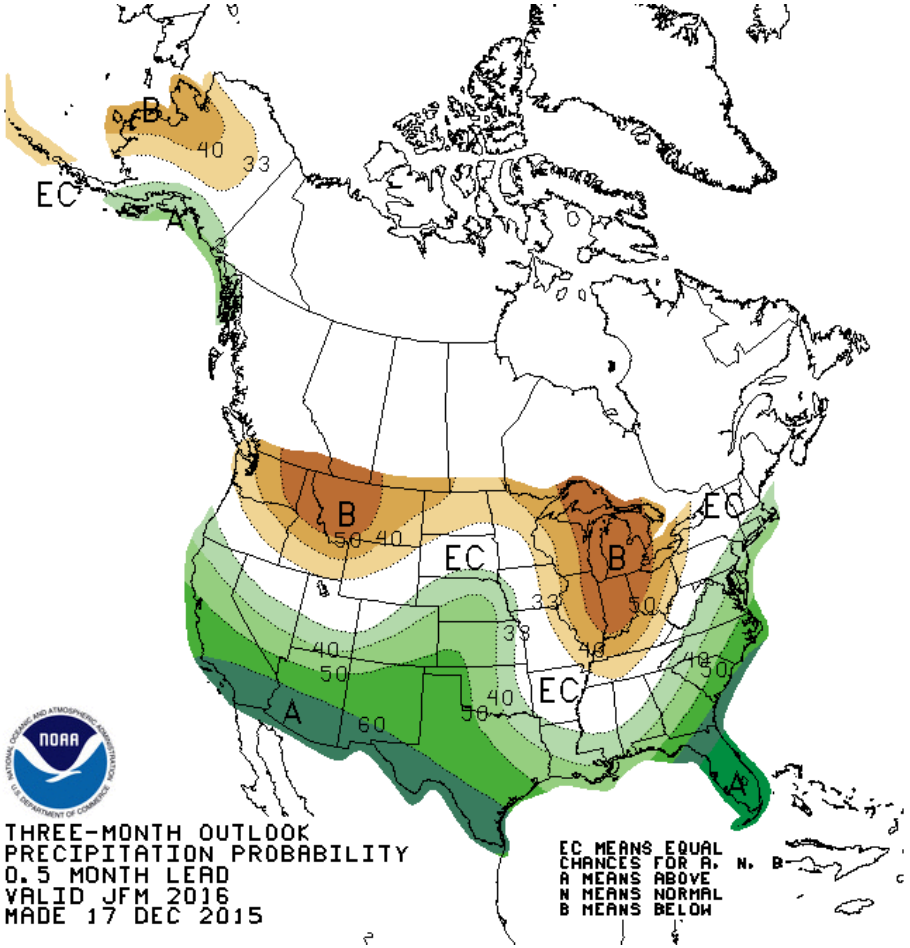
3 month climate outlook

www.cpc.ncep.noaa.gov

Temperature



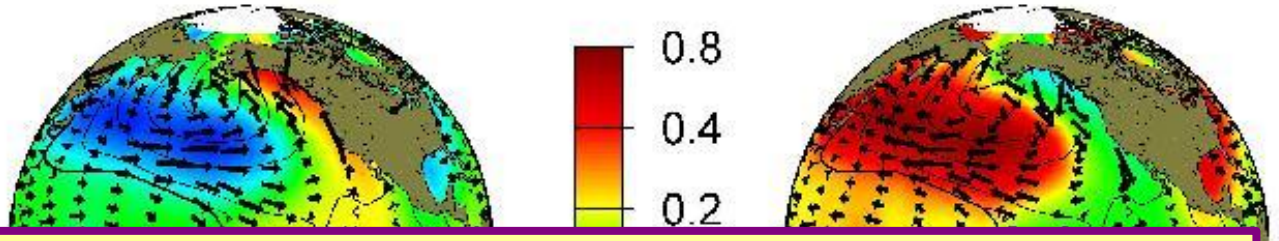
Precipitation



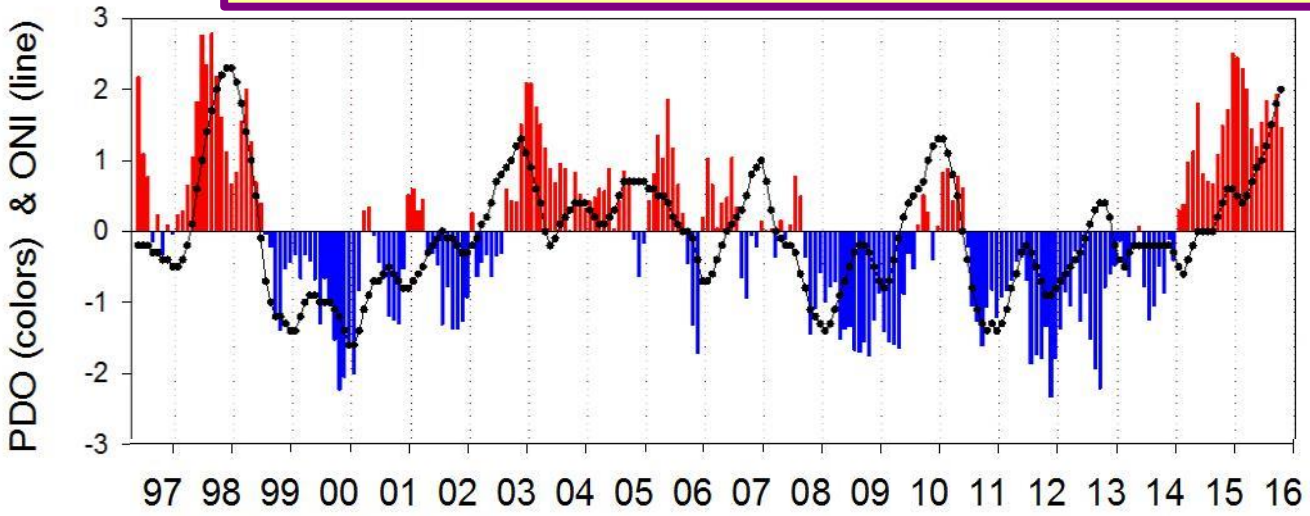
Pacific decadal oscillation (PDO)

Warm (positive) phase

Cold (negative) phase



PDO has been positive since January 2014 and will remain positive until coastal waters cool (El Niño is over)



jisao.washington.edu

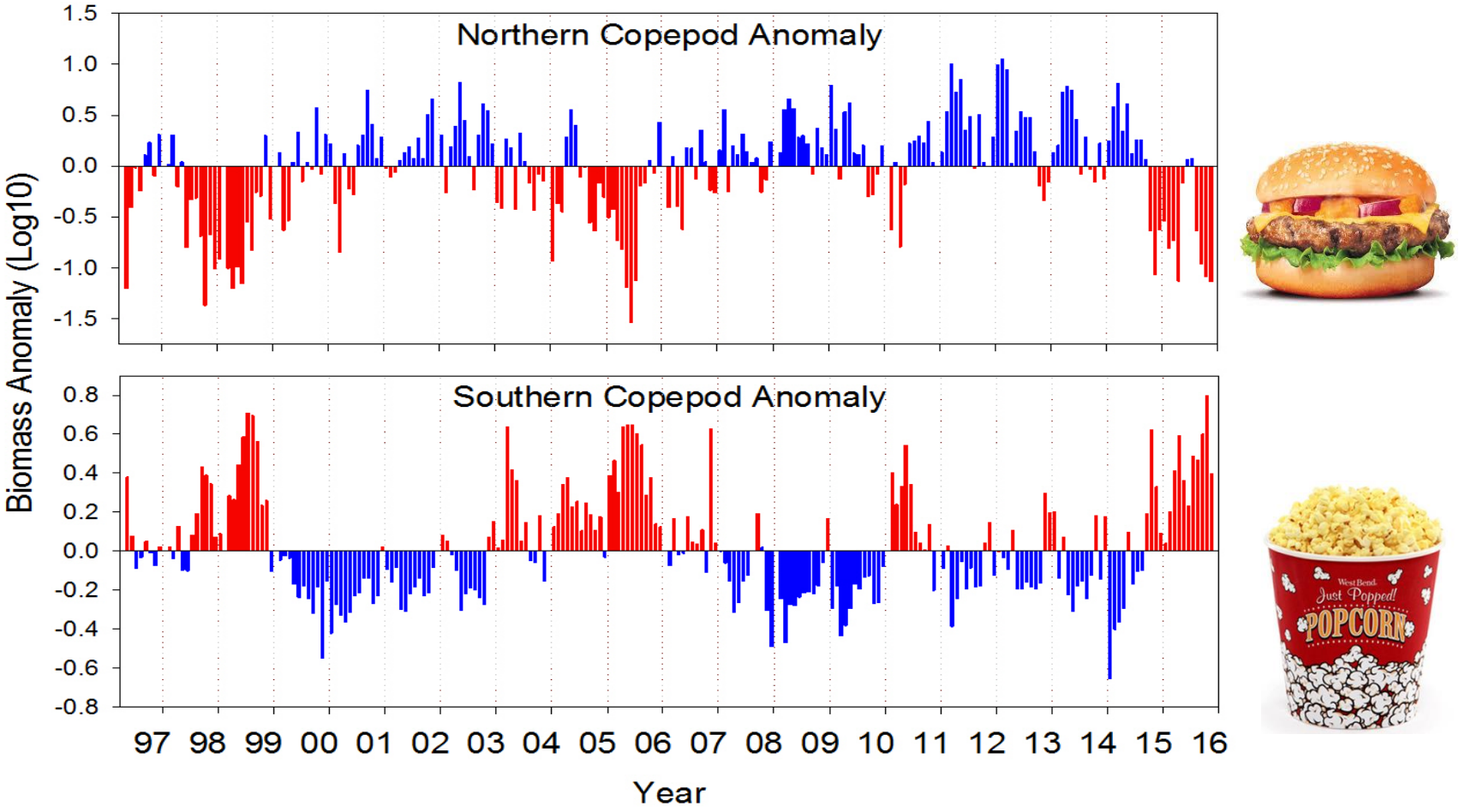
The Blob versus El Niño

Characteristic	The Blob	El Niño
Ocean conditions		
Warm layer thickness	Shallow (<100 m)	Deep (>100m)
Dominant flow	Onshore (weak)	Polewards (strong)
Copepod origins	Pelagic	Coastal
Terrestrial conditions		
Winter conditions	Warm and dry along West Coast	Warm in PNW, cool & wet in CA
Summer conditions	Warm along West Coast	Normal

Biological response to warm ocean in 2015

Joe Orsi (AFSC) with ocean sunfish in SE Alaska, June 2015

Copepod abundance on the Newport (Oregon) Line

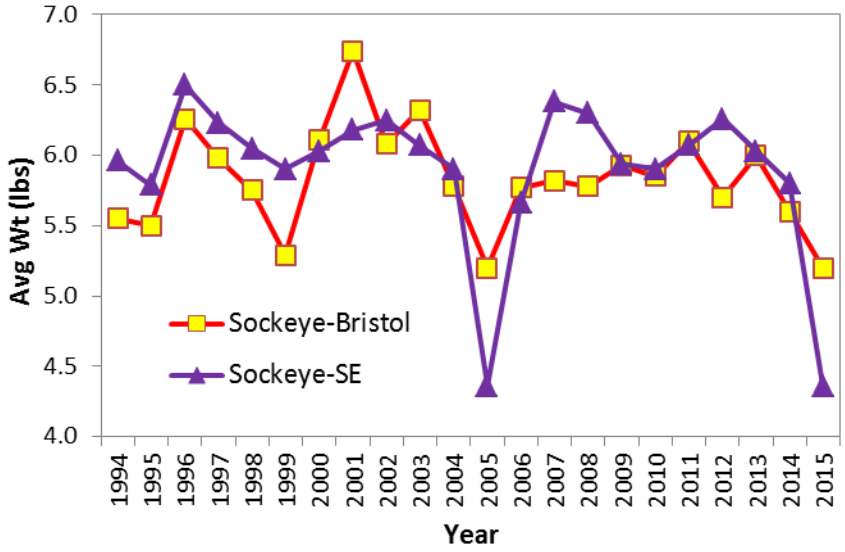


B. Peterson, NOAA, unpublished data

Effects of warm water on Pacific salmon (2015)

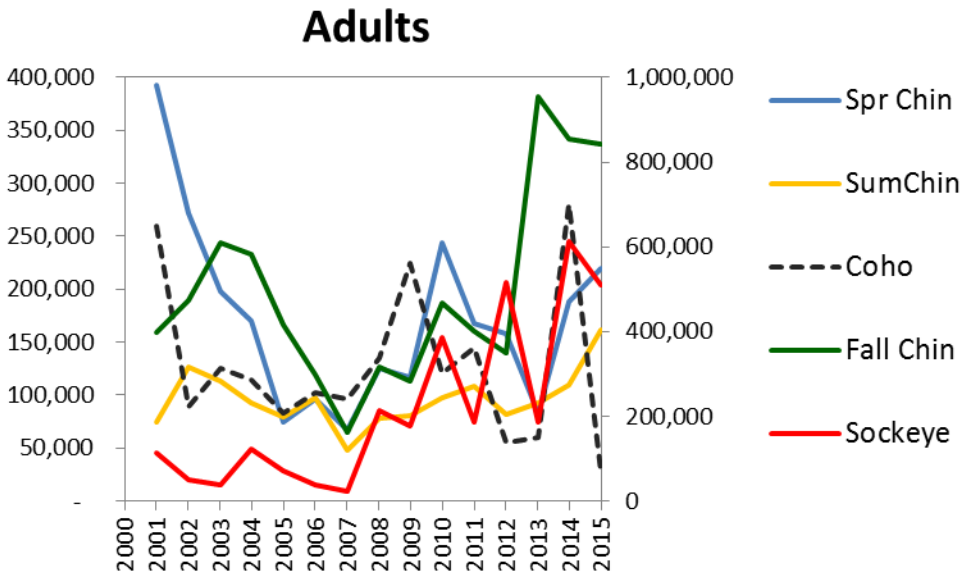
- WA/OR coast:
  - Juvenile salmon in narrow band of cold water, juv. coho coast extremely skinny (Spring 2015)
  - Adult coho returns below expected

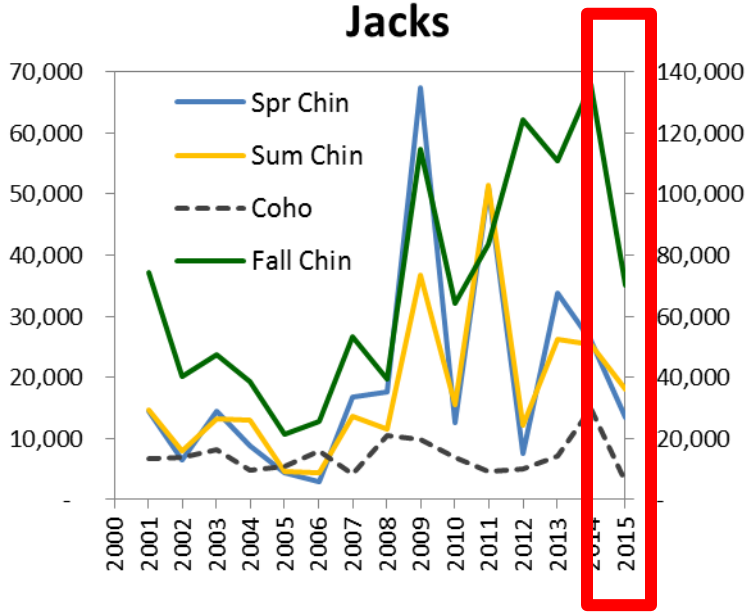
- Alaska
  - Alaskan sockeye adults were abundant but extremely small bodied (smallest in >20 yrs)



