Agenda Item F.1
Situation Summary
April 2008

TENTATIVE ADOPTION OF 2008 OCEAN SALMON MANAGEMENT MEASURES FOR ANALYSIS

The Council adopted three salmon management options in March, which were published in Preseason Report II and sent out for public review. In action under this agenda item, the Council must narrow the March management options to a single season recommendation for analysis by the Salmon Technical Team (STT). To allow adequate analysis before final adoption, the tentatively-adopted recommendations should resolve any outstanding conflicts and be as close as possible to the final management measures. This is especially important to ensure final adoption is completed on Thursday afternoon.

The Council's procedure provides any agreements by outside parties (e.g., North of Cape Falcon Forum, etc.) to be incorporated into the Council's management recommendations must be presented to the Council in writing prior to adoption of the tentative options. The procedure also stipulates any new options or analyses must be reviewed by the STT and public prior to the Council's final adoption.

At its March 2008 meeting, the Council adopted for public review a set of recommendations comprising a rebuilding strategy for Klamath River fall Chinook. The proposed rebuilding strategy is described in Preseason Report II, Appendix A. The final rebuilding strategy is to be implemented through a regulatory amendment beginning with the 2008 ocean salmon management measures. The Council is scheduled to adopt a final strategy under Agenda Item F.5 on Thursday, April 10, 2008.

If necessary, the STT will check back with the Council on Wednesday, April 5, 2008 (Agenda Item F.2) or at other times to clarify any questions or obvious problems with the tentative measures. The Council must settle all such issues on Wednesday to allow time for STT analysis and to meet the final adoption deadline of Thursday afternoon.

Summaries of the testimony presented at public hearings will be provided at the meeting in the supplemental reports noted below (Agenda Item F.1.c). A summary of public comment letters received at the Council office by March 19 are included in Agenda Item F.1.j.

Council Action:

Adopt tentative treaty Indian ocean and non-Indian commercial and recreational management measures for STT collation and analysis.

Reference Materials:

1. *Preseason Report II Analysis of Proposed Regulatory Options for 2008 Ocean Salmon Fisheries* (mailed prior to the hearings and available at meeting).
2. Agenda Item F.1.j, Summary of Written Public Comment.
3. Agenda Item F.1.k, Public Comment.
4. Agenda Item F.1.c, Supplemental Public Hearing Reports 1 through 3: Summary of Public Hearings.
5. Agenda Item F.1.i, Supplemental SAS Report: Proposed 2008 Ocean Salmon Management Measures For Tentative Adoption.
6. Agenda Item F.1.k, Supplemental Public Comment.

Agenda Order:

a.	Agenda Item Overview	Chuck Tracy
b.	Update on Estimated Impacts of March 2008 Options	Dell Simmons
c.	Summary of Public Hearings	Hearings Officers
d.	U.S. Section of the Pacific Salmon Commission Recommendations	Curt Melcher
e.	North of Cape Falcon Forum Recommendations	OR, WA, and Tribes
f.	National Marine Fisheries Service (NMFS) Recommendations	Frank Lockhart
g.	Tribal Recommendations	David Sones
h.	State Recommendations	P. Anderson/C. Melcher/M. Vojkovich
i.	Reports and Comments of Advisory Bodies	
j.	Summary of Written Public Comment	Chuck Tracy
k.	Public Comment	
l.	**Council Action:** Tentatively Adopt Management Measures for 2008 Ocean Salmon Fisheries	

PFMC
03/20/08

SALMON MANAGEMENT OPTION HEARING SUMMARY

Date:	March 31, 2008	Hearing Officer:	Mr. Mark Cedergreen
Location:	Chateau Westport Westport, WA	Other Council Members:	Mr. Phil Anderson Mr. Dale Myer
		NMFS:	Dr. Peter Dygert
Attendance:	20	Coast Guard:	Matt Walker Joe Volker
Testifying:	9	Salmon Team Member:	Mr. Doug Milward
		Council Staff:	Dr. Kit Dahl
Organizations Represented: Washington Trollers Association, Ilwaco Charterboat Association, Westport Charterboat Association			

Synopsis of Testimony

Of the 10 people testifying:

- 5 commented primarily on the commercial troll fishery.
- 4 commented primarily on the recreational (charterboat) fishery.

Special Opening Remarks

Mr. Doug Milward reviewed options for the commercial and sport salmon seasons.

Commercial Troll Comments

- Recommend 60 fish per day landing limit per opening.
- Supports quota south of Leadbetter Point.
- Support for a 2 Chinook to 1 halibut catch ratio with a 30 fish cap.
- Recommendation for Option 1 with a 15 percent guideline assigned to Area 1, 50 fish landing limit, July 1 opener with 40 coho and a 2:1 halibut ratio (report of preliminary meetings of the Washington Trollers Association).
- Concern about boats from south of Cape Falcon moving north and competing for available quota. Possible restrictions include landing requirements, lower quota to make it less

attractive, requirement to use 6-inch plugs.

- Stock enhancement programs should be increased to more rivers and get schools involved.

- Concern about take of salmon in Pacific whiting fishery.

- Concern about consumption of salmon by marine mammals.

- Appreciation for NMFS getting the Guidance Letter out well before the March Council meeting.

- Work with the governors to secure disaster relief and make sure it is available early since the situation is anticipated.

Recreational Comments

- 8 percent exploitation rate for ESA-listed LCR coho unreasonable considering these are descended from hatchery strays

- Council should convey to the Secretary of Commerce the fishery disaster situation on the west coast and secure economic aid.

- Concern about boats from south of Cape Falcon moving north and competing for quota.
- Include charterboat industry in disaster relief programs.

- Support for 2 fish bag limit over 1 fish, even if a Chinook only fishery.

- Some support for an earlier opening than June 8.

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Written Statements (Attached)

- Westport Charterboat Association
- Ilwaco Charter Association

PFMC
04/01/08

Ilwaco Charter Association
P. O. Box 9
Ilwaco, WA 98624

The Ilwaco Charter Association is not here to testify tonight on the options we would like to have. Whether we have Option 1 or Option 3, this year will be a disaster. The 2008 salmon options are extremely draconian and we will have a very hard time lasting 15 days for our summer fishing season. Other Ports on the Washington Coast aren't any better off. I'm here tonight to ask you to do what you can to convey to the Secretary of Commerce the reality of the disaster we face on the Washington Coast. It is not only the charter fishing industry, but also the Washington troll fishery and all our support businesses as well. We are not used to asking for help, but this year will hopefully be one of the few times that we must ask for help. We need direct aid to the fishermen and salmon related businesses. We ask that you, the Pacific Fishery Management Council, please do what you can as soon as possible.

Thank you

Butch Smith
President Ilwaco Charter Assoc.

WESTPORT CHARTERBOAT ASSOCIATION
P. O. BOX 654 • WESTPORT, WASHINGTON 98595

March 30, 2008

Pacific Fishery Management Council
7700 NE Ambassador Place
Suite 200
Portland, OR 97220-1384
Attn: Donald Hansen, Chairman

Dear Chairman Hansen,

My name is Steve Westrick. I'm the president of the Westport Charterboat Association. Our Association is comprised of 33 charter fishing vessels and 10 booking services all operating here in Westport.

First, I'd like to thank the Council for having public hearings in Westport each year.

It's obvious that 2008 will be a tough season. We have been following the development of the salmon stock predictions since December and are well aware of the constraints that will determine this year's fishing levels.

We have two major concerns aside from the economic ramifications of a general lack of opportunity this year.