Effects of warm water on Pacific salmon (2015)

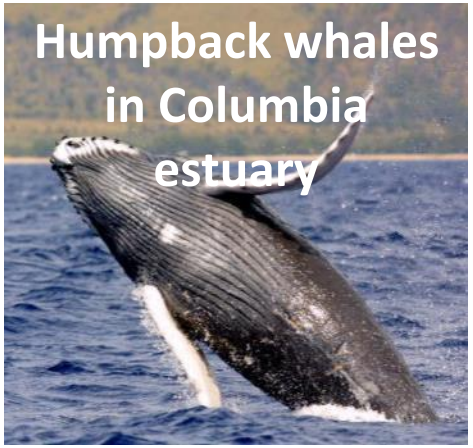
- Fraser River
  - Sockeye and pink adults less than half the number expected
  - Interior Fraser coho abundance, size and fecundity below average
- Columbia River (Bonneville Dam counts)
  - High returns of adult spring, summer & fall Chinook, and sockeye, but low adult coho returns
    - High in river mortality for sockeye (hot water)
  - Low returns for Chinook and coho jacks

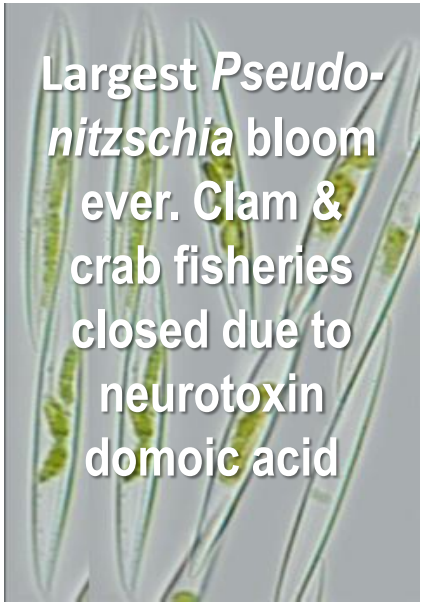


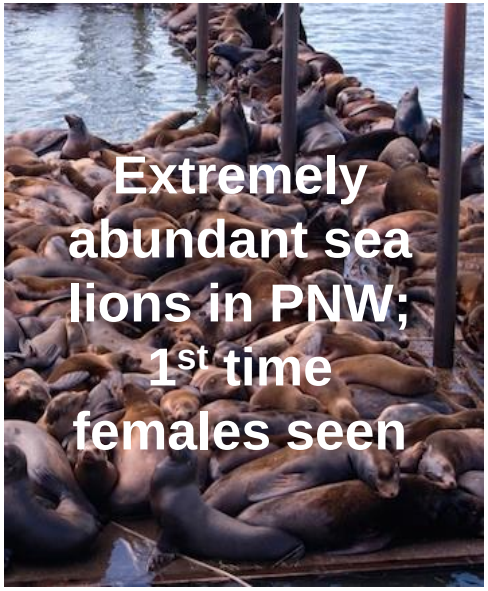


Unusual sightings in 2015

7 swordfish caught along Oregon coast







NWFSC stoplight rankings

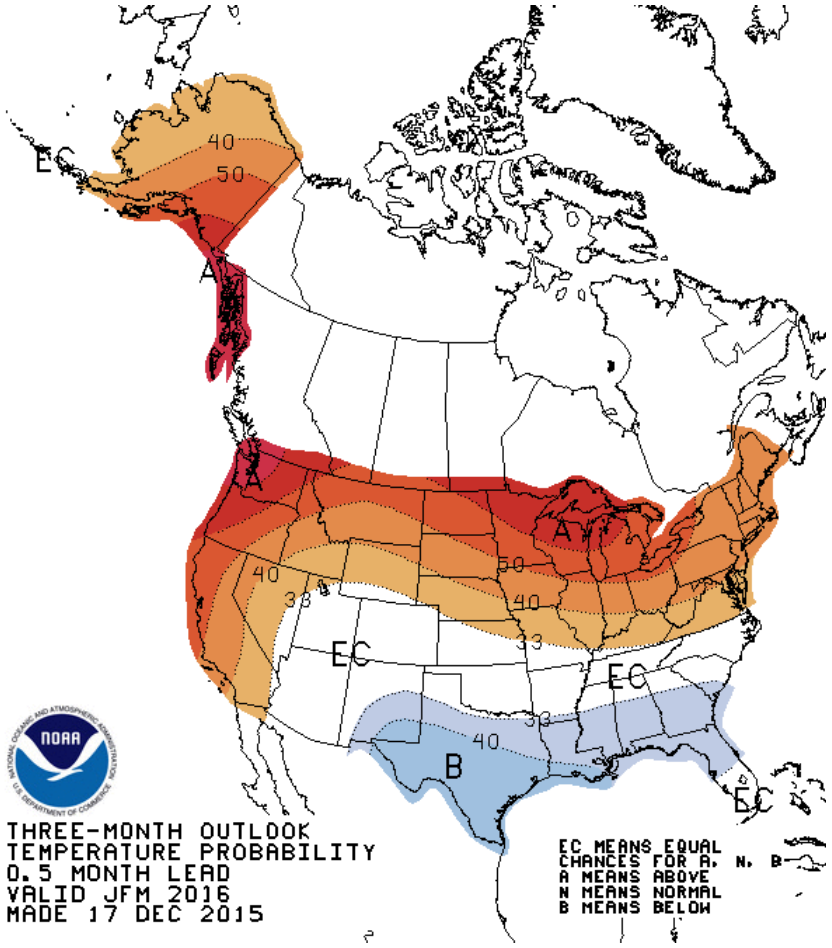
		Year																
	Ecosystem Indicators	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Ocean basin	PDO (Sum Dec-March)	16	6	3	12	7	17	11	15	13	9	5	1	14	4	2	8	10	18
	PDO (Sum May-Sept)	10	4	6	5	11	15	14	16	12	13	2	9	7	3	1	8	17	18
	ONI (Average Jan-June)	18	1	1	6	12	14	13	15	8	11	3	10	16	4	5	7	9	17
Physical	46050 SST (°C; May-Sept)	15	8	3	4	1	7	18	14	5	16	2	9	6	10	11	12	13	17
	Upper 20 m T (°C; Nov-Mar)	17	11	8	10	6	14	15	12	13	5	1	9	16	4	3	7	2	18
	Upper 20 m T (°C; May-Sept)	14	11	13	4	1	3	18	16	7	8	2	5	12	10	6	15	17	9
	Deep temperature (°C; May-Sept)	18	6	8	4	1	9	12	14	10	5	2	7	13	11	3	17	16	15
	Deep salinity (May-Sept)	18	3	7	4	5	14	15	8	6	1	2	11	16	10	9	13	17	12
Biological	Copepod richness anom. (no. species; May-Sept)	17	3	1	7	6	13	12	16	14	11	8	10	15	4	5	2	9	18
	N. copepod biomass anom. (mg C m^{-3}; May-Sept)	17	13	9	10	3	15	12	18	14	11	6	8	7	1	2	4	5	16
	S. copepod biomass anom. (mg C m^{-3}; May-Sept)	18	2	5	4	3	13	14	17	12	10	1	7	15	9	8	6	11	16
	Biological transition (day of year)	17	11	6	7	8	12	10	16	15	3	1	2	14	4	9	5	13	18
	Ichthyoplankton biomass (mg C 1000 m^{-3}; Jan-Mar)	18	9	2	5	7									12	8	6	17	4
	Chinook salmon juvenile catches (no. km^{-1}; June)	17	4	5	15	10									14	3	2	9	13
	Coho salmon juvenile catches (no. km^{-1}; June)	17	7	12	5	6									13		1	11	8
	Mean of ranks	16.5	6.6	5.9	6.8	5.8	11.7	13.9	14.9	11.3	8.5	2.7	7.5	11.4	7.5	6.1	7.1	11.7	14.5
	Rank of the mean rank	18	5	3	6	2	13	15	17	11	10	1	7	12	7	4	7	13	16

2015 was 3rd worst year (1998 was the worst, 2005 was 2nd worst)