FIRST We believe that an 8% Exploitation Rate on ESA listed lower Columbia naturally spawning Coho creates a social and economic disaster that SOME flexibility could lessen. NOAA Fisheries TWICE rejected the listing of this stock, declaring them EXTIRPATED (I believe that means EXTINCT – Webster's dictionary defines it as "REMOVED – DESTROYED TOTALLY"). Basically, the Coho stocks spawning in the wild below Bonneville Dam are HATCHERY STRAYS.

If Hatchery salmon are so detrimental to the health of wild stocks WHY are they listed?

If there are no TRULY PURE ORIGINAL Coho in these Rivers, WHY are they listed?

We believe this was solely a POLITICAL decision with the intent of placating influential groups bent on destroying the fishing industry.

SECOND With regard to the management of the seasons North of Cape Falcon:

We are concerned that commercial fishing vessels from Oregon, with little or no opportunity South of Cape Falcon, WILL have the opportunity to come North of Falcon and take not only a substantial share of the commercial catch but also impact the recreational quota.

We have been constrained for many years while the fisheries south of us have been managed much more liberally. We sympathize with the situation they find themselves in this year but we believe we have a right to our quota, however small.

We ask that you choose regulations that maximize the manageability of the fisheries North of Falcon so as to protect our Washington fisheries.

FINALLY

The timing of our public hearing occurred before the SECOND North of Falcon meeting here in the state. We haven't had our General Membership meeting yet to look at our final recommendations. As we have in the past we will ultimately be supporting a season structure that maximizes opportunity and potential angler success rate given the quotas ultimately agreed upon by the Council.

Respectfully Yours,

Steve Westrick

Steve Westrick, President

SALMON MANAGEMENT OPTION HEARING SUMMARY

Date:	March 31, 2008	Hearing Officer:	Mr. Rod Moore
Location:	Red Lion Hotel Coos Bay, Oregon	Other Council Members:	
		NMFS:	Ms. Sarah McAvinchey
Attendance:	60	Coast Guard:	LT Lyle Kessler
Testifying:	17	Salmon Technical Team:	Mr. Craig Foster
		Council Staff:	Mr. Chuck Tracy

Organizations Represented: Port of Brookings Harbor; Klamath Zone Coalition; Brookings Chamber of Commerce, Curry County Board of Commissioners.

Synopsis of Testimony

Of the 17 people testifying:

- 4 commented primarily on the commercial troll fishery.
- 3 commented primarily on the recreational fishery.
- 5 commented on both recreational and commercial fisheries, or other economic aspects of the fisheries.
- 4 commented on issues associated with Klamath River water management issues.
- 1 commented on salmon predation issues.

Special Opening Remarks

Mr. Moore gave a brief overview of the meeting process and objectives of the fisheries. Mr. Foster provided a summary of the recreational and commercial options.

Commercial Troll Comments

All of those testifying supported Option II or III, there was no support for Option I. Several people requested a disaster relief declaration.

Recreational Comments

All of those testifying supported Option I.

Other Comments

Several people supported implementing emergency regulations allowing recreational fisheries to maintain the economic viability of coastal communities. Several of those testifying expressed frustration with the water management situation in the Sacramento Basin, and requested the Federal agencies to address hydropower and habitat issues. Several people supported funding increases for better scientific data collection, including the proposed GSI study. One person requested lethal removal of sea lions. Two people felt that the whiting fleet should be closed down if the salmon fleet was closed down.

Written Statements (Attached)

Gary Milliman, City of Brookings
Dixie Boley
Curry County Board of Commissioners

PFMC
04/02/08

City of Brookings

898 Elk Drive, Brookings, OR 97415
(541) 469-1100 Fax (541) 469-3650
gmilliman@brookings.or.us

Finally, we need your continuing help in the development of water practices and data gathering systems that will both provide a sustainable fishery yield, and which will aid in refining fishery management practices.

There are two populations that need to be sustained along the Oregon coast that your actions will touch: the Salmon fish, and the human population that relies upon the Salmon fishery for their livelihood.

Respectfully,

Gary Milliman
City Manager

Cc: Mayor and Council
Brookings Harbor Port Commission
Curry County Board of Commissioners
Peter DeFazio, Member of Congress
Ted Kulongoski, Governor
Wayne Krieger, State Assembly
Jeff Kruse, State Senate
Brookings Harbor Chamber of Commerce
Scott Graves, The Pilot

PFMC Public Hearing

Coos Bay, Oregon

March 31.2008

Gentlemen:

I support, with any Option chosen, sufficient Chinook impacts to conduct experimental genetic stock identification studies May 1 – August 31, 2008. This will continue the GSI – Genetic research started in 2006, and continued in 2007, by the CROOS Project. The more information we can learn about when and where Salmon stocks are found swimming in the ocean plus the collected data on ocean conditions promotes good science. The better the science behind fishery decisions, the better the decision.

Thank You,

Dixie Boley

Fishermen Direct Seafood

Gold Beach, OR 97444

Curry County
Board of Commissioners

CURRY COUNTY Commissioner

Georgia Yee Nowlin, *Chair*
Lucie La Bonté, *Vice Chair*
Marlyn Schafer, *Commissioner*

94235 Moore Street / P.O. Box 746
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541-247-3296, 541-247-2718 Fax
800-243-1996 *www.co.curry.or.us*

Pacific Fisheries Management Council
7700 NE Ambassador Place, Suite 101
Portland, OR 97220-1384

Dear Sirs;

March 26, 2008

The Curry County Board of Commissioners would like to go on record in support of the Klamath Management Zone Fisheries Coalition's recommendation of Option 1 for the recreational 2008 Ocean Salmon Season in the Klamath Management Zone. For the commercial season we will support our commercial fishermen from our ports for a salmon emergency declaration with a possible limited season.

The Curry County Board of Commissioners also supports the KMZFC recommendation that GSI (Genetic Sampling Information) studies also take place in 2008. This is so that this vital information as to where and when the Sacramento and Klamath runs are in the ocean can be gathered to identify accurate information regarding impacts from our fishermen.

We would like to emphasize that this drastic reduction in our ocean salmon seasons will devastate the already impacted Curry County economy. We will advocate for a disaster declaration for commercial salmon fishermen and amending the Magnuson Act so that recreational suppliers and ports can also be included in future disaster declarations. We recognize that poor ocean conditions as well as bad management decisions of the Sacramento River are to blame. We hope that the federal government works with the State of California to assure improvement of management practices impacting this federal resource. It is also our hope that the federal government fund important research studies such as GSI so that future economic impacts to our region are not so severe.

Thank you for the opportunity to comment.

Sincerely;

Commissioner Georgia Nowlin
Chair

Commissioner Lucie La Bonté
Vice Chair

Commissioner Marlyn Schafer

SALMON MANAGEMENT OPTION HEARING SUMMARY

Date:	April 1, 2008	Hearing Officer:	Mr. Dan Wolford
Location:	Red Lion Hotel, Eureka, California	Other Council Members:	
		NMFS:	Mr. Mark Helvey
Attendance:	167	Coast Guard:	LT Scott Parkhurst
			ENS Matt Hardgrove
Testifying:	19	Salmon Technical Team:	Mr. Allen Grover
			Ms. Jennifer Simon
		Council Staff:	Mr. Chuck Tracy

Organizations Represented: Humboldt Salmon Trollers Marketing Association; Coastside Fishing Club; Pacific Coast Federation of Fishermen's Associations; Klamath Zone Coalition; Recreational Fishing Alliance

Synopsis of Testimony

Of the 19 people testifying:

- 1 commented primarily on the commercial troll fishery.
- 8 commented primarily on the recreational fishery.
- 2 commented on both the recreational and commercial fisheries.
- 4 commented primarily on economic or other aspects of the fisheries.
- 3 commented primarily on fishery management or habitat/water use issues.