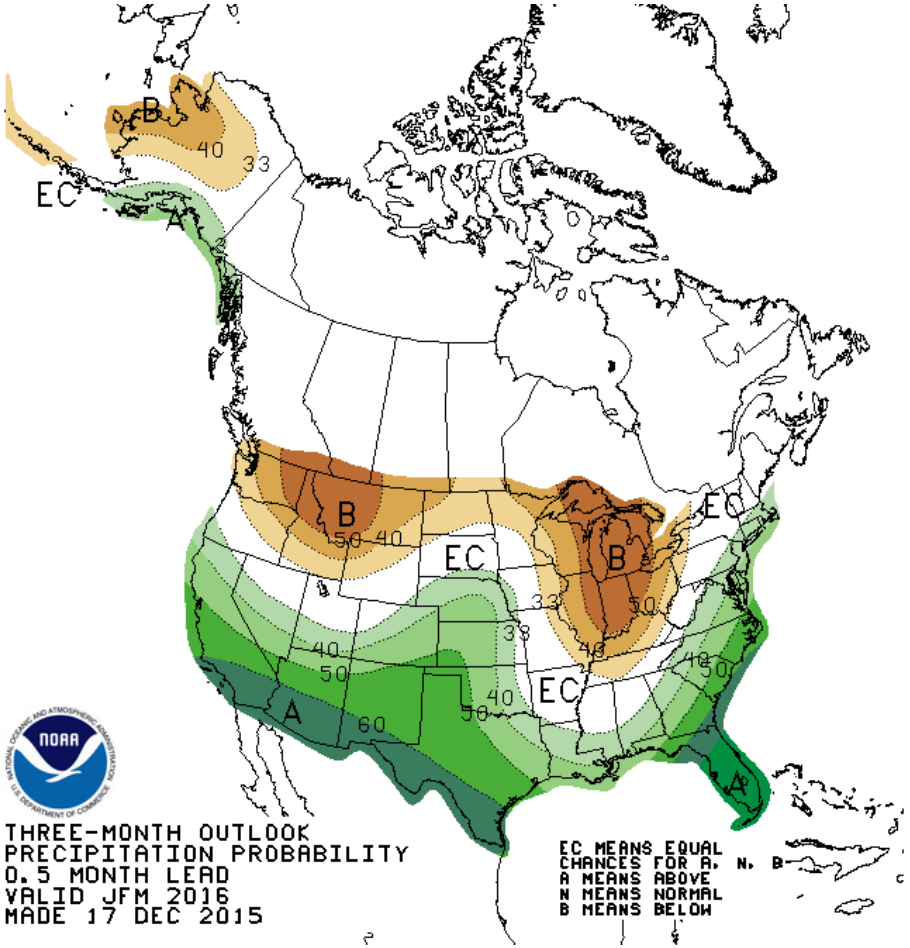
3 month climate outlook

www.cpc.ncep.noaa.gov

Temperature



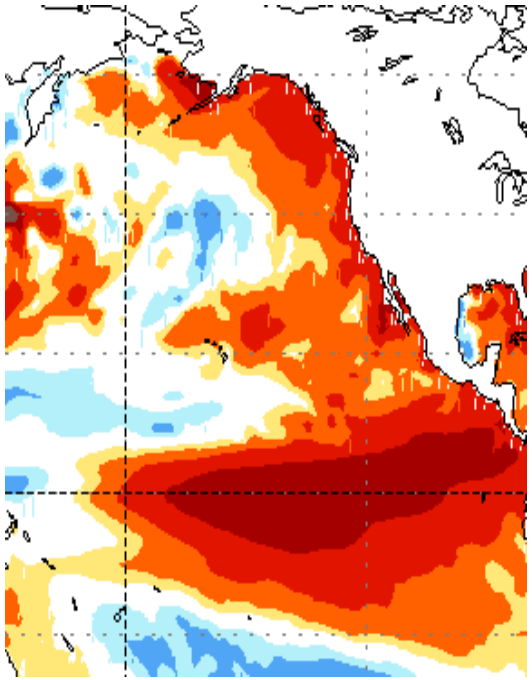
Precipitation



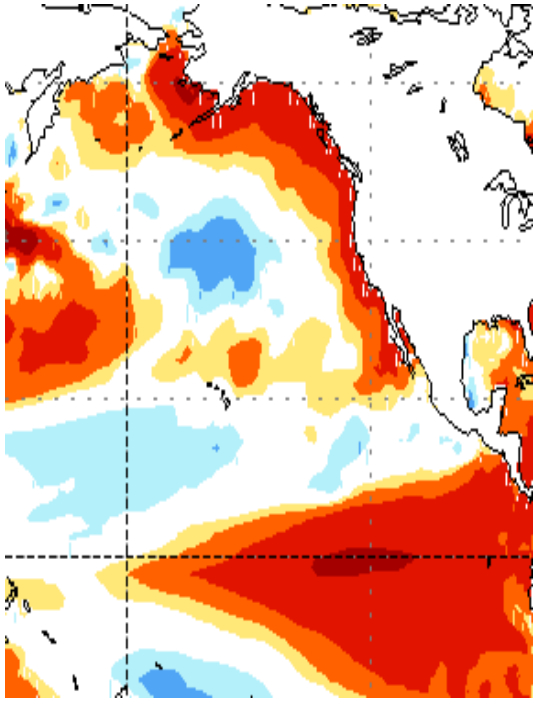
Forecast SST anomalies

NOAA Climate prediction Center coupled forecast model 2

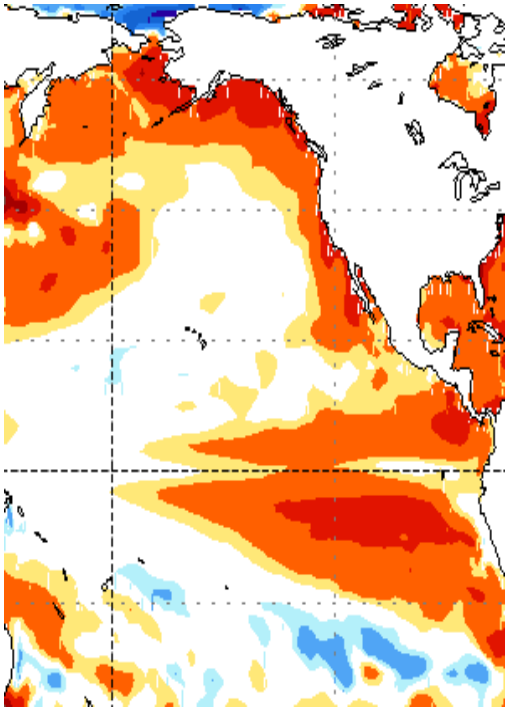
Jan-Feb-Mar 2016

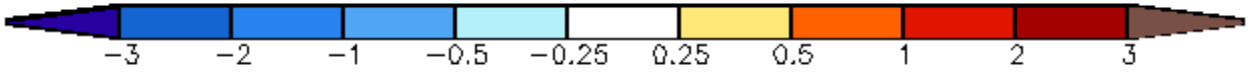


Apr-May-Jun 2016



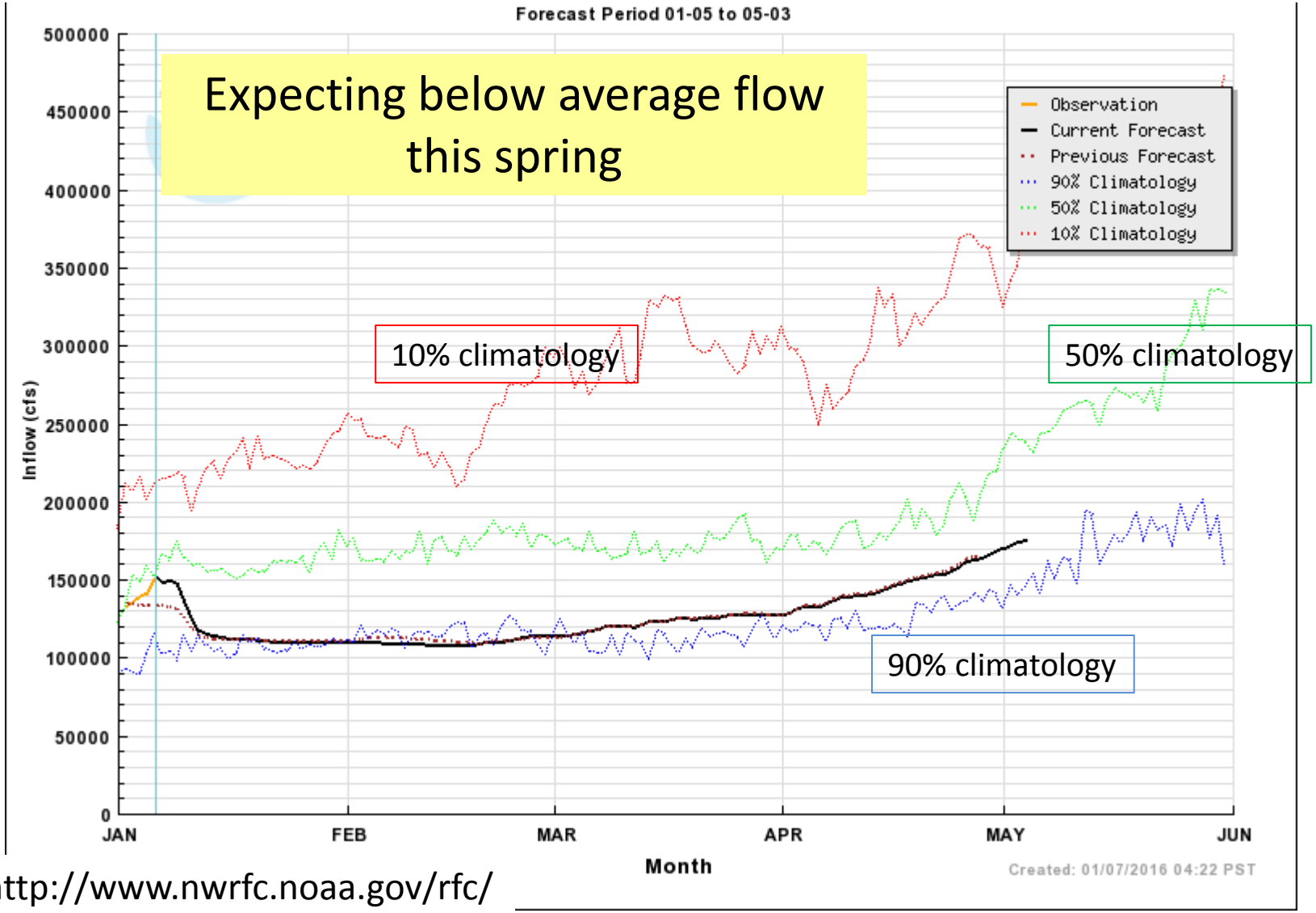
Jun-Jul-Aug 2016





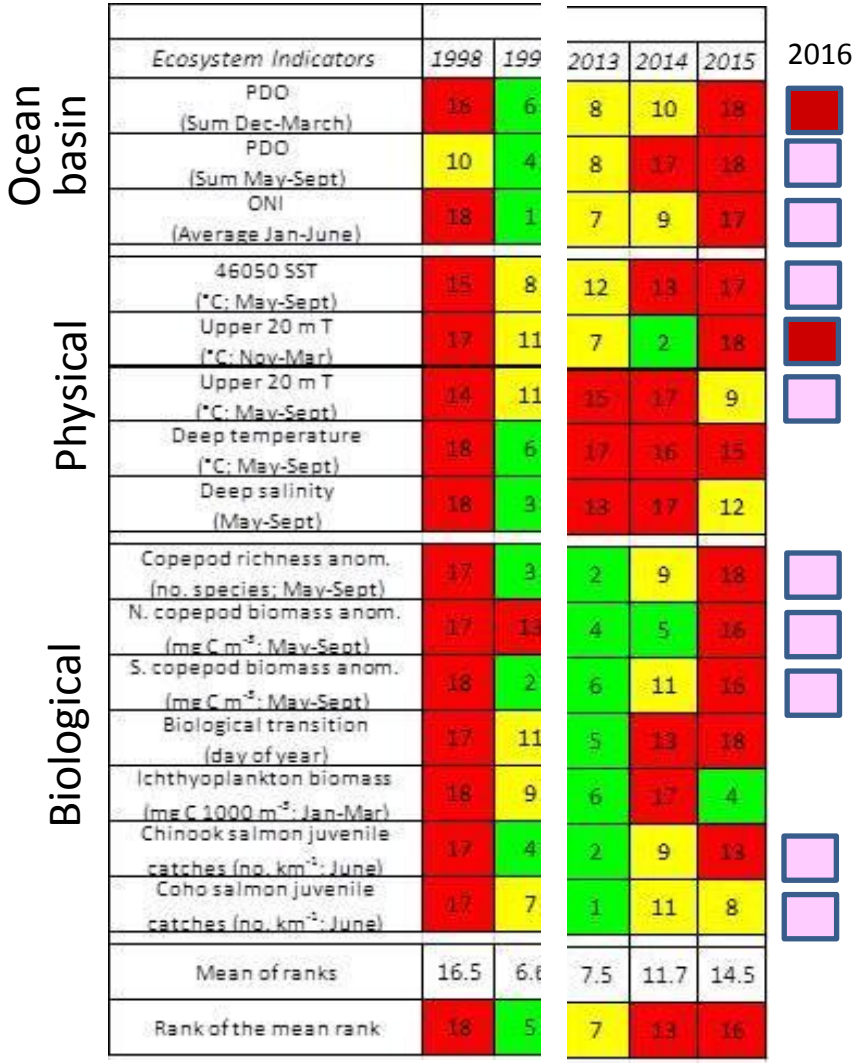
http://www.cpc.ncep.noaa.gov/products/CFSv2/CFSv2seasonal.shtml

Columbia River: 120 day flow forecast



http://www.nwrfc.noaa.gov/rfc/

Laurie's expectations for 2016



	Ecosystem Indicators	1998	199	2013	2014	2015	2016
Ocean basin	PDO (Sum Dec-March)	16	6	8	10	18	
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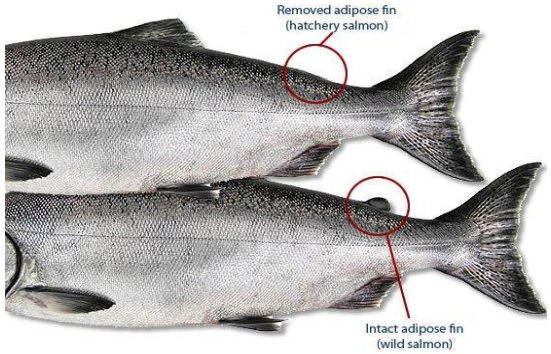
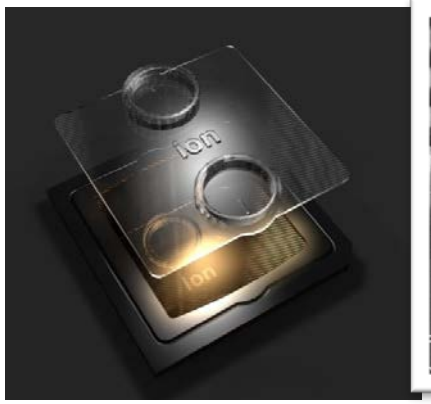
	Mean of ranks	16.5	6.6	7.5	11.7	14.5	
	Rank of the mean rank	18	5	7	13	16	

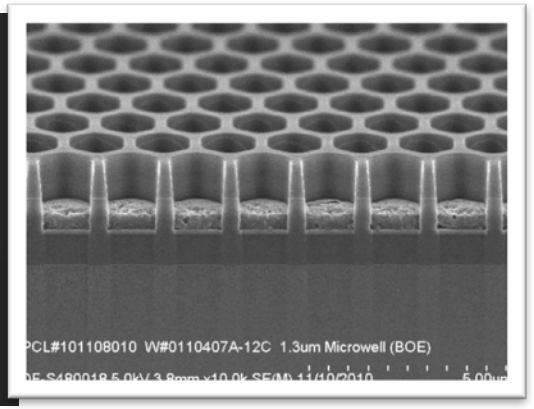
Summary & conclusions

- Effects of warm blob continues, expect increasing influence of El Niño in coastal waters and on land
  - Expect warm coastal water to persist through summer 2016
  - On land, expect below-average precipitation and above-average temperatures across the PNW this spring
- Biological response to warm blob has been huge
  - Range extensions, new/unusual species at all trophic levels
  - Expect continued biological response to El Niño conditions (observed in 1998 after 1997/98 El Niño)
- NWFSC Indicators and poor coho and Chinook jack returns in 2015 indicate poor ocean conditions for PNW salmon that entered ocean in 2014
  - Likely influence Chinook adult returns in 2016(?)
- Expect unfavorable conditions for PNW salmon entering ocean in 2015
  - Suggests low returns in 2016 (coho), 2017 (Chinook)
- Early indications suggest 2016 ocean conditions may be unfavorable for juvenile salmon due to lingering El Niño

CSC report on the Feasibility of use of Parentage-Based Tagging for management of Pacific Salmon







Committee on Scientific Cooperation

January 2016

Portland, British Columbia, Canada

Background

- Coded wire tag technology is at the core of coastwide management approaches for Chinook and Coho salmon.
- The Commission has long recognized the challenges in maintaining the integrity of these programs given fiscal constraints.
- Increasingly complex fisheries management practices challenge the capabilities of the technology and the capacity to sample.
- These issues were identified for consideration by the 2005 CWT expert panel and expanding application of PBT was recognized as a potential alternative given improvement in the PBT technology.
- The Committee on Scientific Cooperation through consultation with PSC Technical Committee's identified the need to re-assess the potential of PBT and RFID tagging technologies.
- Southern Fund provided support for PBT component

What is Parentage-Based Tagging ?

- Underlying principle of PBT is that sampling and genotyping the broodstock at a hatchery will provide genetic “tags” for their offspring that can be recovered through statistical parentage analysis.
- Since this “tagging” process requires genotyping the parents only, PBT is highly efficient at marking, with one pair of genotypes providing thousands of tag releases.
- Fish can be sampled in fisheries and escapement monitoring surveys and identified by pedigree analysis to the hatchery and year of release.

PBT Project (1)

- Oversight Committee (OC) developed a Request for Proposal, selected contractor, and provided feedback to contractor during project.

- OC composed of CSC members and individuals from the Chinook Technical Committee, Coho Technical Committee, and Selective Fishing Evaluation Committee, and included a NOAA and CDFO geneticist

PBT Project (2)

- Selected contracted multidisciplinary team with expertise in economics, genetic, fisheries sampling and CWT analyses
  - William Satterthwaite (NOAA Fisheries, SWFSC)
  - Eric Anderson (NOAA Fisheries, SWFSC)
  - Matthew Campbell (IDFG, Eagle Fish Genetics Lab)
  - John Carlos Garza (NOAA Fisheries, SWFSC)
  - Michael Mohr (NOAA Fisheries, SWFSC)
  - Shawn Narum (Columbia River Inter-Tribal Fish Commission)
  - Cameron Speir (NOAA Fisheries, SWFSC)
- Multiple meetings with OC and the contractor
- Report Submitted April 2015
- Report has been posted on PSC website

PBT Project - Objectives

- Evaluate feasibility and cost of a coordinated coastwide program based on PBT that would provide equivalent information for the same type of group-specific run re-construction analyses currently informed with CWTs.

- Take into account mass marking, Double Index Tagging (DIT), and wild stock tagging needs.

- Provide information on ancillary benefits that might arise from a PBT-based system

PBT Project – Cost Assumptions

- Fishery sampling costs are equivalent for recovering a sample (head or tissue) for both a CWT and a PBT system
- Average fin-clipping and CWT costs are more expensive in AK than other jurisdictions
- Sample processing costs for either CWT or PBT are consistent coastwide
- Genotype costs can be characterised for two sequencing technologies: GBS @ $7/sample
  ExN @ $22.50/sample

PBT Project – Evaluated Scenarios

- CWT current system
- PBT only
- PBT with agency-specific tags (AWT) to flag PBT fish for reduced fishery sample size
- Hybrid system using PBT for hatchery fish and CWT for wild fish

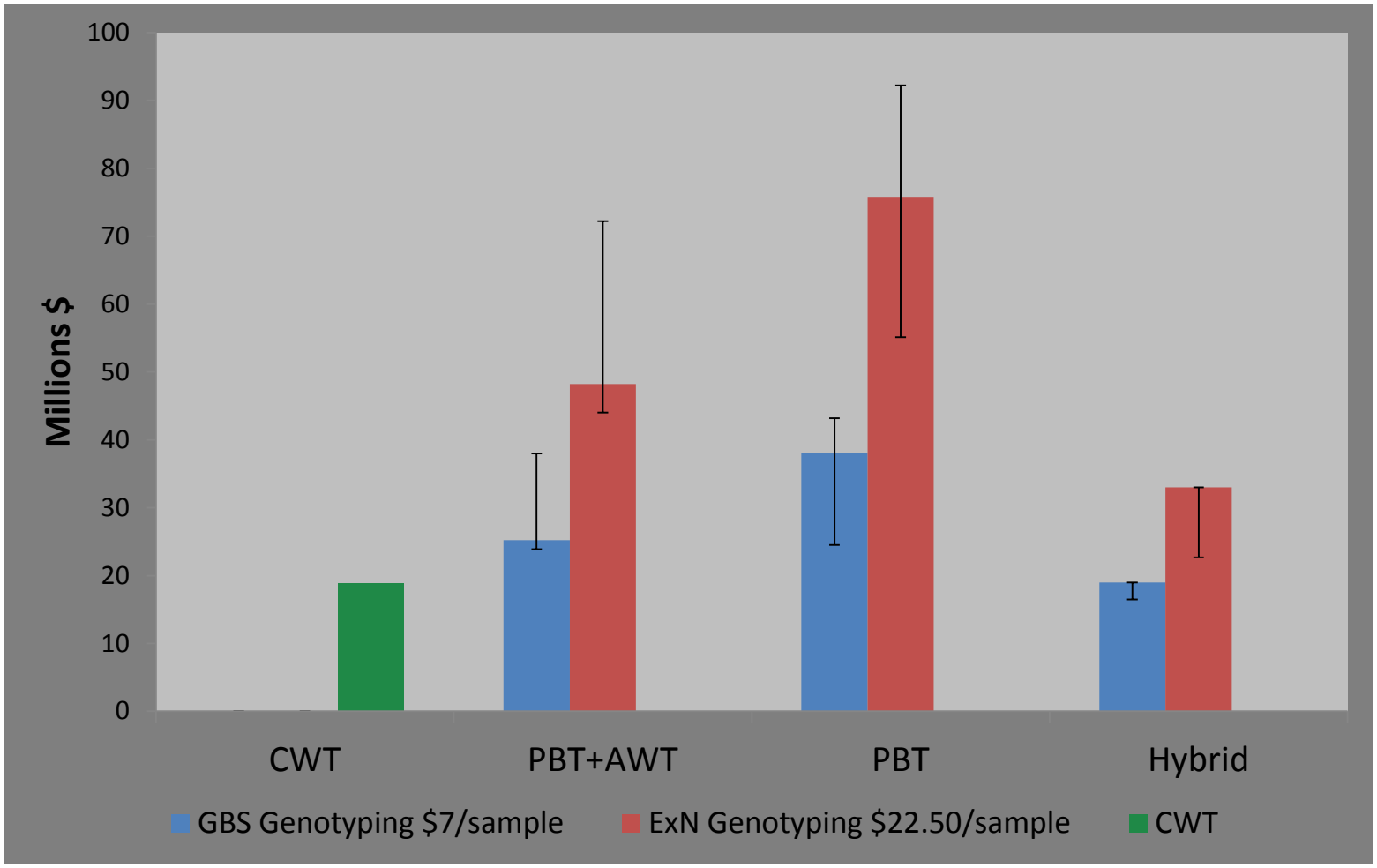
PBT Project – Answers (1)

- PBT is a powerful new analytical tool that has broad applicability for salmon research and management
- PBT could be used to provide the information currently generated by the CWT system for hatchery indicator and production stocks
- PBT also could provide ancillary information on fitness, survival, and hatchery broodstock performance.

PBT Project – Answers (2)

- PBT is not feasible as a replacement for wild stock tagging, requires genetic fingerprinting (expensive)
- For evaluated scenarios, PBT is more expensive than the current system because of costs for wild stock tagging and number of fishery samples required
- At very optimistic genotyping costs, a hybrid PBT/CWT system may be cost-effective

Comparison of CWT and PBT Costs for Marking and Sample Processing



CSC REVIEW

- The CSC reviewed the report with input from the Oversight Committee.
- The CSC developed a summary paper that was provided to the Commission in August 2015.
- The Conclusions reached by the CSC are theirs alone and do not reflect all of the views held by members the Oversight Committee.
- The CSC review could be posted on the PSC website at the discretion of the Commission.

CSC Conclusions (1)

1. An exclusively PBT-based system, though intrinsically feasible, is not cost-effective at this time when compared to the existing CWT system.

2. Cost-effectiveness of the proposed hybrid systems is unclear at present and is dependent on whether or not the proposed approximately $7/fish genotyping cost of a GBS system is a realistic value for genotyping in the near future.

CSC Conclusions (2)

3. If a $7/fish cost for GBS could be achieved in the future, additional factors should be considered in assessing the relative costs of PBT- and CWT-based system. These factors were outside the scope of the report and include the following:
   - Assessment of infrastructure costs.
   - Assessment of the probability that a hybrid system would be “sustainable.”
   - Assessment of the feasibility of a secondary external mutilation mark.
   - Assessment of capital costs.

CSC Conclusions (3)

4. The report makes clear that a number of problematic issues with the existing CWT-based system that were identified in the 2005 Expert Panel Report also pose problems for development of a PBT-based system.

5. The CSC agrees with the report authors that PBT is a powerful new analytical tool that has broad applicability for salmon research and management. It would be prudent to conduct a similar evaluation in 3-5 years considering the pace of development of this technology.

Radio Frequency Identification Tags Proposal

- RFID Identified by CWT Expert Panel as potential improvement to CWTs
- Allows non-lethal sampling, potential for mass-screening
- RFID tags have been used to tag bees, ants, and spiders
- RFID chips as small as 0.15 mm x 0.15 mm x 0.01 mm
  CWTs: Standard size 1.1 mm x 0.25 mm
  PIT: “Small” tags are 8.0 mm x 1.25 mm

Radio Frequency Identification Tags Proposal

Coded
Wire Tag

Radio Frequency Identification Tag Proposal

- Stage II Proposal under review by Northern Fund Committee for 2016 funding
- Funding request for 25K for contract
- Objectives:
  1. Review current application of RFID tags for animal identification and management.
  2. Compare sizes, tag costs, and application costs of RFID tags (including PIT tags) with CWTs.
  3. Review detection capabilities of RFID tags, including detection distances when embedded in tissue.
  4. Evaluate the feasibility of using RFID microchips for salmon mass-marking applications
- Information to be reported to PSC Science Community at February 2017 Annual Meeting

Next steps

- Conduct RFID evaluation project subject to receiving approval from the endowment fund.
- Re-evaluate the potential of PBT in 3-5 years and track development in the interim.
- Decision from the Commissioners regarding posting of CSC Review and Conclusions.

Review of Satterthwaite et al. 2015: *Multidisciplinary Evaluation of the Feasibility of Parentage-Based Genetic Tagging (PBT) for Management of Pacific Salmon*

Committee on Scientific Cooperation, Pacific Salmon Commission:

David Hankin, Humboldt State University (retired)

Carmel Lowe, Department of Fisheries and Oceans

Mark Saunders, Department of Fisheries and Oceans

Alex Wertheimer, National Marine Fisheries Service (retired)

August 2015

Background on Issuance of RFP, Report Development and Report Review

In October of 2013, the Committee on Scientific Cooperation (CSC) submitted a proposal, titled *Assessment of emerging technologies with potential to enhance and/or replace the current CWT system*, jointly to the Northern and Southern Funds for their consideration. This original proposal called for issuance of two RFPs for the following tasks: (a) a feasibility study of Parentage-Based Tagging (PBT) as a possible replacement for or complement to the existing Coded Wire Tag (CWT) system, and (b) an assessment of the current status and cost of miniaturized Radio Frequency Identification (RFID) tags that might be suitable for tagging juvenile Pacific salmon as a potential ``second generation'' alternative to CWTs. The Southern Fund granted funding for the PBT feasibility study. A total of $83,000 was awarded: $60,000 for development of a report consistent with the PBT RFP, with remaining funds to support travel to allow an Oversight Committee to develop the RFP, select an appropriate contractor, and review the delivered product. The Oversight Committee consisted of all four members of the Committee on Scientific Cooperation as well as the following individuals: Terry Beacham, Gayle Brown and Arlene Tompkins (DFO), John Carlile and Bill Templin (ADFG), Andy Gray (NMFS), and Marianna Alexandersdottir (NWIFC). A copy of the RFP issued by the PSC is attached as Appendix I.

The RFP was timely because a 2005 Expert Panel Report on the Future of the CWT System had concluded that ``There is no obvious viable short-term alternative to the CWT system that could

provide the data required for cohort analysis and implementation of PST management regimes for Chinook and coho salmon. Therefore, agencies must continue to rely upon CWTs for several years (at least 5+ years), even if agencies make decisions for development and future implementation of alternative technologies.'' The Expert Panel had also noted the development of a new technology, now termed Parentage-Based Genetic Tagging (PBT), that might, if feasible and cost-effective, replace or complement the CWT system in the future.

Since the 2005 report, there has been increasing application of PBT, primarily in the Columbia River system and in California's Central Valley system, as well as technological advancements in genomic technology. The CSC therefore believed it appropriate to revisit the potential management applications of this newly developing technology. Challenges facing the existing CWT program and identified in 2005 have persisted and in some cases increased. These challenges include: escalating complexity of salmon fishery management, increasing demand for finer scale management, more widespread implementation of Mass Marking and Mark-Selective Fisheries (MM&MSF), and incomplete sampling for Double Index Tags (DIT) in ocean and freshwater fisheries. All of these challenges have placed increased demands on the existing CWT system, but fiscal support for the CWT system has generally diminished. (Subsequent to the 2005 Expert Panel Report, the governments of the United States and Canada provided $7.5 million each to improve the performance of the existing CWT system, but those funds have since been exhausted.)

The issued RFP called for a detailed assessment of the feasibility of PBT to deliver estimates of parameters (age- and fishery-specific exploitation rates in ocean and freshwater fisheries, and survival rates from release to specified ocean age) that currently are used by the Pacific Salmon Commission (PSC) and the Pacific Fishery Management Council (PFMC) to assess performance of fisheries, ensure that stocks of concern are not overfished, and guide development of fishing regulations. Estimates of these parameters are currently based on cohort reconstruction methods applied to recoveries (expanded by sampling fractions) of fish from CWT release groups (of both hatchery- and natural-origin) generated from sampling of ocean and freshwater fisheries and natural spawning escapements, and enumeration of returns to hatcheries. In addition, the RFP called for a comparison of the probable cost of a coast-wide system based on PBT with that of the existing CWT system. The RFP specifically noted that a multidisciplinary team, including fisheries modelers with expertise in salmon management as well as geneticists with expertise in development or application of the PBT concept, would be needed to develop an adequate response to the RFP.

In August of 2014, the Oversight Committee awarded the RFP to a highly qualified team with direct knowledge of contemporary management of Pacific salmon and of PBT development and application. Team membership included five fisheries scientists from the National Marine

Fisheries Service Ecology Lab in Santa Cruz, CA: Will Satterthwaite and Michael Mohr (fisheries modeling and salmon management), Carlos Garza and Eric Anderson (genetics and PBT) and Cameron Spier (economics); and two fisheries geneticists with expertise using PBT in the Columbia River system: Shawn Narum (Columbia River Inter-Tribal Fish Commission) and Matt Campbell (Idaho Department of Fish and Game). This team submitted a draft report to the Oversight Committee in early January of 2015; two members of the team (Satterthwaite and Spier) gave a preliminary oral report of progress at the February 2015 PSC meeting; and the final report was submitted on 01 April 2015, and posted at the PSC website on 28 April 2015. Members of the Oversight Committee reviewed and discussed the submitted final report, with the CSC responsible for development of this written assessment of the report's implications by July-August 2015.

Summary of CSC Findings and Recommendations

In a PBT-based system, as the authors envisage, all hatchery broodstock would be genotyped, thereby resulting in genetic tagging of all hatchery fish. All progeny produced from specific sets of genotyped parents would be reared and released in an identical fashion, thereby generating ``PBT release groups'' directly analogous to current ``CWT release groups''. Sampling programs for ocean and freshwater fisheries, spawning escapements, and hatcheries would produce recoveries of fish from PBT release groups via statistical matching of genotypes of sampled individuals to two genotyped hatchery parents (mother and father - offspring *trios*) or to single parents (parent-offspring *pairs*). All parent genotypes would be stored in a coast-wide database of hatchery parent genotypes, and a Regional Mark Information System (RMIS)-like database would be used to store observed and expanded PBT recoveries.

The ability to efficiently and cost-effectively tag the entire production of a hatchery by genotyping a relatively small number of parents has considerable conceptual appeal, and recent preliminary applications of PBT suggest that this approach could feasibly generate recovery data required for current management of Chinook and coho salmon by the Pacific Salmon Commission. Whether or not the PBT approach could (or should) replace or be used to complement the existing CWT system, however, depends on the relative operating costs of the two systems (or of hybrid systems), and on the quality and quantity of information generated by the two systems. It would only make sense to switch to PBT-based or PBT-augmented systems if the operating costs of these systems were less than those of the current CWT system and the information generated were at the very least equivalent, *or* if the costs of a PBT-based system were only modestly greater but the quality and quantity of generated information were considerably greater than for CWT. Assessing the relative costs of competing schemes is, in principle, relatively straightforward. Costs of applying and recovering CWTs are well-defined and well documented. Costs of genotyping required to implement PBT have fluctuated

considerably across laboratories and technologies, but in principle meaningful costs per fish of genotyping can be based on current experience and technology or on anticipated near-term changes in technologies. In their calculations of the relative costs of a number of alternative PBT-based systems (a synopsis of report methodologies and findings is presented as Appendix II), the authors have assumed two possible costs per fish of genotyping (192 SNPs):

1. $7/fish for *genotyping by sequencing*, GBS (a low cost anticipated to be achievable by a new developing technology, but at an unknown time in the future); and,
2. $22.50/fish for genotyping by *exonuclease-based sequencing,* ExN (approximate current cost for an existing proven technology).

It is much more difficult to place a monetary value on information generated from tag recovery data, even though modern salmon management is heavily reliant on such data. The authors of the report made no attempt to quantify the relative value of information generated from PBT-based and CWT-based systems, but instead restricted their analyses to the more limited comparison of total operating costs of three of their five proposed alternative PBT-based systems with those of the existing CWT system. (Note: “total operating costs” excluded costs of sampling required to collected heads (CWT) or genetic material (PBT), per the RFP instructions. Sampling costs were assumed to be identical for PBT or CWT systems.)

Using the two alternative genotyping costs per fish and existing data on costs per fish of applying adipose fin clips (ADC), inserting CWT or blank agency wire, etc., and data summarizing hatchery releases and recent ocean fishery sampling statistics, the authors found that the total costs (tagging plus recovery) of all three of the alternative PBT-based systems (and variants of these systems) exceeded those of the existing CWT system for the current ExN genotyping method, but that the total costs of a ``hybrid'' system (two variants) were similar to or slightly less than total costs of the existing CWT system for the low-cost GBS genotyping method. (In hybrid systems, PBT would be used to tag all hatchery fish, but CWT would be used to tag all natural-origin fish.) The high estimated costs of non-hybrid PBT-based systems relative to the existing CWT system were primarily due to two factors: (a) inability to directly apply the PBT concept to natural-origin smolts which cannot be tagged via genotyping of parents, but must instead be genotyped individually and recovered using DNA fingerprinting; and (b) difficulties in design of a recovery system which can cost-effectively reduce the number of ADC and unmarked fish which would need to be genotyped in ocean and freshwater sampling programs. (The second of these factors is a direct consequence of mass marking in which large numbers of hatchery fish are now released with ADC but without CWT, associated mark-selective fisheries, and double-index tagged (DIT) releases of unmarked fish with CWTs.)

As noted above, for the hybrid systems *which assume low GBS genotyping costs*, hatchery fish would be all tagged with PBT but natural-origin fish (and possibly also some very small hatchery

populations and special unplanned releases) would be tagged with ADC+CWT as at present. Thus, the hybrid schemes would require simultaneous operation of two coordinated coast-wide systems: one for PBT releases and recoveries, and one for CWT releases and recoveries. For one of the hybrid systems considered, Alternative 5, the calculated total operating cost was just slightly higher ($19.02 million) than the equivalent cost of the existing CWT system ($18.87 million). A second hybrid system, Alternative 5a, assumed that some secondary mutilation mark (e.g., left ventral fin clip) could be used to allow visual identification of ADC fish that belonged to PBT release groups (or non-ADC fish that belonged to DIT groups), thereby greatly reducing genotyping sample sizes. Calculated total cost for Alternative 5a ($16.46 million) was less than that for the existing CWT system. Calculated *break even* costs per genotype (cost per fish which make a proposed alternative hybrid systems equal in cost to the existing CWT system) were $6.84/fish and $12.97/fish for Alternatives 5 and 5a, respectively.

Based on our review of the authors' report, members of the CSC conclude the following:

1. An exclusively PBT-based system, though intrinsically feasible, is not cost-effective at this time when compared to the existing CWT system.