Special Opening Remarks

Mr. Wolford gave a brief overview of the meeting process and objectives. Ms. Jennifer Simon gave a brief overview of the recreational and commercial options and associated biological impacts.

Commercial Troll Comments

All of those testifying supported Option II or III, there was no support for Option I.

Recreational Comments

All those testifying supported Option I. Several people supported additional fishing time for the KMZ in August or September with a catch record card with an annual limit of 10 salmon.

Other Comments

Several people supported implementing emergency regulations allowing recreational fisheries to maintain the economic viability of coastal communities. There was wide concern about compressing the available fishing time into 10 days during holiday weekends causing overcrowding at the limited ramps in Humboldt County and the possibility of weather preventing fishing on the open dates. Several of those testifying expressed frustration with the water management situation in the Sacramento Basin, and requested the Federal agencies to address water use issues. Several people supported funding increases for better scientific data collection, including the proposed GSI study. Several people felt sea lion removal would benefit salmon populations. One person felt the KRFC recovery criteria of two consecutive years with a natural spawning escapement of at least 40,700 was not advisable because it allowed recovery based on one successful brood. Two people requested development of management objectives and research for Klamath River spring Chinook.

Written Statements (Attached)

Ben Doane, Klamath Zone Coalition
Petey Brucker, SRRC, KFA, KSAGA, KSMC
Gregg Niekrass

PFMC
04/3/08

TO- Pacific Management Council
Date: April 1, 2008
From: Petey Brucker- SRRC, KFA, KSAGA, KSMC
RE: PFMC- 2008 Fishing Season Comments

Dear Mr. Isaacson,

The following are comments and recommendations that I have for the Pacific Fisheries Management Council I regards to the 2008 Salmon Fishing Season.

In 1992, 16 years ago, the restrictions and closures to Klamath Management Zone ocean and in-Klamath river fishing were devastating. Fishing in the ocean or river were curtailed due to the collapse of at least one year class. Now California and Oregon ocean salmon fisheries are still recovering from a poor fishing season in 2005 and a disastrous one in 2006, when Klamath River fall Chinook returns were below their spawning escapement goal. The catch of salmon in 2007 in these areas was also well below average, as the first effects of the Sacramento River fall Chinook stock collapse was felt. The potential closure of ocean fishing for the 2008 season is devastating news to beleaguered salmon fleets on the west coast.

We recognize and support the PFMC as it takes steps to try and prevent the reoccurring collapse of the Pacific Coast salmon runs and stocks from different river systems, highlighting the Klamath River Basin salmon. The PFMC has tried to take steps to offer increased protection for years when low returns are predicted. They have also worked to refine the model predictors and worked to better understand the impacts of fishing to different stocks and try and develop a better informed regulation to target stronger runs and reduce harvest of the weaker ones.

Although the PFMC has worked hard to try and prevent the re-occurring collapse of various stocks and runs of Pacific Cost salmon, more short and long conservation and transitional step are needed now due to the foreboding trend indicators in the data and signs on the horizon.

Some of these include:

Bad Trend Indicators

- ► Wild fall and wild spring-run Chinook of the Klamath River Basin (Basin) have been decreasing since 1992.

- ► The lowest 4 year average of wild fall-run grilse occurred 2002-05 in the Basin with an average 487 fish/yr.

- ► Average wild adult escapement (2004-06) decreased 75% from 1994-03 average while mixed wild/hatchery natural spawning (2004-06) decreased 51% and average escapement to hatcheries (2004-06) decreased only 23% from 1994-03 average.

► Escapement to hatcheries has been increasing 6% per year since 1980.

► The hatchery produced portion of total run has been increasing 1-2% per year.

► 2006 juvenile out-migration trapping data throughout the Klamath River Basin indicates an extremely low year class, as is reflected in the STT's Pre-Season Report. The 2008 SSRT Pre-Season Report to the PFMC states,

"While no Conservation Alert has been triggered this year, the STT is concerned that 2007 observed escapements for several stocks are outside the bounds of the data.

In 2007, Central Valley Chinook had a record low number of jacks in the escapement last year. Klamath River fall Chinook also had record low jack returns in 2007, and are thus outside the bounds of the data used to forecast ocean age-3 abundance.

The escapement index for north migrating Oregon coast fall Chinook has declined sharply for the past four years and the stocks failed to meet their post-season escapement goal in 2007 for the first time since 1983.

The STT is concerned that the 2008 forecasts for stocks south of Cape Falcon may be overly optimistic. "

There are various signs on the horizon longer term cumulative impacts and short term problems facing the Klamath salmon. I have provided you with some of these below and have alos made recommendations to this years proposed salmon fishing season regulations for 2008. These include:

<u>Bad Signs for Klamath/Trinity Chinook on the Horizon</u>

► **Poor Ocean Conditions** – Ocean conditions appear to be
NOAA-

SST - **The fact that so many of the stocks south of Cape Falcon are experiencing declining trends suggests that recent ocean conditions have been very unfavorable for survival.**

► **Toxic Algae – The presence of blue green toxic algae, microsystis arugenosa,** is increasing in the Klamath River, as is illustrated in the 2007 emergency postings on the lower 150 miles of the Klamath River that warned people of the dangers of being in the river. This toxic algae also affects fish acutely and cumulatively and is a growing concern for Klamath River fish, including Chinook salmon.

► **Disease** -Extensive annual impacts to juvenile out-migration from various diseases appears to be increasing in the Klamath River during the spring and early summer. The incidence and extent of disease may be increasing in the Klamath River due to poor water quality conditions and lack of dynamic water flows.

► **Invasive Fish Species** – The presence and suspected increase in invasive fish species in the Klamath River is occurring.

► **Climate Change** - Predicted climate change and impacts to salmon at the edge of their range, for which Klamath/Trinity Chinook are close to the edge and Spring-run

Chinook are even more so at-risk. Assessment predict a loss of up to 20% of the existing rainfall in the Klamath River by 2050.

<u>Proposed KRFC Rebuilding Strategy</u>

We have reviewed the PFMC strategy for rebuilding the Klamath FALL Chinook Stocks and offer these comments. In number 13, 14, and 15.

<u>Council Proposed KRFC Rebuilding Strategy</u>

After review of the stock and EFH assessments, the Council is required to recommend actions to:

A) end any excessive fishing mortality;

B) specify criteria for determining the end of the Overfishing Concern;

C) achieve the conservation objective of the stock; and

D) specify actions necessary to rebuild the stock. The STT completed a stock assessment, which was presented to the Council in March 2008, and included a number of recommendations intended to address the required actions identified above.

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1. Consider the Overfishing Concern of KRFC ended when a natural spawning escapement of at least 35,000 adults is achieved in three out of four consecutive years or when a natural spawning escapement of at least 40,700 adult KRFC is achieved in two consecutive years.

2. Target a natural spawning escapement of 40,700 adult KRFC until the Overfishing Concern is ended (the rebuilding period). When implementing *de minimis* fisheries during the rebuilding period, provide for an age-4 ocean impact rate of no more than 10 percent when preseason stock abundance forecasts result in pre-fishing spawning escapement projections of less than about 54,000.

3. No further modifications in parameterizing the Klamath Ocean Harvest Model (KOHM) components are recommended at this time.

4. During periods of stock rebuilding, fall fishing opportunity in areas impacting KRFC abundance should be restricted.

5. The practice of reopening the upper Klamath and Trinity rivers to recreational fishing once hatchery egg take goals are met should be suspended during rebuilding periods or when an Overfishing Concern is imminent.

6. All river fishery strata should be sampled at a minimum sampling rate of 20 percent for catch and biological information, including coded-wire tags (CWTs) used to estimate impact on natural area spawners and returns of hatchery fish.