2. Cost-effectiveness of the proposed hybrid systems is unclear at present and appears to depend on whether or not the proposed approximately $7/fish genotyping cost of a GBS system is a realistic value for genotyping in the near future.

3**. If a $7/fish cost per fish for GBS could be achieved in the future, additional factors should be considered in assessing the relative costs of PBT- and CWT-based system. These factors were outside the scope of the report and include the following:**

- **Assessment of infrastructure costs.** In their calculations of the relative costs of the proposed hybrid systems, the authors did not consider costs associated with the coast-wide infrastructure and databases that would be needed to maintain two distinct systems: a PBT system and a CWT system. A comprehensive comparison with the existing CWT system warrants consideration of such costs.

- **Assessment of the probability that a hybrid system would be ``sustainable''** in the long term for both hatchery and wild stock tagging. In the proposed hybrid systems, PBT is used to tag close to 100% of all hatchery releases. Coast-wide support for the CWT system might wane if it were used only to generate recoveries of natural-origin fish. CWT tagging of natural-origin fish is currently of relatively small magnitude when compared to overall levels of CWT tagging of hatchery fish and also varies regionally in importance. We note, for example, that natural origin CWT tagging is clearly of great importance for naturally spawning populations of Chinook salmon in southeast Alaska

(including the transboundary Taku and Stikine rivers) and in the Lewis River and Hanford Reach of the Columbia River, but natural origin Chinook salmon are not marked in British Columbia. Wild stocks of coho salmon are marked with CWT in both British Columbia and Washington for use in the Coho Technical Committee management model. Total CWT recoveries from natural-origin fish are very small relative to those from all CWT'd hatchery populations combined.

- **Assessment of the feasibility of a secondary external mutilation mark**. The CSC considers it highly unlikely that a suitable secondary external mutilation mark will become available to support implementation of the more economically attractive hybrid system, Alternative 5a. Indeed, the desirability of identifying such a secondary mutilation mark was noted in the 2005 Expert Panel Report on the Future of the CWT Program (in the context of sampling problems associated with mass marking and large scale release of ADC fish without CWT). No suitable mark has yet been identified/introduced due to concerns over mark-induced mortality (especially for Chinook populations with subyearling smolts), suspected large errors of mark recognition at recovery, and suspected difficulties of developing auto-tagging procedures for asymmetric mark types. Instead, electronic tag detection (ETD) was introduced to identify presence of CWT among ADC fish (or among unmarked fish with CWT that belong to DIT groups).

- **Assessment of capital costs.** The Report did not consider in detail capital costs that would be required to establish a new coast-wide PBT-based tag recovery system, yet such costs need to be appropriately assessed to support a more rigorous comparison of system costs.

4. The report makes clear that a number of problematic issues with the existing CWT-based system that were identified in the 2005 Expert Panel Report also pose problems for development of a PBT-based system. One such issue is mass-marking for mark-selective fisheries. For either CWT or PBT, sampling complexity and cost are greatly increased due to mass-marking, the resolution of data is sometimes decreased, and the DIT approach (to assess fishery impacts on unmarked populations) has yet to be fully implemented. (Ocean and freshwater fisheries seem generally not sampled for catches of DIT fish: see the most recent Selective Fishery Evaluation Committee report). When stocks are exposed to MSF, the fishery exploitation rates experienced by AD+CWT hatchery fish can no longer be assumed the same as those for unmarked natural origin populations of conservation concern.

Although the report indicates that a PBT-based system is theoretically feasible and could generate the same information as currently generated by the CWT program, the CSC concludes that the existing CWT system remains a more cost-effective system for providing the information required for PSC management models. Further study of the issues we have identified above is recommended for a more comprehensive comparison of the costs of CWT- and PBT-Based systems. The CSC also recognizes the substantial value of data that may be generated by genotyping parents and their returning progeny at fish hatcheries. Such data, if augmented by estimated age-specific mortality rates based on CWT recovery data, could be used to establish inheritance of traits such as age at maturity, fecundity or growth rates, to assess variation in family size, and for many other purposes that could enhance our scientific understanding of Pacific salmon and steelhead and strengthen fishery management practices and hatchery operations. In light of this, and considering the pace of development and downward evolution of costs in the PBT-field, the CSCS recommends that a reassessment of the relative costs and merits of the PBT-based or hybrid PBT/CWT systems should be undertaken again in five years or possibly sooner if technological changes or significant reductions in cost warrant it.

The CSC believes that the authors of the report have provided an outstanding and objective assessment of the feasibility and costs of implementing a PBT-based system for management of Pacific salmon. We thank them for their willingness to take on a very difficult task with very modest funding, and we commend them for their efforts. We also thank the members of our Oversight Committee for their time and effort supporting the CSC members in their preparation of this review.

Finally, we note that the CSC had also originally proposed issuance of an RFP for an assessment of the current status and cost of miniaturized RFID devices that might alternatively replace the CWT in a system that would otherwise be essentially unchanged. In principle, miniaturized RFID tags would allow real-time (and possibly repeated) non-lethal recoveries and elimination of costs associated with extraction and reading of CWTs. Although this proposal was not supported, the CSC continues to recognize the merits of such a study and advocates for its initiation in the immediate future. In the meantime, the CSCS strongly encourages the PSC and its cooperating agency partners to fully support the existing coordinated coast-wide CWT system.

APPENDIX I. Posted RFP.

REQUEST FOR PROPOSALS:

EVALUATION OF THE FEASIBILITY AND COST-EFFECTIVENESS OF DEVELOPING A COORDINATED COAST-WIDE TAG RECOVERY SYSTEM USING PARENTAL BASED TAGGING (PBT)

BACKGROUND STATEMENT

The coast-wide Coded Wire Tag (CWT) Recovery System was developed in the early 1970s and for the past 40 years has generated critical information that supports the management of Chinook and coho salmon fisheries along the Pacific Coast of North America, from central California to southeast Alaska. The importance of CWT recovery data for salmon management is exemplified in the 1985 Pacific Salmon Treaty (Memorandum of Understanding, August 13, 1985, Section B: Data Sharing, 1985 PST Agreement) that obligates the US and Canada to maintain the CWT system to support management of PSC salmon fisheries.

The level of coast-wide coordination that has been accomplished with the CWT recovery system represents an unprecedented achievement in collaborative and cooperative management of salmon fisheries. Recent issues raised by mass marking and mark-selective fisheries, as well as reduced or insecure funding for certain aspects of the CWT system, have generated recent consideration of the future of the CWT system. A 2005 Expert Panel report prepared by the Pacific Salmon Commission concluded that the CWT system was clearly the only viable means to generate critical information required for salmon management “for at least the next five to ten years”. The time therefore appears ripe to reevaluate this assessment.

Since 2005, a new genetic approach, termed Parental Based Tagging (PBT), has emerged as a potential alternative to the CWT system and substantial experience has been gained in application of this approach on local scales (i.e., within watersheds). Although some proponents of PBT have argued or implied that PBT should quickly replace the CWT system on a coast-wide basis, many fishery scientists who have for many years used CWT recovery data for fishery management are highly skeptical that an effective and highly coordinated coast-wide PBT system could be developed and provide the same type and level of information as the CWT system for all stocks of interest. There is also skepticism that it could be operated in a cost-competitive fashion when compared with the existing CWT system.

No transition from the coast-wide CWT system to any alternative approach, such as PBT or perhaps new RFID tags, would make sense unless it met the following criteria:

1. The alternative system would need to have long-term annual operating costs that would be no more than or, ideally, substantially less than that of the existing CWT system.
2. The alternative system would need to generate at least the information that is currently generated from the CWT system via run reconstruction (cohort) analyses of estimated recoveries from individual CWT release groups.

Assuming that transition from the existing CWT system to a coast-wide system based on PBT might be feasible and cost-effective, it is important to recognize that it would be highly desirable to maintain (and secure funding for) both systems for at least one full Chinook salmon brood cycle (5 years) so that direct empirical comparisons could be made concerning the performance of the two systems and comparability of information generated from the two systems. Therefore, unless the cost of a coast-wide PBT system were *substantially* less than that of the existing CWT system, a transition from the existing CWT system to PBT or some alternative system would not make sense unless:

3. The alternative system delivers additional or novel information, not provided by the existing CWT system, that would inform management of fisheries for coho and Chinook salmon.

REQUEST FOR PROPOSALS

We seek proposals for development of a report that would achieve the following overarching objective:

> ***Evaluate the feasibility and cost of developing a coordinated coast-wide tag recovery program that would be based on the PBT concept*.**

Requested Report Structure

The developed report would have the following required structure and content and should, wherever judged appropriate, distinguish between issues raised for Chinook as compared to coho salmon:

Part I. Current Status of the CWT System and of the PBT Concept and Applications.

A. Update on the current status , operation, and concerns with the existing CWT system based on reports and experiences since publication of the 2005 Expert Panel Report on the Future of the Coded Wire Tag Recovery Program for Pacific Salmon. This update should focus on the following specific issues:

   1. Progress and concerns identified by the Coded Wire Tag Improvement Team (CWTIT) since 2005;
   2. Current status of mass marking (100% AD-clip), mark-selective fisheries (MSF: coast-wide extent and locations of implementation) and assessments of MSF impacts for coho and Chinook salmon, and of Pacific coast hatchery marking programs generally (including California);

B. Overview of the PBT concept and a review of recent applications of this concept, including both published applications and on-going implementations that have not yet generated published reports.

Part II. Structure, Feasibility and Cost of a Coordinated Coast-Wide PBT Tag Recovery System.

A. Detailed description of the structure of and requirements for a coordinated coast-wide PBT tag recovery system that could allow the same kind of tag group-specific run reconstruction analyses that are currently performed based on recoveries of CWTs. The description must include locations and requirements for tagging and sampling for tag recoveries; address the timeliness of sample analysis for both in-season and post-season applications; quantify the required laboratory capacities (throughput, precision/accuracy of genotyping and assignments, and resolution); identify the computing resources required to perform and store data related to parental assignments; and address coastwide coordination, data sharing, and analytical verification of parental assignments and QA/QC. Requirements should be given separately for a system that would generate information from unmarked (adipose fin intact) fish belonging to paired groups designed to assess impacts of mark-selective fisheries, and for a system that does not attempt to generate this information.

B. Description of the requirements for hatchery programs to implement a parental-based tagging program, to maintain tagged groups without mixing between different tagged groups, and to accurately assess the number of tagged individuals per tagged group at the time of release. This section would also determine the degree to which substantial hatchery infrastructure changes would be needed to implement PBT.

C. Assessment of the degree to which this system could or could not deliver estimates of the key life history and fishery parameters that are currently delivered from the CWT program and do so with similar or better accuracy (i.e., consider errors of estimation). Identify areas or issues where implementation of PBT on a coast-wide basis seems most problematic.

D. Identification of additional information that could be generated from a coast-wide PBT system, over and above the kind of information that is currently generated from CWTs.

E. Identification of any qualitative benefits that might be realized if PBT were adopted (e.g., no need to remove heads on fish destined for “whole fish” market; no issues re cooperation of fishermen with recovery of heads).

F. Assessment of whether or not the PBT concept could be applied to tagging of wild stocks, specifically when acceess to parent spawners is impossible or impractical.

G. Assess more limited and targeted applications of the PBT technology that could cost-effectively supplement or replace “parts” of the existing CWT system.

H. Assess the degree to which additional specific issues (see Appendix A) might rule out feasible or cost-effective application of PBT (for fisheries management purposes) on a coast-wide basis.

I. Quantify the probable range of costs for implementation of a coast-wide tag recovery system based on PBT and compare the cost of this system against the costs of supporting the existing CWT tag recovery system. (See Appendix B for further details.)

J. If judged meaningful, determine the "break-even" cost-per-fish of genotyping that would generate approximately equal costs for support of CWT-based and PBT-based systems.

Proposal Due Date, Available Funding, and Time Frame for Report Development

Proposals are due no later than July 15, 2014.

Funds available to support preparation of the requested report are $60,000, to cover all expenses (including indirect costs, if any), awarded on a not-to-exceed basis.

We anticipate the following dates for achieving key milestones in development of the requested report:

mid-August 2014:	Bid proposals reviewed by Oversight Committee and selection made. Initial teleconference of contractor (lead party) with Oversight Committee.
early November 2014	Preliminary Report of Progress. Teleconference with members of the Oversight Committee, if judged necessary.
15 December 2014:	Draft report from contractors due for Oversight Committee Review and payment of $30,000 to the contractor.
15 January 2015:	Comments on Draft report due back to contractor.
11 February 2015:	Presentation of draft findings by RFP contractor to the Pacific Salmon Commission's science community, including preliminary response to comments.
01 April 2015	Submission of Final Report to the PSC and payment of remaining $30,000 to contractor.

Requested Respondent Proposal Packages:

Respondents must submit the following:

1. A plan (including timeline and budget costs) for development of the requested report;

2. A listing of individuals proposed to participate in development of the requested report, including identification of their specific areas of expertise, and brief (2 page) CVs for each participating individual;

3. Names and contact information for references who could be contacted concerning prior success in developing reports in response to RFPs;

Selection of Awardee:

The selected awardee must show expertise and understanding regarding the following areas:

1. Salmon fisheries management in the PST and PFMC jurisdictions.
2. Current methods used by PSC technical teams for analysis of CWT data.
3. Procedures for insertion of, sampling for, and detection of CWTs.
4. Theory and application of PBT in salmon research and management in the PST and PFMC areas.

Respondent proposal packages will be evaluated on the basis of their proposed plan as well as the level and relevance of experience possessed by individuals participating in report preparation.

Recommended References for Preparation of Proposals (posted at the PSC web site).

Anderson, E. C. 2012. Large-scale parentage inference with SNPs: an efficient algorith for statistical confidence of parent pair allocations. Statistical applications in genetics and molecular biology 11: article 12. http://www.psc.org/pubs/csc/Anderson2012.pdf

Anderson, E.C., and J.C. Garza. 2006. The power of single-nucleotide polymorphisms for large-scale parentage inference. Genetics 172: 2567-2582. http://www.psc.org/pubs/csc/AndersonAndGarza2006.pdf

Beacham, T. 2014. Genetic Stock Identification/Parental Based Tagging for Pacific Salmon. Powerpoint presentation given at Strategy Session, February 2014, Seattle. ftp://ftp.psc.org/pub/tcchinook/PBT/

Coded Wire Tag Improvement Team (CWTIT) Annual Reports. Available in annual reports of the Chinook Technical Team (2006-present) : http://www.psc.org/publications_tech_techcommitteereport.htm#TCCHINOOK

Morishima, G., and M. Alexandersdottir. 2013. Q&A About Parental Based Tagging (PBT). Report prepared for NWITFC. http://www.psc.org/pubs/csc/MorishimaAndAlexandersdottir2013ParentalBasedTagging10-17-2013(1).pdf

Northwest Power Planning Council Memos and Reports: http://www.nwcouncil.org/fw/tag/home/ : specifically see FTF Decision memo ([April 30, 2013], IEAB FTF Report

Pacific Salmon Commission. 2005. Report of the expert panel on the future of the coded wire tag recovery program for Pacific salmon. available at http://www.psc.org/publications_tech_psctechreport.htm See, in particular: Part I (BACKGROUND INFORMATION p. 1-21); Part II (Issues Raised by Mass Marking & Mark-Selective Fisheries; Existing and Future Technologies that Might Complement or Replace the CWT System p. 23-27); p. 79-90 (summary of full parental genotyping); APPENDIX A. Proposed Scheme for Estimation of Total Age-Specific Non-Catch Mortalities to Unmarked Chinook Salmon Subject to a Mixture of Non-Selective and Mark-Selective Fisheries; APPENDIX F. Alternative Schemes for Estimating Total Age-Specific Non-landed Mortalities to Unmarked Salmon Subject to a Mixture of Non-Selective and Mark-Selective Fisheries (166-); Appendix H. Comparison of Sampling Requirements for CWT and Genetic Based Methods(198-207).