7. No change to the current FMP conservation objective for KRFC.

8. Encourage implementation of a 25 percent constant fractional marking program at Iron Gate Hatchery.

9. Encourage further research on disease issues in the Klamath Basin as they relate to population dynamics and fishery management.

10. Encourage expanded studies of tributary and mainstem production and survival rates of KRFC.

11. Encourage studies of early-life marine survival rates for KRFC.

12. Continued Council involvement in the Federal Energy Regulatory Commission (FERC) relicensing process, and consideration of Council recommendations by FERC.

13. Develop stock identification and improved life history understanding of wild stocks in the mainstem and tributaries, including wild fall and spring Chinook throughout the Klamath River Basin.

14. Develop a Fish Management Plan and Conservation Objectives for Klamath/Trinity Spring-run Chinook.

15. In the Klamath River Basin, there is significant hatchery production of fall chinook and less so of spring Chinook, resulting primarily from mitigation programs for dams constructed in both Upper Klamath and Trinity Rivers. (PFMC –Pacific Coast Salmon Plan -1999 -Amendment 14) Need to develop prioritized research and monitoring study design to identify impacts between wild and hatchery species and provide remedial actions.

Management of Klamath/Trinity Spring-run Chinook salmon

Spring-run Chinook salmon (*Oncorhynchus tshawytscha*) were once the dominant run type in the Klamath/Trinity Basin, Spring run populations are at less than 10% of the historic level and at least 7 runs (in the Klamath Basin) are now extinct. (NOAA Fisheries –1998 Chinook Status Review). The Spring-run Chinook in the Klamath Basin currently utilize an estimated 3 % of their historical habitat. Several of these historic stocks proliferated above the dams on the Klamath, Trinity and Shasta rivers. The run decline is largely due to the construction of dams/fisheries barriers, alteration of the natural hydrograph (natural and human related), increased sediment production, excessive fishing, and negative impacts to essential habitat caused by agriculture, forestry-logging/fire management, historic hydrolic mining, and others. Impacts to the Spring run Chinook have also resulted from drought, and other natural events.

In the middle to late 20th century, the decline of the depleted populations continued as a result of further dam construction (for example, of Trinity and Iron Gate Dams) and, in 1964, heavy sedimentation of habitat that resulted from catastrophic landslides due to heavy rains on soils denuded by logging (Campbell and Moyle 1991). The large run in the Shasta River disappeared coincidentally with the construction of Dwinnell Dam in 1926 (Moyle et al. 1995).

By the 1980s, spring-run Chinook had been largely eliminated from much of their former habitats because the cold, clear water and deep pools that they require were either absent or inaccessible. In the Klamath River drainage above the Trinity, only the (Spring Chinook) population in the Salmon River and Wooley Creek remains; it has annual runs of 150-1500 fish (Campbell and Moyle 1991, Barnhart 1994). Numbers of fish in the area continue to decline (Moyle 2002). with only 90 returning adults counted in the 2005 cooperative snorkel surveys on the Salmon River.

NMFS debated designation of the Klamath spring-run Chinook as a distinct ESU, but decided that it was too closely related to fall-run Chinook to justify separation (Myers et al. 1998). Nevertheless, the presence of genetic differences and of great differences in life history suggest that it should be managed as a distinct ESU (as was done for the Sacramento River spring-run Chinook) or as a distinct population segment. Protection and restoration of streams used by spring-run Chinook salmon would provide additional protection for coho salmon because the two salmon have similar temperature and habitat requirements.

Within the lower Klamath watershed, the Salmon River remains the most pristine tributary. (Moyle 2004) Spring Chinook require deep pools for summer holding and cooler waters for juvenile rearing, such as those in the Salmon River. Because the Trinity River run of several thousand fish per year is apparently sustained largely by the Trinity River Hatchery, the Salmon River population may be the last wild (naturally spawning) population in the basin. The Trinity River Hatchery releases over 1 million juvenile spring-run Chinook every year, usually in the first week of June. Apparently, all spawners in the mainstem Trinity River below Lewiston Dam are of hatchery origin.

<u>Short and Long Term Recommendation for Management of Klamath Trinity Chinook Species, Runs and Stocks and</u>

<u>Long Term</u>

- The PFMC should recognize that Chinook salmon are in poor condition and should anticipate species and run sizes getting worse in the near future.

- The PFMC and fishing community should develop a short term and long term program that provides disaster or emergency assistance to impacted businesses and communities in the Klamath Management Zone and in the Klamath and Trinity Rivers. Also included in this program should be the purchase of a certain amount of boats and businesses from fishing interests, as well as offer retraining for those that sign up for this transitional economic fishing community stimulus.

- All fishing opportunities in the river or ocean should include a scientific research component that enlists the fishers assistance in data collection and information gathering and sharing. Although the ocean has a program being developed between the scientists, managers and fishing community, a similar program is needed for the in-river fishing for tribal and non-tribal sport alike.

- PFMC and other fish managers should insure that adequate stock identification is secured both for the Klamath Chinook in the ocean and for the key stocks of fish in the Klamath/Trinity River system for hatchery and wild fish, as in the Klamath River Salmon, Scott, Shasta, Trinity and other tributaries, and for both the spring and fall runs of Chinook. The need to develop accurate and effective stock identification methods for the various stocks and runs of the Klamath River Basin are emphasized because we currently do not understand the impacts of fishing to the wild stocks of the Klamath River Basin. The analysis associated with the Deminimus Fishing Rule in Amendment 15 identifies the increased potential for above average impacts to the wild stocks of the tributaries, such as the Salmon, Scott, Shasta, and other tributaries for Fall Chinook during this fishery.

- Stock identification is needed to understand the life history and fishing impacts to the Klamath/Trinity Spring-run Chinook because the PFMC and other related state and federal fish managers have in the past and still inadequately manage and protect these fish. This is evidenced by the PFMC's continual failure to develop the required fish management plan and conservation objectives for Klamath/Trinity Spring-run Chinook salmon.

- The PFMC should insure that the minimum research needs are met to continue to examine stock behavior in the ocean and in the river

- The PFMC should insure that the Klamath Fishery Management Council has adequate funding and support to fulfill their on-going management role and function with regard to Klamath River salmon stocks.

- **Create a KRSC cohort reconstruction model like the KRFC model to allow for run size predictions and quotas to prevent over fishing.**

- **Do not recommend open season fishing for KRSC as long as they are in worse condition then KRFC and need appropriate management.**
- **Manage KRSC to recover the Salmon River and South Fork Trinity components**

<u>Short Term - 2008 Salmon Fishing Season Recommendation</u>

The post-August 2007 commercial and sport ocean salmon fisheries have already harvested approximately 4,000 KRFC from the 2008 abundance and the 2008 regulation should consider this.

►Initiate Creel surveys for KRSC harvest between the mouth of the Klamath and Weitchpec.

► There is no quota to be met or to trigger closures/protection for Klamath Spring Chinook in the ocean and/or river. The PFMC does not have the required Fish Management Plan or Conservation Objectives for Klamath Trinity Spring Chinook run, as listed in Ammendment 14.

In the 2008 fishing season there is anticipated a great increase in fishing pressure for springers due to ocean and other river closures. The two fish a day bag limit for Klamath Spring-run Chinook is not driven by a fish management plan or conservation objectives thus there is no limit of how many fish can be taken nor a quota that when met would trigger a closure. The proposed fishing regulations iterate this when it is described as an "Open Season" for Klamath Trinity spring- run Chinook.