Pacific Salmon Commission. 2014. *2013 Exploitation Rate Analysis and Model Calibration.* ***Volume One.*** *February* 2014. Joint Chinook Techincal Committee. Available at http://www.psc.org/publications_tech_techcommitteereport.htm#TCCHINOOK

Steele, C.A., E. C. Anderson, M. W. Ackerman, M. A. Hess, N. R. Campbell, S. R. Narum, and M.R. Campbell. 2013. A validation of parentage-based tagging using hatchery steelhead in the Snake River basin. Can. J. Fish. Aquat. Sci. **70**: 1046–1054 http://www.psc.org/pubs/csc/Steele_et_al2013.pdf

Appendix A. ADDITIONAL SPECIFICATIONS FOR REPORT CONTENTS: Assessment of the degree to which the following issues might rule out feasible or cost-effective application of PBT (for fisheries management purposes) on a coast-wide basis. (See Part II. E.)

1. Is there any way to efficiently apply the PBT concept to wild stocks? For example, some wild AK populations that have no hatchery indicators are currently CWT'd (wild smolts), but access to adults for PBT is essentially impossible;

2. How could PBT be used for mark-selective fisheries evaluation? Is there any possible DIT analogue for PBT and, if so, what would the sampling requirements be to achieve the equivalent of DIT groups?

3. Coast-wide coordination of PBT databases and analyses would be required to implement a useful scheme. What genetic data would be reported and to whom? (e.g., just summaries of assignments of sampled fish to PBT parental groups, or genotypes for individual sampled fish)?

4. Achieving the equivalent of CWT release groups (where hatchery fish are released at different times/location/sizes/methods) using PBT would appear to require that all progeny from a particular set of genotyped and spawned parents are held separately from others throughout their rearing prior to release. Would significant new hatchery infrastructure be needed to support such separation of progeny from different sets of genotyped parents? Also important is ensuring that tagged fish are "representative" of all hatchery releases of the same type/time of release. How could this be accomplished? Finally, how could PBT be used to achieve the equivalent of "unanticipated" CWT groups that might need to be released in response to events (e.g., drought or unusually low flows) that could not have been foreseen at the time when parents were spawned?

5. How feasible would it be to develop a consistent and effective coast-wide set of SNPs that could be used at all laboratories, along with a consistent and mutually agreed upon procedures for tissue handling, genotyping, QA/QC, data management, and algorithms for generating assignments to PBT groups?

6. Would detection of PBT- tagged groups occurring at very low proportions in fisheries be a more serious problem for PBT than for CWT?

7. The ability to use electronic detection to locate fish (heads) with CWTs provides an efficient way to screen out 'untagged' fish from fishery or escapement samples. This reduces costs associated with shipping, storing and dissection. Could there be a PBT analogue for this capability?

8. The California Hatchery Scientific Review Group has recently recommended that all hatchery Chinook salmon should be released from CA hatcheries with CWT, but that only a fraction (about 25%) should also be released with externally visible adipose fin clips. Would this marking scheme pose special problems for implementation of PBT?

Appendix B. ADDITIONAL SPECIFICATIONS FOR REPORT CONTENTS: Quantify the probable range of costs for implementation of a coast-wide tag recovery system based on PBT and compare the cost of this system against the costs of supporting the existing CWT tag recovery system. (See Part II.G.)

The contractor shall provide information to compare costs of marking, mark recovery sampling, and mark detection between CWT and PBT. The cost estimates should assume that adipose fin clips will in most areas continue to be used as an indicator of tag presence for either mark type (CWT or PBT) and for mass-marking of hatchery fish released to support mark-selective fisheries. Costs should be calculated for two alternative PBT-based systems: (a) a system that would generate information from unmarked (adipose fin intact) fish belonging to paired groups designed to assess impacts of mark-selective fisheries, and (b) for a system that does not attempt to generate this information. Cost comparisons between PBT-based and CWT-based systems should assume existing levels of CWT tagging for hatchery and wild stocks used for the CTC exploitation rate analysis (Table 2.1, TCCHINOOK (14)-1.v1).

1. Marking Costs

    a. Hatchery Releases. Assume equivalent costs of adipose fin-clipping for both CWT and PBT.

        i. Estimate the current range of CWT/fish costs for marking hatchery populations and releasing current numbers of fish released with CWT.
        ii. Estimate the current cost per fish of parental genotyping for marking hatchery population.
        iii. Apply and compare costs to the average annual releases and average number of parents at hatcheries used for the CTC exploitation rate analysis (Table 2.1, TCCHINOOK (14)-1.v1). (Note: Table of CWT releases will be provided.) Include costs of DIT tagging where indicated.

    b. Wild stock releases. Assume equivalent costs to capture and adipose fin-clip fish.

        i. Estimate the range of CWT/fish costs for wild populations.
        ii. Estimate the range of costs per fish to genotype either fin tissue from marked juveniles or from adults to characterize wild population.
        iii. Apply costs to the average annual tags and escapement levels of the five wild stocks used for the CTC exploitation rate analysis. (Table 2.1, TCCHINOOK (14)-1.v1).

2. Fisheries Sampling (Recovery sampling). Assume equivalent costs to screen the same proportion of the catch (typically about 20%) for adipose fin clips and to remove heads or take genetic samples as needed.

a. Estimate range of costs/head for processing by recovery agencies listed in Table 1, Morishima and Alexanderdottir (2013).
b. Estimate range of current genotyping costs/fish for fish required to be processed for PBTs.
c. Apply and compare costs to average annual sample statistics detailed in Table 1, Morishima and Alexanderdottir (2013) assuming either that (a) the PBT-based system would generate information from unmarked (adipose fin intact) fish belonging to paired (DIT) groups designed to assess impacts of mark-selective fisheries, or (b) the PBT-based system does not attempt to generate this information.

3. Escapement sampling.
    a. Hatcheries. Calculate cost of screening fish for presence of CWT and for recovery of CWTs. (Note: PBT costs for escapement sampling have already been accounted for under Marking as all returning individuals must be genotyoped.) Apply costs to hatcheries used for CTC exploitation rate analysis as per 1.a.iii.

    b. Spawning grounds. Assume costs of obtaining escapment samples (carcass or live sampling) are equivalent.
    i. Apply head processing costs identified in 2.a. to expected number of heads collected on natural spawning grounds.
    ii. Apply genotypic costs identified in 2.b. to expected number of fish that would need to be geneotyped given sampling rates on natrural spawning grounds currently used to estimate number of CWTd fish that fail to enter hatcheries.

    c. Wild stocks. Assume costs of obtaining escapment samples (carcass or live sampling) are equivalent.
    i. Apply head processing costs identified in 2.a. to expected number of heads from five wild stocks used as CTC exploitation rate indicators.
    ii. Apply genotyping costs identified in 2.b. to expected number of samples from five wild stocks used as CTC exploitation rate indicators.

4. Discuss comparative costs for coastwide information systems and data management required for the two mark types.

5. If judged meaningful, calculate the genotyping cost per fish that would be allowable if a PBT-based system were to be cost-equivalent to the current CWT program. under two scenarios: 1) PBT is used to develop the equivalent of DIT to assess impacts of mark-selective fisheries; and 2) PBT is not used to develop DIT equivalents

Appendix II. Abbreviated Synopsis of Report Structure, Methods and Contents

The final Report (135 pages in length) directly addressed all of the specific issues identified in the issued RFP (see Appendix I) and was organized around these specific issues. In part as a consequence, the merits of the analysis methods and the implications of the report calculations are difficult to fully grasp from just a single reading. Therefore, in this section we provide an abbreviated synopsis of the Report's content, methods, and findings.

Part I of the Report reviews the current status, operation and concerns regarding the CWT system since the 2005 Expert Panel Report, and also summarizes the parentage-based tagged (PBT) concept and its applications/implementations since 2005. Part II of the Report proposes the structure of five alternative approaches that might be taken to develop exclusively PBT-based systems or to develop hybrid PBT-CWT systems; addresses a number of practical hatchery management issues that need to be addressed to successfully implement PBT (with illustrative examples taken from large-scale application of PBT for hatchery steelhead within the Columbia River system); and presents cost analyses designed to allow comparison of the total annual operating costs of three of the five alternatives (and numerous variants) with total operating costs of the existing CWT system.

Two Report appendices include a review of the Snake River experience in transition to a PBT-based system for steelhead and Chinook salmon, and an assessment of the statistical errors in estimation of PBT recoveries in ocean fisheries (as compared to errors of estimation of CWT recoveries) that might emerge as a consequence of uncertainty in PBT tagging rate. The first of these appendices demonstrates that it is indeed feasible to use the PBT approach on a large scale. The second appendix responds to concerns raised by the OC concerning effects of uncertainty of PBT tagging rates and shows that errors of estimation of PBT recoveries in ocean fisheries would likely be no larger than those for the existing CWT system.

Below we provide brief descriptions of the five alternative systems that were proposed, a brief

review of the methods that were used to compare operating costs of the alternative systems, and we reproduce a number of Report tables that seem most pertinent for summarizing the authors' findings. We also provide an abbreviated glossary of acronyms used in the Report and in this synopsis.

Abbreviated List of Acronyms and Abbreviations

ADC	adipose fin clip
AWT	agency wire tag
CWT	coded wire tag
DIT	double index tagging (paired groups released with ADC+CWT, and CWT only), used to assess fishery impacts for unmarked fish subjected to mark-selective fisheries
ETD	electronic tag detection (use of wands to detect presence of CWT or AWT)
ExN	exonuclease-based sequencing
GBS	genotyping by sequencing
GSI	genetic stock identification
MM	mass marking (marking of all hatchery releases with ADC)
MSF	mark-selective fishery (or fisheries)
PBT	parentage-based tag (or tagging)
RFP	request for proposals
SNP	single nucleotide polymorphism

Five Alternative Approaches for Using PBT to Generate Data Now Generated by CWT System

The existing CWT system is referred to as System 0. Five alternative systems (Systems 1-5) were described in detail and were qualitatively assessed regarding various issues that were raised by specific systems. For each approach, it was assumed that a (highly successful) attempt would be made to genotype 100% of hatchery broodstock at each hatchery (i.e., full parental genotyping, with the exception of rare genotyping failures or hatchery logistics errors). The authors assumed that *all* progeny from specific sets of genotyped parents could be held and

reared separately from other juveniles and released at a common date and location as part of a (relatively small) number of *PBT release groups.* Some of these PBT release groups would be directly analogous to current *CWT release groups* (groups of hatchery fish sharing group-specific common CWT codes, with all members of specific CWT groups released at approximately the same date, size and location, often at sizes, dates and locations that are intended to represent natural populations for which a particular hatchery population serves as an indicator). Whether or not PBT could be fully implemented in this fashion at most hatcheries is unclear, but even if it could not be fully implemented that would not materially alter the issues identified in the report because the numbers of fish released with CWT are usually small (no more than 25% of total releases) compared to the total number of releases made at most hatcheries. We believe that it would generally be logistically feasible at most hatcheries to rear and release all progeny from *some* specific sets of genotyped parents so as to generate the equivalent of existing CWT release groups.

The five alternative systems are as follows:

- **System 1. Replicate Existing CWT system.**

  This system uses a combination of PBT, ADC, AWT and ETD to essentially replicate the structure of the existing CWT system, but using PBT instead of CWT as the tag, using ADC as an external mark (to identify hatchery fish as a MM and to support MSF (OR, WA, BC), or as an indicator for the presence of a CWT (CA)), and using AWT to allow identification (via electronic detection, ETD) of members of an ADC+PBT release group (or unmarked PBT DIT group). Natural-origin smolts would be genotyped and ADC to allow later identification via DNA fingerprinting. Ocean and freshwater sampling would rely on presence of ADC to identify hatchery fish, ETD to identify that fish belonged to an ADC PBT release group (or an unmarked PBT DIT group), and genotyping used to establish PBT group membership.

- **System 2. PBT Only.**

  For this system, distinct sets of genotyped parents would be used to generate PBT hatchery release groups and associated DIT groups. ADC would be used to identify hatchery fish and marked natural-origin fish as for current MM or constant fractional marking regimes. Because neither AWT nor ETD would be relied upon, all ADC fish encountered during recovery sampling would need to be genotyped, thereby generating additional information (via GSI) on untagged fish (ADC or unmarked), but also greatly increasing the number of fish that would need to be genotyped. In areas where unmarked members of DIT groups are expected to be present (e.g., in fishery areas where ADC and unclipped fish are both allowed to be captured), some fraction of unclipped fish would need to be genotyped. (Note that the size of PBT DIT groups could be greatly expanded at little cost to allow reduction in ocean fishery sampling rates needed to generate equivalent DIT recoveries but at greatly reduced genotyping expense.)

- **System 3. PBT but with AWT as a secondary mark.**

  This system builds on System 2 by using AWT as a "secondary mark" indicating ADC fish that do *not* belong to a PBT release group, thereby reducing genotyping requirements. AWT would be applied to the equivalent of current levels of fish released with ADC but without CWTs. Natural-origin smolts would be genotyped to allow later identification via DNA fingerprinting, and would typically be ADC (unless subject to MSF). ETD (negative detection) would be used to identify ADC-only fish that belonged to PBT release groups or natural-origin ADC tag groups. (Note that the Report authors did not attempt to calculate the annual operating costs of this alternative.)

- **System 4. Combine PBT, ADC, AWT and ETD along with a new at-sea sampling program.**

This complicated system would provide improved information on impacts of MSFs and natural-origin stocks and full details are presented in the Report. Sampling would require observers on fishing vessels in MSF marine and freshwater fisheries. DIT would not be needed for this system. (Note that the Report authors did not attempt to calculate the annual operating costs of this alternative.)

- **System 5. Hybrid PBT/CWT System.**

  This system would rely almost exclusively upon PBT to tag hatchery fish but would use ADC+CWT for natural-origin tagging. At hatcheries, genotype all parents for PBT release groups and ADC all members of PBT release groups as for existing levels of ADC. For natural-origin stocks, apply CWT to natural-origin smolts and ADC (unless subject to MSF). Fish in unmarked components of DIT groups would receive CWT but not ADC. ADC + CWT might also be used for low production hatcheries or small and/or unplanned release groups. Ocean and freshwater sampling would screen ADC fish for CWT using ETD and heads would be extracted; sampled ADC fish without CWT would be genotyped.

Relative Costs of PBT-based Alternative Tag Recovery Systems

Operating costs of three of the above alternative PBT schemes (systems 1, 2 and 5 and variants of each) were calculated and compared with the equivalent operating costs of the existing CWT system. Costs include those associated with tagging and marking at release and (some of) those costs associated with recovery. Recovery costs were limited to those associated with extracting/decoding CWTs (for existing CWT system) or genotyping (for PBT systems). Costs for sampling of ocean and freshwater fisheries and spawning escapements to obtain recoveries were assumed to be the same for all systems (including CWT), as requested in the RFP, and were therefore not included in cost calculations. Thus, calculated operating costs for the existing CWT system and the proposed alternative PBT-based systems are less than true total operating costs, as

they exclude costs of sampling required to collected heads (for CWTs) or tissues (for PBT) in sampling of fish in fisheries, spawning escapements and at hatcheries, but they should nevertheless be directly comparable.

Based on an assumption that the mean number of fish released per female Chinook and coho salmon are 3,800 and 1,800, respectively, the authors calculated (from RMIS release statistics) that their recommended full (100%) parental genotyping at hatcheries would require 135,709 Chinook broodstock genotypes and 87,489 coho salmon broodstock genotypes per year. Full parental genotyping would mean that all hatchery releases would be tagged via genotyping of their parents.

Total costs of tag or mark application for ADC, CWT and AWT are based on average cost per fish data provided by various agencies multiplied by the numbers of juvenile fish that would need to be tagged at hatcheries or in natural areas (wild stock tagging). Numbers of fish that are currently released and tagged with and without ADC and CWT are based on an average for 2010-2012, as reported by the RMIS data system, and were summarized in their Table II.I.5 (reproduced below).

For natural populations, the authors estimate that approximately 900,000 fish are currently tagged with CWT and released annually on a coast-wide basis from natural populations, most of which are also ADC. Assumed costs per fish of tagging and marking in different contexts were reported in their Table II.I.8 (reproduced below).

Table II.I.5 Annual average (2010-2012) of total juvenile Chinook and coho salmon released, marked, and tagged by state or province. Source: RMIS database query

State/Province	Total Releases (A)	ADC+CWT (B)	ADC only (C)	CWT only (D)
Chinook				
Alaska	8,733,799	954,632	173,282	0
British Columbia	40,956,206	4,720,789	95,251	121,505
Washington	115,752,460	13,964,150	85,967,225	6,624,108
Idaho	14,916,114	2,001,648	9,274,477	2,586,519
Oregon	31,449,600	6,492,490	21,083,507	1,000,907
California	46,038,662	14,824,064	92,388	42,803
Coastwide Total – Chinook	257,846,840	42,957,774	116,686,130	10,375,841
Coho				
Alaska	27,175,400	923,726	24,324	411
British Columbia	12,264,848	759,501	5,554,653	146,457
Washington	31,763,644	3,006,772	23,250,324	2,469,814
Idaho	384,940	0	0	71,438
Oregon	6,361,877	447,986	5,690,097	152,478
California	788,427	117,391	2,348	66,441
Coastwide Total - Coho	78,739,136	5,255,375	34,521,746	2,907,040

"Decoding" costs per fish were assumed to be $5/fish for CWT (extraction and reading of a CWT) and were assumed to be either $7/fish for GBS (genotyping-by-sequencing, a developing technology) or $22.50/fish for ExN (exonuclease genotyping, an existing technology). These costs per fish were applied to the estimated number of fish for which heads would be needed to be decoded (CWT) or for which genotypes would need to be taken based on Morishima and Alexandersdottirs (2013) coast-wide summaries of recent recovery sampling effort and tag/mark presence for Chinook and coho salmon sampled from primarily ocean fisheries along the Pacific Coast (the authors' Table II.I.7, reproduced below).

Table II.1.8 Estimated Unit Costs -Marking and Tagging

Step	Estimated Unit Cost (2014 US Dollars)
CWT-based alternative systems	
ADC+CWT • Auto-tagging trailer	0.154
ADC+CWT • Hand tag	0.236
CWT only • Auto-ta22ing trailer	0.154
CWT only • Hand tag	0.236
ADC only • Auto-tagging trailer	$0.048
ADC only • Hand tag	$0.1095
PBT-based alternative systems	
ADC+AWT • Auto-tagging trailer	$0.104
ADC+AWT • Hand tag	$0.186
ADC only • Auto-ta22ing trailer	$0.048
ADC only • Hand tag	$0.1095
AWT only • Auto-tagging trailer	$0.104
AWT only • Hand tag	$ 0.186
ADC+ alternative mark • Auto-tagging trailer	$0.064
ADC+ alternative mark • Hand tag	$ 0.146
Alternative mark only • Auto-tagging trailer	$0.064
Alternative mark only • Hand tag	$ 0.146
Natural-origin Stock Tagging	
ADC+CWT • Hand tag	$0.236
ADC only (with tissue sample) • Hand tag	$ 0.146
ADC+ alternative mark • Hand tag	$ 0.146
ADC+AWT • Hand tag	$ 0.186
AWT only • Hand tag	$ 0.186

Table II.I.7 Annual average (2008-2011) of total sampled adult Chinook and coho salmon sampled and recovered by state or province of sampling. Source for Columns A-D: Table 1, Morishima and Alexandersdottir (2013). U.S. Fed includes fish sampled by USFWS, NMFS, and NMFSNWR. Source for Columns E-F: Authors' calculations as described in section above.

State or Province	Sampled (A)	Processed (B)	Tags Decoded (C)	Ad Clipped, current mark rate (D)	Estimated Ad Clipped 100% mark with DIT (E)	Estimated Ad Clipped 100% mark without DIT (F)
Chinook						
AK	116,369	10,198	6,040	10,198	83,545	85,253
BC	44,049	7,282	2,958	7,785	11,436	12,165
WA	270,612	34,529	30,623	169,366	191,208	197,843
ID	0	0	0	0	0	0
OR	90,415	13,484	12,093	27,088	35,731	36,685
CA	52,161	15,362	14,590	15,360	28,215	28,215
U.S. Fed.	81,852	15,971	14,115	52,540	59,316	61,374
Coastwide Chinook	655,458	96,826	80,419	282,337	409,451	421,535
Coho						
AK	635,861	10,329	7,789	10,291	54,781	55,889
BC	42,119	588	221	636	1,253	1,351
WA	438,469	62,144	32,107	339,317	388,546	403,371
ID	0	0	0	0	0	0
OR	67,406	6,989	6,366	31,168	36,220	37,671
CA	16	8	1	8	10	9
U.S. Fed.	18,695	4,324	4,033	15,199	17,404	18,068
Coastwide Coho	1,202,566	84,382	50,517	396,619	498,214	516,359

Using the information contained in Tables II.I.5, II.I.8, and II.I.7, the authors calculated the annual operating costs of three of the alternative PBT-based systems (and several variants of each) and the existing CWT system for the GBS genotyping scheme (at genotyping cost of $7/fish and for the ExN genotyping scheme (at genotyping cost of $22.50/fish). GBS costs were reported in their Table II.I.3 (reproduced below). ExN costs were reported in their Table II.I.4 (reproduced below)

Table II.I.3 Detailed summary of costs by step assuming genotypes performed using GBS ($7 per genotype). At 100% PBT tag rate, Chinook hatchery broodstock = 135,709 and coho hatchery broodstock = 87,489. All values are millions of U.S. dollars.

System	Mark and Tag	Genotype Parents	Handle Natural-origin Fish	Genotype Natural-origin Fish	Decode Tag	Total
0 CWT	17.71	-	0.25	-	0.91	18.87
1	14.64	1.56	0.20	7.54	1.27	25.20
1a	22.39	1.56	0.20	7.54	6.35	38.04
1b	14.64	0.26	0.20	7.54	1.27	23.90
1c	12.18	1.56	0.16	7.54	1.27	22.70
2	20.98	1.56	0.16	7.54	7.90	38.14
2a	20.98	1.56	0.16	7.54	13.01	43.24
2b	21.64	1.56	0.16	7.54	6.57	37.46
2c	10.38	1.56	0.16	7.54	4.75	24.39
2d	22.78	1.56	0.16	7.54	1.27	33.30
5	12.45	1.56	0.25	-	4.75	19.02
5a	13.37	1.56	0.25	-	1.27	16.46

Table II.I.4 Detailed summary of costs by step assuming genotypes performed using ExN ($22.50 per genotype). At 100% PBT tag rate, Chinook hatchery broodstock = 135,709 and coho hatchery broodstock = 87,489. All values are millions of U.S. dollars.

System	Mark and Tag	Genotype Parents	Handle Natural-origin Fish	Genotype Natural-origin Fish	Decode Tag	Total
0	17.71	-	0.25	-	0.91	18.87
1	14.64	5.02	0.20	24.22	4.08	48.16
1a	22.39	5.02	0.20	24.22	20.42	72.25
1b	14.64	0.84	0.20	24.22	4.08	43.97
1c	12.18	5.02	0.16	24.22	4.08	45.66
2	20.98	5.02	0.16	24.22	25.40	75.79
2a	20.98	5.02	0.16	24.22	41.80	92.19
2b	21.64	5.02	0.16	24.22	21.10	72.14
2c	10.38	5.02	0.16	24.22	15.28	55.06
2d	22.78	5.02	0.16	24.22	4.08	56.25
5	12.45	5.02	0.25	-	15.28	33.00
5a	13.37	5.02	0.25	-	4.08	22.73

A number of features of the calculated operating costs for the three PBT-based alternative systems compared to the existing CWT system are worth noting:

- Total estimated costs for the ExN genotyping system exceed those of the existing CWT system ($18.87 million) for all explored alternatives, often by very large

amounts.

- High costs of exclusively PBT-based systems (i.e., non-hybrid systems) are the consequence of high recovery expenses ("Decode Tag") and high costs of genotyping natural-origin smolts, not of high costs of parental genotyping (tagging).

- The cost of genotyping natural-origin smolts for exclusively PBT-based alternatives is extremely high: $7.54 million for GBS and $24.22 million for ExN.

- Estimated total operating costs for the GBS genotyping system are comparable to or lower than the operating costs of the existing CWT system only for the hybrid schemes (Alternatives 5 and 5a). For the hybrid alternatives, all natural-origin smolts would be tagged with CWT.

14 January 2016
Pacific Salmon Commission
Post-season meeting
Portland Oregon, USA

Fraser River Panel Report to the Pacific Salmon Commission

Fraser River Panel; Kirt Hughes, US Section Chair and Jennifer Nener Canadian Section Chair

The Fraser River Panel (the Panel) met Tuesday and Wednesday this week. Chairs and alternates also meet this morning. In addition to reviewing the 2015 season, the Panel has worked to address items identified in our work plan and emerging issues. The items of significance which the Panel wishes to highlight for the Commission are:

- work in support of the hydro-acoustics strategic review committee (FSRC)
- Panel-related test fisheries and use of the test-fishing revolving fund
- renegotiation of the Fraser River Panel Chapter of the Pacific Salmon Treaty
- environmental and ocean conditions

Hydro-acoustic program review

You will recall that the Panel contracted Dr. Carl Walters to "examine alternative hydroacoustic monitoring configurations for the Mission Bridge and Qualark Creek stations". Dr. Walters has concluded his work and provided a report to the Panel. The Panel has reviewed this report and prepared a summary document focused on recommendations of the report and future work the Panel will need to accomplish prior October of 2016 when we will report our findings to the FRSC. A critical element of the Panels review includes operation of the hydro-acoustic program at Qualark. Department of Fisheries and Oceans Canada have submitted a proposal to the Southern Endowment Fund for operation of this program in 2016. The Panel strongly supports and recommends that the Commission and Endowment Fund support this proposal.

Test-Fishing Program

During the 2015 fishing season the Panel discontinued the harvest of "pay-fish" in response to conservation needs for Fraser River sockeye. This resulted in the need to utilize a significant portion of the test-fishing revolving fund. As a consequence the revolving fund has been largely depleted. It is anticipated that 2016 and 2017 will bring low abundances of returns across all stock groups limiting the ability to generate sufficient revenue from test-fishing activities even with significant modifications to those activities.

Earlier this week the Panel met with the Finance and Administration Committee to discuss these funding needs. The Panel continues to investigate a reduced test-fishing program for 2016 and access to additional funding to cover program needs. The Panel anticipates updating the Committee on this work during the February 2016 PSC meeting.

In addition the Panel is working to complete revisions to the PSC's Test Fishing Policy Document. The revised policy will define the balance between conservation, program funding, and harvest objectives sufficient to guide decisions on salmon retention in Fraser River Panel-Approved Test Fisheries.

Re-negotiations of the Fraser River Chapter and Associated Fiscal Needs
Chapter 4 of the Treaty was recently renegotiated and came into effect in 2014. It will expire one year later than chapters currently being renegotiated. Implementation of the renewed Chapter is functioning relatively well. It is not anticipated at this time that substantive changes will be required. However, in light of funding needs for the hydro-acoustic and test-fishing programs identified above the two countries will need to have some discussion regarding the Chapter and its renewal in advance of 2019. These discussions will likely focus on time requirements and funding needed to support of treaty renewal. The Panel believes that there is a greater likelihood of success on the budgetary front by coupling the Panels fiscal needs with those of the other chapters currently being renegotiated. Our thinking behind this is that the fewer times we go to Ottawa and Washington D.C. seeking monies the better. It is worth noting that future funding levels may dictate deviating from current management strategies necessitating substantive changes in chapter language.

Environmental and Ocean conditions
The Panel continues to discuss conditions effecting sockeye and pink salmon abundance in particular, the “blob”. Whereas these conditions are not specific to impacting sockeye and pink salmon the Panel suggests the Commission request NOAA Fisheries scientist Laurie Weitkamp provide her presentation as given to the Southern Panel to other panels and the Commission in February.

Pacific Salmon Treaty
Northern Panel
Portland Session January 11-15, 2016
Summary Report to the Commissioners

The Panel met nationally and bi-laterally at this session.

Session Outcomes:

Northern Boundary Technical Committee:

1. Completed the 2013 & 2014 Northern Boundary Area sockeye and 2015 pink salmon run reconstructions, updated the cumulative AAH harvest sharing agreements, and submitted a preliminary report to the Northern Panel.

Northern Panel:

1. Reviewed Northern Boundary Area fisheries for 2015 and discussed compliance with provisions of the 2009 PST Agreement.
2. Reviewed the Northern Boundary Technical Committee's update of the 2013 and 2014 sockeye salmon and 2015 pink salmon run reconstruction, and allowable and actual harvests of sockeye salmon and pink salmon, as specified in Annex IV, Chapter 2. The NBTC provided a preliminary reporting of the allowable and actual harvest, and a current balance of the carry forwards.
3. Key issues for possible renegotiation of Chapter 2 of the Treaty were discussed in order to be presented to the Commissioners at the closure of the session.
4. Reviewed the status of the Northern Fund and received a general update about the type of projects being funded.

Key questions for discussion and possible renegotiation of Chapter 2 of the Treaty include:

- Review of the language around management actions that may be required if there is an extremely low return of Nass River sockeye.
- Review of alternate methods that could be used as a surrogate to coho salmon CPUE and average catch per boat as specified in Attachment B of the treaty?
- Additional questions were raised in morning 14 January bilateral discussions. Further written clarification of these questions was provided in the afternoon.