These fish are not protected and/or let alone included in the management of the Fall Chinook. NOAA says a Chinook is a Chinook in the Klamath/Trinity river. Although we greatly appreciate what protective measures are adopted more recently for the Klamath/Trinity Spring Chinook, The management is not consistent between agencies for Fall and Spring Chinook articulating a clear differences and separation of evolution between these fish. They are separated by habitat use and needs, life history patterns, run timing in as adults and out as juveniles, wild vs hatchery stocks, and many more differences. It is often quite confusing for me and my community who have stopped fishing Spring Chinook in the largest as almost only wild run left pn the Klamath River and are a prime stock to consider for reintroduction above the PacifiCorop dams.

The Salmon River Spring Chinook are the fish/run anticipated of ruse in the reintroduction. We need to build this run up and offer adequate protection to do this immediately, other wise we may be wasting and not really managing this valuable resource for the future. .

►Allow no Chinook harvest from Weitchpec to Iron Gate from Jan 1 – September 1 like the Commission has chosen to do for the South Fork Trinity.
August 31 closure are proposed in Trinity to protect wild Spring Chinook runs. They are closed until August 15th on the Klamath River above Weitchpec. These should be changed to August 31. Closure at the mouth of the Salmon River is needed because the majority of the salmon in the Klamath River above Weitchpec between August 15 and Aug 31 are either stranded or migrating wild Spring Chinook trying to get to the salmon river or they are summer run Chinook.

►Allow no Chinook harvest within 500 ft. of the mouth of Salmon River, Camp Creek and Bluff Creek from January 1 – September 1. These areas are important cold water refugia areas that have documented KRSC use through the month of August.

The regulations should close the mouth of Salmon in particular to protect wild Spring Chinook fish until September 15th if not all year. This is a key cleaner cold water refugia for the migrating adults in the Klamath River, not to mention the significance it has for the Spring run in the spring and summer months, until mid-September when the Klamath

River water temperatures cool. The PFMC should also consider closing fishing at the mouths such as the Scott , Shasta and other key refugia and holding areas all year or at least until September 15th, to better protect springers at least, if not also offer additional protection to the fall run Chinook which have questionable viability levels currently when considering the 3 year age class this year..

In conclusion, I would like to thank you for your attention. I look forward to your response. If you have any questions or would like to discuss this further with me, please let me know.

Respectfully,

Petey Brucker

Petey Brucker for the
SRRC, KSMC, KSAGA and KFA

Remarks for the PFMC Public Hearing, April 1, 2008 in Eureka, CA

Good evening, my name is Ben Doane and I'm here tonight to represent the Klamath Management Zone Fisheries Coalition, a group of ocean sport fishing enthusiasts, commercial fishing interests, concerned city and county officials, fisheries dependant businesses and port authorities.

My information resources are the PFMC's Preseason Report I – February 2008, Preseason Report II – March 2008 and the Klamath River Technical Advisory Team's Klamath River Basin Fall Chinook Salmon Age-Specific Escapement, and Run-size Estimates 2007 Run – 12 February 2008

KRFC September 1, 2007 stock forecast: 31,600 age 3 fish, 157,000 age 4 fish and 1,900 age 5 fish. KR Tech. Advisory Team estimated the Age 2 (jacks) 2007 return at 1,661 fish. The 2008 escapement forecast is 26,900 natural spawners with a 2007 equivalent fishing season and 74,300 natural spawners with 0 fishing in 2008.

Considering Option#1: Nine (9) days of fishing.

The impact On Klamath River Fall Chinook in both CA/OR KMZ 1300 is fish.

The impact on Sacramento River Fall Chinook in the CA KMZ is 48 fish which equals 3.69% of the total estimated CA/OR KMZ catch. Impact in the OR KMZ is 35 fish which equals 2.69% of the total estimated CA/OR KMZ catch. Combined impact is 6.38% of the total estimated KMZ catch or 83 fish. In the whole of the KMZ the total impact in August is 22 SRFC under Option #1.

Preseason Report II indicates that the Klamath River in-river recreational fishery and federally recognized tribal fisheries will share no less than an estimated 45,900 fish (Option #1 with an escapement of 40,700 natural spawners) and as many as 56,641 fish if the KRFC are managed to an escapement of 35,000 natural spawners. It appears that there is a sufficient number of KRFC to allow the KMZ an ocean sport fishing season while achieving an escapement of 40,700 KRFC natural spawners in the Klamath River system and with limited impact on SRFC stock.

Considering Options #2 and #3: Zero ocean sport fishing.

The total closure of the KMZ ocean salmon season would be a disaster from which many commercial fishermen and fisheries dependant businesses may never recover, even with federal assistance money.

My experience with the weather conditions in the KMZ, having fished from 1964 fishing season to the 2007 fishing season, is that fishermen will be very lucky to get on the water 50% of nine days that are allowed in Option #1. Mother Nature will no doubt further reduce our potential impact on all salmon stocks.

The KMZFC strongly recommends that the PFMC adopt nothing less restrictive than Option #1 while considering a less restrictive option that would include three days on each of the Memorial Day and 4th of July holiday weekends and the last two full week of August (8/16 to 8/31). The additional impact on the SRFC stock in late August is negligible as the vast majority of that stock will have already entered the Sacramento River system in which they spawn. Additionally, the KMZFC believes that it is necessary for the proper management of the salmon resource to complete the Genetic Stock Identification Studies. The completion of the GSI will enable fisheries agencies to more accurately determine the catch location and the catch rate of the various salmon stocks.

Your support of the KMZFC's requests will be greatly appreciated. Thank You.

PACIFIC FISHERY MANAGEMENT COUCIL
ATTENDANCE SIGN-IN SHEET

DATE: Tuesday, April 1, 2008 **GROUP:** Salmon Hearing **PLACE:** Red Lion – Eureka, CA

NAME	ADDRESS/AFFILIATION
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SALMON ADVISORY SUBPANEL

PROPOSED 2008 OCEAN SALMON MANAGEMENT MEASURES FOR TENTATIVE ADOPTION

Tuesday
April 8, 2008

TABLE 1. Commercial troll management measures proposed by the SAS for non-Indian ocean salmon fisheries, 2008.
(Page 1 of 5)

North of Cape Falcon

A. SEASON DESCRIPTIONS

Supplemental Management Information

1. Overall non-Indian TAC: 40,000 Chinook and 25,000 coho marked with a healed adipose fin clip (marked).
2. Trade: none.
3. Non-Indian commercial troll TAC: 20,000 Chinook and 4,000 marked coho.

U.S./Canada Border to Cape Falcon

- May 3 through earlier of June 30 or 13,334 Chinook quota.

Saturday through Tuesday with a landing and possession limit of 50 Chinook per vessel for each open period north of Leadbetter Point and 50 Chinook south of Leadbetter Point (C.1). All salmon except coho (C.7). Cape Flattery, Mandatory Yelloweye Rockfish Conservation Area, and Columbia Control Zones closed (C.5). See gear restrictions and definitions (C.2, C.3). Oregon State regulations require that fishers south of Cape Falcon, OR intending to fish within this area notify Oregon Department of Fish and Wildlife before transiting the Cape Falcon, OR line (45º46'00" N. lat.) at the following number: 541-867-0300 Ext. 271. Vessels must land and deliver their fish within 24 hours of any closure of this fishery. Under state law, vessels must report their catch on a state fish receiving ticket. Vessels fishing or in possession of salmon while fishing north of Leadbetter Point must land and deliver their fish within the area and north of Leadbetter Point. Vessels fishing or in possession of salmon while fishing south of Leadbetter Point must land and deliver their fish within the area and south of Leadbetter Point, except that Oregon permitted vessels may also land their fish in Garibaldi, Oregon. Oregon State regulations require all fishers landing salmon into Oregon from any fishery between Leadbetter Point, Washington and Cape Falcon, Oregon must notify ODFW within one hour of delivery or prior to transport away from the port of landing by calling 541-867-0300 Ext. 271. Notification shall include vessel name and number, number of salmon by species, port of landing and location of delivery, and estimated time of delivery. Inseason actions may modify harvest guidelines in later fisheries to achieve or prevent exceeding the overall allowable troll harvest impacts (C.8).

U.S./Canada Border to Cape Falcon

- July 1 through earlier of September 16 or 6,666 preseason Chinook guideline (C.8) or a 4,000 marked coho quota (C.8.d).

Open July 1-2, then Saturday through Tuesday thereafter. Landing and possession limit of 35 Chinook and 25 coho per vessel per open period north of Leadbetter Point and 35 Chinook and 25 coho south of Leadbetter Point (C.1). All Salmon except no chum retention north of Cape Alava, Washington in August and September (C.7). All coho must have a healed adipose fin clip (C.8.d). Gear restricted to plugs six inches or longer. See gear restrictions and definitions (C.2, C.3). Cape Flattery, Mandatory Yelloweye Rockfish Conservation Area, and Columbia Control Zones closed (C.5). Oregon State regulations require that fishers south of Cape Falcon, OR intending to fish within this area notify Oregon Department of Fish and Wildlife before transiting the Cape Falcon, OR line (45º46'00" N. lat.) at the following number: 541-867-0300 Ext. 271. Vessels must land and deliver their fish within 24 hours of any closure of this fishery. Under state law, vessels must report their catch on a state fish receiving ticket. Vessels fishing or in possession of salmon while fishing north of Leadbetter Point must land and deliver their fish within the area and north of Leadbetter Point. Vessels fishing or in possession of salmon while fishing south of Leadbetter Point must land and deliver their fish within the area and south of Leadbetter Point, except that Oregon permitted vessels may also land their fish in Garibaldi, Oregon. Oregon State regulations require all fishers landing salmon into Oregon from any fishery between Leadbetter Point, Washington and Cape Falcon, Oregon must notify ODFW within one hour of delivery or prior to transport away from the port of landing by calling 541-867-0300 Ext. 271. Notification shall include vessel name and number, number of salmon by species, port of landing and location of delivery, and estimated time of delivery. Inseason actions may modify harvest guidelines in later fisheries to achieve or prevent exceeding the overall allowable troll harvest impacts (C.8).

TABLE 1. Commercial troll management measures proposed by the SAS for non-Indian ocean salmon fisheries, 2008. (Page 2 of 5)
A. SEASON DESCRIPTIONS
South of Cape Falcon
Supplemental Management Information
1. Sacramento Basin recreational fishery allocation: _____. 2. Klamath River recreational fishery allocation: _____. 3. Klamath tribal allocation: _______.
Cape Falcon to Florence South Jetty • Closed except for sufficient impacts to conduct experimental genetic stock identification study May 1 through August 31. All salmon must be released in good condition after collection of biological samples. In 2009, the season will open March 15 for all salmon except coho. This opening could be modified following Council review at its March 2009 meeting.
Humbug Mt. to OR/CA Border (Oregon KMZ) • Closed except for sufficient impacts to conduct experimental genetic stock identification study May 1 through August 31. All salmon must be released in good condition after collection of biological samples. In 2009, the season will open March 15 for all salmon except coho, with a 28 inch Chinook minimum size limit. This opening could be modified following Council review at its March 2009 meeting..
OR/CA Border to Humboldt South Jetty (California KMZ) • Closed except for sufficient impacts to conduct experimental genetic stock identification study May 1 through August 31. All salmon must be released in good condition after collection of biological samples.
Humboldt South Jetty to Horse Mt. • Closed except for sufficient impacts to conduct experimental genetic stock identification study May 1 through August 31. All salmon must be released in good condition after collection of biological samples.
Horse Mt. to Point Arena (Fort Bragg) • Closed except for sufficient impacts to conduct experimental genetic stock identification study May 1 through August 31. All salmon must be released in good condition after collection of biological samples.
Pt. Arena to Pigeon Pt. (San Francisco) • Closed except for sufficient impacts to conduct experimental genetic stock identification study May 1 through August 31. All salmon must be released in good condition after collection of biological samples.
Pigeon Pt. to Pt. Sur (Monterey) • Closed except for sufficient impacts to conduct experimental genetic stock identification study May 1 through August 31. All salmon must be released in good condition after collection of biological samples.
Pt. Sur to U.S./Mexico Border (Morro Bay) • Closed except for sufficient impacts to conduct experimental genetic stock identification study May 1 through August 31. All salmon must be released in good condition after collection of biological samples.

TABLE 1. Commercial troll management measures Proposed by the SAS for non-Indian ocean salmon fisheries, 2008. (Page 3 of 5)

A. SEASON DESCRIPTIONS

B. MINIMUM SIZE (Inches) (See C.1)

	Chinook		Coho		
Area (when open)	Total Length	Head-off	Total Length	Head-off	Pink
North of Cape Falcon	28.0	21.5	16.0	12.0	None
Cape Falcon to OR/CA Border	28.0	21.5	16.0	12.0	
OR/CA Border to Horse Mt.	28.0	21.5	-	-	None
Horse Mt. to U.S./Mexico Border					
Prior to July 1 and after August 31	27.0	20.5	-	-	None
July 1-August 31	28.0	21.5	-	-	None

C. REQUIREMENTS, DEFINITIONS, RESTRICTIONS, OR EXCEPTIONS

C.1. Compliance with Minimum Size or Other Special Restrictions: All salmon on board a vessel must meet the minimum size, landing/possession limit, or other special requirements for the area being fished and the area in which they are landed if the area is open. Salmon may be landed in an area that has been closed more than 96 hours only if they meet the minimum size, landing/possession limit, or other special requirements for the area in which they were caught. Salmon may be landed in an area that has been closed less than 96 hours only if they meet the minimum size, landing/possession limit, or other special requirements for the areas in which they were caught and landed.

States may require fish landing/receiving tickets be kept on board the vessel for 90 days after landing to account for all previous salmon landings.

C.2. Gear Restrictions: Salmon may be taken only by hook and line using barbless hooks.

a. Single point, single shank, barbless hooks are required in all fisheries.
b. Cape Falcon, Oregon, to the OR/CA border: No more than 4 spreads are allowed per line.
c. OR/CA border to U.S./Mexico border: No more than 6 lines are allowed per vessel, and barbless circle hooks are required when fishing with bait by any means other than trolling.

C.3. Gear Definitions:

Trolling defined: Fishing from a boat or floating device that is making way by means of a source of power, other than drifting by means of the prevailing water current or weather conditions.

Troll fishing gear defined: One or more lines that drag hooks behind a moving fishing vessel. In that portion of the fishery management area (FMA) off Oregon and Washington, the line or lines must be affixed to the vessel and must not be intentionally disengaged from the vessel at any time during the fishing operation.

Spread defined: A single leader connected to an individual lure or bait.

Circle hook defined: A hook with a generally circular shape and a point which turns inward, pointing directly to the shank at a 90º angle.

C.4. Transit Through Closed Areas with Salmon on Board: It is unlawful for a vessel to have troll or recreational gear in the water while transiting any area closed to fishing for a certain species of salmon, while possessing that species of salmon; however, fishing for species other than salmon is not prohibited if the area is open for such species, and no salmon are in possession.