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2015 POST SEASON PSC MEETING
January 11-15, 2016

SOUTHERN PANEL MEETING REPORT

Session Activities:

- *Received post-season reports of both US and Canadian fisheries and well as a US report on marine environmental conditions.*
    - The post-season reports of both parties noted the wide-spread trend of extremely low returns of coho along with small body size and associated low fecundities of females, causing reduced fisheries and impacting achievement of escapement and hatchery egg take goals. Also, small body size was observed in a number of systems on returning pink and Chinook salmon. Skewed sex ratios toward males were observed among returning Chinook and coho.
    - Bilateral panel members expressed great concern regarding the stressful environmental conditions for salmon in 2015, such as drought conditions during summer months with extremely low flows and warm water conditions in many of our northwest rivers. Also ocean conditions were extremely poor for salmon with the warm blob and El Nino conditions converging, likely impacting future adult returns. As a result, there is increased uncertainty as the parties develop pre-season forecasts and fishery plans for 2016.
- *Schedule of 2016 dates for information exchange between the parties.*
    - The Panel scheduled 2016 dates for information exchange between the parties (see table below). Of note was the Manager-to-Manager meeting (in-person and teleconference capability; Seattle, WA) scheduled for March 24 to discuss US/CAN exchange of information per Chapter 5 paragraph 8 section g of the PST. Participants in this meeting will use their own agency funds to attend. Panel members developed a draft agenda for the March 24 meeting, in which preliminary stock status information and proposed fishing scenarios will be shared between the parties.
- *Chapter and Annex review of deliverables*
    - The Panel reviewed the draft "Chapter Review Matrix" as a tool to assess responsibilities of the Panel as specified in the Coho and Chum chapters of the current Annex. With the addition of a column in the matrix noting the current status or feasibility of achieving each deliverable, this tool has been helping the Panel identify any potential issues in the current language of Chapters 5 and 6 as we begin the work for renegotiation by 2018.
- *Update on 2016 Southern Endowment Fund proposals for Coho*
    - Brigid Payne, Canadian Alternate Chair of Southern Panel, gave two PowerPoint presentations to the Panel summarizing the two 2016 SEF proposals submitted by Panel and CoTC proponents. The proposals address the two primary Coho priorities for Southern Panel, as follows:
        - 1) Workshop to investigate alternative management scenarios for the PST Southern Coho management regime. If funded, this workshop would be implemented in Fall 2016.

- 2) Determine reference points and associated allowable exploitation rates for PST status categories for Canadian Management Units (MUs).
    - There is a two-year time frame to complete this work; information resulting from the alternative strategies workshop above would inform the work of the reference points project.
- The Coho Working Group is meeting on Thursday January 14 to develop the planning team and design a framework for accomplishing deliverables of these projects should they be funded.

- *Update from Coho Technical Committee*
    - US and Canadian co-chairs of the Coho Technical Committee discussed with the Panel issues for renegotiation of Chapter 5 from their perspective. They reiterated points made last cycle, regarding data limitations and insufficient resources needed to meet the data-intensive obligations of the current Abundance Based Management regime for Southern Coho.
    - There is bilateral consensus that progress on renegotiation of Chapter 5 will be significantly advanced by information and recommendations coming out of the Alternative Management Strategies Workshop and Reference Points projects, should these projects be funded by Southern Endowment Fund in 2016.
    - The Canadian co-chair discussed the latest updates on the research activities occurring domestically that will inform the Management Unit status assessments for the four Canadian Coho Management Units.

- *Update from Chum Technical Committee*
    - The US and Canadian co-chairs of the Chum Technical Committee presented an update on their work plan, including their research projects funded by Southern Endowment Fund.
    - This week the Chum TC worked together to review Chapter 6 language in an effort to note any potential issues for renegotiation. At the upcoming February pre-season meeting, Chum TC will present their list of recommendations to Southern Panel regarding chapter language issues that need work for renegotiation.
    - There was general bilateral consensus that the current Chum chapter is working well and is a good template to follow in moving forward, provided that the Albion and Johnstone Strait test fisheries can continue given the pivotal role these test fisheries play in the annual bilateral chum management cycle. The parties believe they can accomplish renegotiation of the Chum chapter efficiently compared to other chapters.
- Considering that Southern Panel coho and chum fisheries have implications for Chinook management among the parties, the Southern Panel would welcome direction from Commissioners during Chinook negotiations.
- Finally, an agenda was planned out for the upcoming February Meeting of Panel in Vancouver, BC.

Proposed 2016 Schedule for US/CAN information exchanges

Important dates for the 2016 season:

February 8-12	PSC Annual Meeting, Vancouver BC
First week of March	Draft Southern BC Integrated Fisheries Management Plan released
March TBC by CoTC	Electronic Exchange of PRELIMINARY US/CAN Information
March 9-14	PFMC #1
March 16 -17	NOF #1 (Tribal – State)
March TBD by CoTC	Electronic Exchange of updated US/CAN Information
March 24	Manager to Manager meeting (in-person and teleconference capability; Seattle, WA) to discuss US/CAN exchange of information per Chapter 5 paragraph 8 section g. See draft agenda below. [1/]
March 29-31	NOF #2 (Tribal – State)
April 9-14	PFMC #2
April – June	Exchange of information as per Coho - Chapter 5, paragraph 8 section h
Late June, TBD	Coho Working Group Meeting – develop metrics, criteria for alternative coho management strategies.
Early October, TBD	Coho Working Group meeting – immediately following alternative coho management strategies workshop.
October	Exchange of information as per Chum - Chapter 6 paragraph 10 section d.

1/

Manager to Manager Information Exchange, Draft Agenda:

March 24, 2016

Information to share prior to meeting:

- Stock forecast documents as available
  - PFMC forecasts document
  - Other stock forecast document as available
  - Canadian Outlook document
- If available:
  - State of the Ocean Report (Canada)
  - Assessment of impacts of previous El Niños
- Post-season review documents:
  - PFMC post-season review
  - Other relevant post-season review document

Agenda

- Forecasts and / or Outlook for (*focus on stocks relevant to fisheries impacting on Chapter 5 Coho MU's*):
  - IFR Coho
  - Chinook (Southern BC / Puget Sound / Columbia / Coastal WA, OR)

  - Pink (Fraser)
  - Sockeye (Fraser)
- Discuss factors considered in forecasting (including Ocean indicators and consideration of anomalous Ocean conditions)
- Review Canadian Outlook document (as required)
- Update on environmental factors (if available) – *could share Canadian State of the Ocean report; snow-pack data*
- Status of Canadian & U.S. Mgmt Units
- Update on pre-season model run data exchange
- Provisional fishing plans for 2016
- Other Southern Panel business remaining from February PSC meeting
  - Status update on Southern Endowment Fund projects
  - Coho Working Group meeting agenda planning

Key Contacts:
All contacts listed below should be included in each electronic exchange.

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January 8, 2016

Pacific Salmon Commission
1155 Robson St.
Vancouver, BC V6E 1B5, Canada

via: email in PDF format

Re: **Request For A Reduction In Harvest Impacts on Southern Bound Natural Spawning Salmon Stocks**

The Twin Harbors Fish & Wildlife Advocacy is a non-profit organization based in Washington State. The purpose of the Advocacy is "*Provide education, science, and other efforts that encourage the public, regulatory agencies and private businesses to manage or utilize fish, wildlife and other natural resources in a fashion that insures the sustainable of those resources on into the future for the benefit of future generations.*" (www. thfwa.org).

Advocacy members and their family and neighbors have personally spent decades investing in salmon production through volunteer projects that have raised millions of Chinook, Coho, and Chum salmon that contribute to the pool of fish caught in the Pacific Ocean. Our members and supporters have joined with other Washington citizens and property owners in contibuting billions of dollars in habitat restoration, state operated hatchery production, culvert replacements, property devaluation, loss of timber harvest, municiple or private sewage and stormwater improvements, etc. under government mandates wherein the stated primary purpose is the recovery or substainability of natural spawning salmon stocks in WA streams.

With all this effort and investment, salmon recovery has struggled to succeed. Instate fishing has declined and ESA listings have plauged the state from the Columbia on the south to Puget Sound to the north.

Over the last 4 years, the Advocacy and others have invested thousands of hours in assisting the Washington Fish & Wildlife Commission in adoption of two new salmon management policies for the coastal terminals of Willapa Bay[1] and Grays Harbor[2]. The policies prioritize conservation over harvest, install hatchery reform and place an increased emphasis on achieving escapement goals for natural spawning stocks. In simple terms, an all out effort is underway to avoid further ESA designations and return natural spawning production to numbers adequate to sustain viable fisheries in the future.

The effort underway went forth with the knowledge that harvest inside the terminal has to be managed in a manner that could often require reduction of harvest inside the two terminals in order to achieve escapement goals. Using 2015 as an example, tribal and non-tribal commercial

1 http://wdfw.wa.gov/conservation/fisheries/willapa_bay_salmon/
2 http://wdfw.wa.gov/conservation/fisheries/grays_harbor_salmon/

seasons were curtailed for Chinook in Willapa and Grays Harbor. Recreational fishers in both terminals were forced to forgo retention of un-marked Chinook. Then, the much smaller than expected 2015 coho return forced closures of tribal commercial, non-tribal commercial, and recreational seasons within both coastal terminals.

Even with all these measures and sacrifices, we believe it is clear escapement goals for natural spawning Chinook in Willapa Bay in 2015 were not reached. The adjustments in non-tribal and tribal fisheries inside the terminal, combined with a recent lowering of the escapement goal, might have allowed us to reach escapement goal for Chinook in Grays Harbor. We further predict that coho escapment goals will not be achieved in either terminal even with the closures as once again the conservation burdon fell on the terminal fishers who waited patiently for their turn to fish as harvest continued on schedule on the ocean.

We recognize that the citizens who live on and around salmon bearing streams are stewards of those streams and will pay a significantly greater price than non-locals for the production of fish that are likely to be harvested on the open ocean. However, in providing this subsidy to fishers in other regions, the harvest rate applied outside the terminals by PSC should not make it nearly impossible to achieve escapement goals or threaten the locals with additional burdens from ESA listing of species resulting from a consistant failure to achieve spawning production at a rate that insures the viability of the stock for the future. Unfortunately, such was the case in 2015 for Chinook in the Willapa and for Coho in both coastal terminals.

As an example of the hardship placed on those inside the terminal, on page 51 of PSC's annual report on Chinook harvest (TCCHINOOK15-1_V1, PSC.PDF) it states in 2014 "*....on average 86% of fishery-related mortality on WA coastal stocks*" results from PSC sanctioned fisheries located north of the Canadian/WA border. Relating that mortality to Willapa Bay, the returning runsize of Chinook natural spawners coming across the bar into the Bay was below the escapement goal. In simple terms, the number of natural spawning Chinook heading for Willapa Bay was reduced by harvest in AK and BC to the point the runsize into the Bay was well below escapement making achievement of the escapement goal impossible even if all fishing inside the terminal was canceled. It is important to note that this phenomenia is not limited to 2014, but rather the norm in Willapa for over a decade. Neither is it limited to just Chinook as the same shortfall in runsize below escapement goal occured in 2015 for coho in both terminals resulted in season cancellations though seasons on the ocean proceeded forward on the initial schedule.

In accordance with the Advocacy's purpose referenced earlier, it is our belief that the elected officials and citizens of Washington state should have the opportunity to fully understand all the reasons why the billions already invested by Washingtonians have not produced the anticipated conservation results and the list of threatened or endangered stocks continue to grow in Puget Sound and elsewhere. It is therefore our intention to engage all in a long over-due discussion regarding the reasons why the state is plauged by the failure to recovery natural spawning salmon stocks.

The latest indicator of the need for such a broad based public discussion is the overfishing notice recently published by NOAA in the federal register for Willapa Bay and Grays Harbor fall Chinook and coho in the Hoh River further up the coast. We believe the citizens will quickly ask

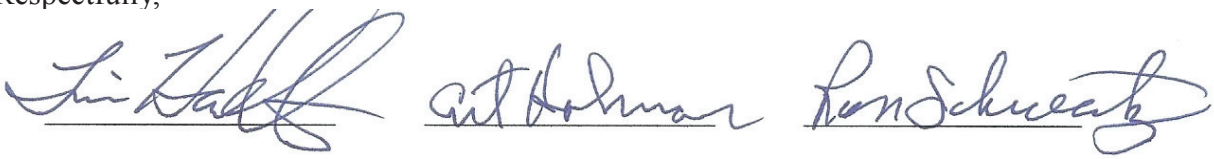
"Where is all this fishing occuring?" With 86% of fishing mortality occuring north of the WA/ Canada border, we expect most eyes to then turn to the PFC processes. The question we expect to hear is "*If we can't get PFC to let enough back to the streams to meet escapement goals, where's the incentive for Washingtonians to continue pouring billions of dollars in public and private resources into habitat restoration and hatchery production?*" At this point, the Advocacy doesn't have an answer that we are confident the majority of citizens of Washington would find acceptable. Especially when responding to the family living on Willapa Bay that recently lost a quarter of a million dollars in harvestable timber due to setbacks intended to protect habitat for natural spawners that have yet to materialized in the nearby stream due to harvest impacts.

As we move forward in our project to engage all in discussions about how we can restore natural spawning stocks in Washington, the Advocacy respectfully requests that the Pacific Salmon Commission consider seasons north of Washington's border for 2016 forward that reduces the impacts on natural origin salmon stocks that have either struggled to meet escapement goals or noted under ESA guidelines. In the case of Willapa and Grays Harbor Chinook and Hoh River coho, we are requesting a decrease in northern impacts on natural spawners of 10% per year for five consective years or until such time as the number crossing over from the Pacific is expected to be at least 110% of the escapement goal for two consecutive years.

In presenting this request, we recognize that the Advocacy is not accustomed to the processes used within the Commission to establish qoutas and harvest rates and some might frown on our approach. In our defense, at this point a relatively small percentage of Washingtonians even know the Commission exists let alone understand the impact the Commission has on the economic well-being of the state's citizens. Then, the closed to the public meeting processes used by the Commission when establishing seasons north of WA do not provide the normal regulatory transparency we are accustomed to in the U.S. leaving one uncertain how to participate.

If anyone in the Commission has recommendations on how to participate in a more effective fashion, we will give all suggestions offered due consideration. In the meantime, we will be moving forward with our plans to engage the public and elected officials in a conversation about the difficulties and obstacles that need to be addressed to insure recovery of natural spawning salmon stocks in WA streams.

Respectfully,



Tim Hamilton	Art Holman	Ron Schweitzer
President	Vice-President	Secretary/Treasurer

cc: The Honorable Members of the Washington State Congressional Delegation
The Honorable Governor Jay Inslee
The Honorable Members of the WA Fish & Wildlife Commission
The Director and selected staff, WA Department of Fish & Wildlife
Interested Parties & Media Contacts List

DRAFT U.S. Bilateral Meeting List January 12, 2016

U.S. Commissioners recommend approval of the following list of bilateral meetings represented in work plans of the following Panels and Committees. Further an additional list of meetings also represented in work plans are recommended for deferral or changed location.

Approval Recommended for the Following Bilateral Meetings:

- CTC- AWG – March 2016
- Fraser River Panel and Tech Committee pre-season planning – April 2016
- CTC – April 2016
- CTC- AWG – May 2016
- Fraser Tech Modeling – May 2016
- Chum Tech Committee – May 2016
- SFEC- AWG – June 2016
- CTC – June 2016
- Fraser River Panel and Tech Committee pre-season planning – June 2016
- Coho Working Group – June 2016
- Coho Tech Committee – July 2016
- Fraser River Panel In-Season – August 4 2016
- Fraser River Panel In-Season – August 11 2016
- Fraser River Panel In-Season – August 18, 2016
- Fraser River Panel In-Season – August 25, 2016
- CTC- AWG – August 2016
- Coho Model Workgroup – September 2016
- CTC – September 2016

Deferral or Location Change Recommended for the Following Bilateral Meetings:

- Fraser Panel and Tech Committee post-season planning – requested for September 2016 at a location proximate spawning grounds; recommend deferral until early October 2016 at a location proximate Vancouver, B.C.
- Coho Tech Committee / Coho work group – requested as "TBD"'; recommend deferral until early October 2016