TABLE 1. Commercial troll management measures proposed by the SAS for non-Indian ocean salmon fisheries, 2008. (Page 4 of 5)
C. REQUIREMENTS, DEFINITIONS, RESTRICTIONS, OR EXCEPTIONS (continued)

C.5. Control Zone Definitions:

a. *Cape Flattery Control Zone* - The area from Cape Flattery (48º23'00" N. lat.) to the northern boundary of the U.S. EEZ; and the area from Cape Flattery south to Cape Alava (48º10'00" N. lat.) and east of 125º05'00" W. long.

b. *Mandatory Yelloweye Rockfish Conservation Area* – The area in Washington Marine Catch Area 3 from 48°00.00' N. lat.; 125°14.00' W. long. to 48°02.00' N. lat.; 125°14.00' W. long. to 48°02.00' N. lat.; 125°16.50' W. long. to 48°00.00' N. lat.; 125°16.50' W. long. and connecting back to 48°00.00' N. lat.; 125°14.00' W. long.

c. *Columbia Control Zone* - An area at the Columbia River mouth, bounded on the west by a line running northeast/southwest between the red lighted Buoy #4 (46°13'35" N. lat., 124°06'50" W. long.) and the green lighted Buoy #7 (46°15'09' N. lat., 124°06'16" W. long.); on the east, by the Buoy #10 line which bears north/south at 357° true from the south jetty at 46°14'00" N. lat.,124°03'07" W. long. to its intersection with the north jetty; on the north, by a line running northeast/southwest between the green lighted Buoy #7 to the tip of the north jetty (46°15'48" N. lat., 124°05'20" W. long.), and then along the north jetty to the point of intersection with the Buoy #10 line; and, on the south, by a line running northeast/southwest between the red lighted Buoy #4 and tip of the south jetty (46°14'03" N. lat., 124°04'05" W. long.), and then along the south jetty to the point of intersection with the Buoy #10 line.

d. *Bandon High Spot Control Zone* - The area west of a line between 43º07'00" N. lat.; 124º37'00" W. long. and 42º40'30" N. lat; 124º 52'0" W. long. extending to the western edge of the exclusive economic zone (EEZ).

e. *Klamath Control Zone* - The ocean area at the Klamath River mouth bounded on the north by 41°38'48" N. lat. (approximately six nautical miles north of the Klamath River mouth); on the west, by 124°23'00" W. long. (approximately 12 nautical miles off shore); and on the south, by 41°26'48" N. lat. (approximately six nautical miles south of the Klamath River mouth).

C.6. Notification When Unsafe Conditions Prevent Compliance with Regulations: If prevented by unsafe weather conditions or mechanical problems from meeting special management area landing restrictions, vessels must notify the U.S. Coast Guard and receive acknowledgment of such notification prior to leaving the area. This notification shall include the name of the vessel, port where delivery will be made, approximate amount of salmon (by species) on board, and the estimated time of arrival.

C.7. Incidental Halibut Harvest: During authorized periods, the operator of a vessel that has been issued an incidental halibut harvest license may retain Pacific halibut caught incidentally in Area 2A while trolling for salmon. Halibut retained must be no less than 32 inches in total length, measured from the tip of the lower jaw with the mouth closed to the extreme end of the middle of the tail, and must be landed with the head on. License applications for incidental harvest must be obtained from the International Pacific Halibut Commission (phone: 206-634-1838). Applicants must apply prior to April 1 of each year. Incidental harvest is authorized only during May and June troll seasons and after June 30 if quota remains and if announced on the NMFS hotline (phone: 800-662-9825). ODFW and Washington Department of Fish and Wildlife (WDFW) will monitor landings. If the landings are projected to exceed the 37,707 pound preseason allocation or the total Area 2A non-Indian commercial halibut allocation, NMFS will take inseason action to close the incidental halibut fishery.

Beginning May 1, license holders may land no more than one Pacific halibut per each 2 Chinook, except one Pacific halibut may be landed without meeting the ratio requirement, and no more than 35 halibut may be landed per trip. Pacific halibut retained must be no less than 32 inches in total length (with head on).

A "C-shaped" yelloweye rockfish conservation area is an area to be voluntarily avoided for salmon trolling. NMFS and the Council request salmon trollers voluntarily avoid this area in order to protect yelloweye rockfish. The area is defined in the Pacific Council Halibut Catch Sharing Plan in the North Coast subarea (Washington marine area 3), with the following coordinates in the order listed:

48°18' N. lat.; 125°18' W. long.;
48°18' N. lat.; 124°59' W. long.;
48°11' N. lat.; 124°59' W. long.;
48°11' N. lat.; 125°11' W. long.;
48°04' N. lat.; 125°11' W. long.;
48°04' N. lat.; 124°59' W. long.;
48°00' N. lat.; 124°59' W. long.;
48°00' N. lat.; 125°18' W. long.;
and connecting back to 48°18' N. lat.; 125°18' W. long.

TABLE 1. Commercial troll management measures proposed by the SAS for non-Indian ocean salmon fisheries, 2008. (Page 5 of 5)
C. REQUIREMENTS, DEFINITIONS, RESTRICTIONS, OR EXCEPTIONS (continued)

C.8. Inseason Management: In addition to standard inseason actions or modifications already noted under the season description, the following inseason guidance is provided to NMFS:

a. Chinook remaining from the May through June non-Indian commercial troll harvest guideline north of Cape Falcon may be transferred to the July through September harvest guideline on a fishery impact equivalent basis.

b. NMFS may transfer fish between the recreational and commercial fisheries north of Cape Falcon if there is agreement among the areas' representatives on the SAS.

c. At the March 2009 meeting, the Council will consider inseason recommendations for special regulations for any experimental fisheries (proposals must meet Council protocol and be received in November 2008).

d. If retention of unmarked coho is permitted in the area from the U.S./Canada border to Cape Falcon, Oregon, by inseason action, the allowable coho quota will be adjusted to ensure preseason projected mortality of critical stocks is not exceeded.

C.9. Consistent with Council management objectives:

a. the State of Oregon may establish additional late-season fisheries in state waters.

b. the State of California may establish limited fisheries in selected state waters.

Check state regulations for details.

C.10. For the purposes of California Department of Fish and Game (CDFG) Code, Section 8232.5, the definition of the KMZ for the ocean salmon season shall be that area from Humbug Mt., Oregon, to Horse Mt., California.

TABLE 2. Recreational management measures proposed by the SAS for non-Indian ocean salmon fisheries, 2008. (Page 1 of 4)
A. SEASON DESCRIPTIONS
North of Cape Falcon
Supplemental Management Information
1. Overall non-Indian TAC: 40,000 Chinook and 25,000 coho marked with a healed adipose fin clip (marked). 2. Recreational TAC: 20,000 Chinook and 21,000 marked coho; all retained coho must be marked. 3. Trade: none. 4. Area 4B add-on fishery opens upon ocean closure with a quota of 5,000 marked coho and Chinook non-retention (C.5). 5. Buoy 10 fishery opens Aug. 1 with an expected landed catch of 3,500 marked coho in August and September.
U.S./Canada Border to Leadbetter Point • June 1 through earlier of June 28 or a quota of 8,200 Chinook (C.5). Tuesday through Saturday north of the Queets River (Neah Bay and La Push Subareas) and Sunday through Thursday south of the Queets River (Westport subarea). Chinook only, one fish per day. Chinook 24-inch total length minimum size limit (B). See gear restrictions (C.2). Inseason management may be used to sustain season length and keep harvest within the overall Chinook recreational TAC for north of Cape Falcon (C.5).
Leadbetter Point to Cape Falcon (Columbia River Subarea) • June 1 through earlier of June 28 or a subarea guideline of 5,300 Chinook (C.5). Seven days per week. Chinook only, one fish per day. Chinook 24-inch total length minimum size limit (B). See gear restrictions (C.2). Inseason management may be used to sustain season length and keep harvest within the overall Chinook recreational TAC for north of Cape Falcon (C.5).
U.S./Canada Border to Cape Alava (Neah Bay) • July 1 through earlier of September 13 or 1,260 marked coho subarea quota with a subarea guideline of 950 Chinook (C.5). Tuesday through Saturday. All salmon two fish per day, no more than one of which can be a Chinook and no chum retention August 1 through Sept. 13. Chinook 24-inch total length minimum size limit (B). All retained coho must be marked. See gear restrictions (C.2). Closed east of a true north-south line running through Sail Rock in July. Beginning August 1, Chinook non-retention east of the Bonilla-Tatoosh line (C.4.a) during Council managed ocean fishery. Inseason management may be used to sustain season length and keep harvest within the overall Chinook recreational TAC for north of Cape Falcon (C.5).
Cape Alava to Queets River (La Push Subarea) • July 1 through earlier of September 13 or 560 marked coho subarea quota with a subarea guideline of 350 Chinook (C5). • September 20 through earlier of October 5 or 50 marked coho quota or 100 Chinook quota (C5): In the area north of 47°50'00 N. lat. and south of 48°00'00" N. lat. (C.6). Tuesday through Saturday through September 13. All salmon, two fish per day, no more than one of which can be a Chinook. Chinook 24-inch total length minimum size limit (B). All retained coho must be marked. See gear restrictions (C.2). Inseason management may be used to sustain season length and keep harvest within the overall Chinook recreational TAC for north of Cape Falcon (C.5).
Queets River to Leadbetter Point (Westport Subarea) • June 29 through earlier of September 13 or 8,640 marked coho subarea quota with a subarea guideline of 5,100 Chinook (C.5). Sunday through Thursday. All salmon, two fish per day, no more than one of which can be a Chinook. Chinook 24-inch total length minimum size limit (B). All retained coho must be marked. See gear restrictions and definitions (C.2, C.3). Grays Harbor Control Zone closed beginning August 1 (C.4.b). Inseason management may be used to sustain season length and keep harvest within the overall Chinook recreational TAC for north of Cape Falcon (C.5).
Leadbetter Point to Cape Falcon (Columbia River Subarea) • June 29 through earlier of September 30 or 10,500 marked coho subarea quota with any remainder of the 5,300 Chinook subarea guideline from the May-June Chinook directed fishery (C.5). Sunday through Thursday. All salmon, two fish per day, no more than one of which can be a Chinook. Chinook 24-inch total length minimum size limit (B). All retained coho must be marked. See gear restrictions and definitions (C.2, C.3). Columbia Control Zone closed (C.4.c). Inseason management may be used to sustain season length and keep harvest within the overall Chinook recreational TAC for north of Cape Falcon (C.5).

TABLE 2. Recreational management measures proposed by the SAS for non-Indian ocean salmon fisheries, 2008. (Page 2 of 4)

A. SEASON DESCRIPTIONS

South of Cape Falcon

Supplemental Management Information

1. Sacramento Basin recreational fishery allocation: ______.
2. Klamath River recreational fishery allocation: ______.
3. Klamath tribal allocation: ______.
4. All retained coho must be marked with a healed adipose fin clip (marked).

Cape Falcon to Humbug Mt.

- May 1 through June 15 (C.6).

Seven days per week. All salmon except coho; one fish per day (C.1). Chinook minimum size limit of 24 inches total length (B). See gear restrictions and definitions (C.2, C.3). Fishing in the Stonewall Bank groundfish conservation area restricted to trolling only on days the all depth recreational halibut fishery is open (see 70 FR 20304, and call the halibut fishing hotline 1-800-662-9825 for additional dates)

In 2009, the season will open March 15 for all salmon except coho, two fish per day (C.1). Chinook minimum size limit of 24 inches total length (B); and the same gear restrictions as in 2008 (C.2, C.3).

Cape Falcon to OR/CA Border

- June 22 through earlier of August 31 or a landed catch of 10,000 marked coho.

Seven days per week. Except as provided below in the Humbug Mt. to OR/CA border fishery for July 4-6 and August 28-31, all salmon except Chinook, two fish per day (C.1). All retained coho must be marked with a healed adipose fin clip. Fishing in the Stonewall Bank groundfish conservation area restricted to trolling only on days the all depth recreational halibut fishery is open (see 70 FR 20304, and call the halibut fishing hotline 1-800-662-9825 for additional dates) (C.3, C.4.d). Open days may be adjusted inseason to utilize the available quota (C.5).

Humbug Mt. to OR/CA Border. (Oregon KMZ)

- May 24-26; July 4-6; August 28-31 (C.6).

Except as provided above in the selective coho fishery, all salmon except coho, two fish per day (C.1). Chinook minimum size limit of 24 inches total length (B). See gear restrictions and definitions (C.2, C.3).

In 2009, the season will open March 15 for all salmon except coho, two fish per day (C.1). Chinook minimum size limit of 24 inches total length (B); and the same gear restrictions as in 2008 (C.2, C.3).

OR/CA Border to Horse Mt. (California KMZ)

- May 24-26; July 4-6; August 28-31 (C.6).

All salmon except coho, two fish per day (C.1). Chinook minimum size limit of 24 inches total length (B). See gear restrictions and definitions (C.2, C.3). Klamath Control Zone closed in August (C.4.e). See California State regulations for additional closures adjacent to the Smith, Klamath, and Eel rivers.

Horse Mt. to Point Arena (Fort Bragg)

- February 16 through March 31;
- May 24-26; July 4-6; August 28-31 (C.6).

All salmon except coho. Two fish per day (C.1). Chinook minimum size limit of 20 inches total length (B). See gear restrictions and definitions (C.2, C.3).

In 2009, season opens February 14 for all salmon except coho, two fish per day (C.1). Chinook minimum size limit of 20 inches total length (B); and the same gear restrictions as in 2008 (C.2, C.3).

Point Arena to Pigeon Point (San Francisco)

- May 24-26; July 4-6; August 28-31 (C.6).

All salmon except coho. Two fish per day (C.1). Chinook minimum size limit of 20 inches total length (B). See gear restrictions and definitions (C.2, C.3).

In 2009, the season will open April 4 for all salmon except coho, two fish per day (C.1). Chinook minimum size limit of 20 inches total length (B); and the same gear restrictions as in 2008 (C.2, C.3).

Pigeon Point to U.S./Mexico Border (Monterey South)

- May 18-26 (C.6).

All salmon except coho. Two fish per day (C.1). Chinook minimum size limit of 20 inches total length (B). See gear restrictions and definitions (C.2, C.3).

In 2009, the season will open April 4 for all salmon except coho, two fish per day (C.1). Chinook minimum size limit of 20 inches total length (B); and the same gear restrictions as in 2008 (C.2, C.3).

TABLE 2. Recreational management measures proposed by the SAS for non-Indian ocean salmon fisheries, 2008. (Page 3 of 4)

B. MINIMUM SIZE (Inches) (See C.1)

Area (when open)	Chinook	Coho	Pink
North of Cape Falcon	24.0	16.0	None
Cape Falcon to OR/CA Border	24.0	16.0	None
OR/CA Border to Horse Mountain	24.0	-	20.0
Horse Mt. to U.S./Mexico Border	20.0	-	20.0

C. REQUIREMENTS, DEFINITIONS, RESTRICTIONS, OR EXCEPTIONS

C.1. Compliance with Minimum Size and Other Special Restrictions: All salmon on board a vessel must meet the minimum size or other special requirements for the area being fished and the area in which they are landed if that area is open. Salmon may be landed in an area that is closed only if they meet the minimum size or other special requirements for the area in which they were caught.

Ocean Boat Limits: Off the coast of Washington, Oregon, and California, each fisher aboard a vessel may continue to use angling gear until the combined daily limits of salmon for all licensed and juvenile anglers aboard has been attained (additional state restrictions may apply).

C.2. Gear Restrictions: Salmon may be taken only by hook and line using barbless hooks. All persons fishing for salmon, and all persons fishing from a boat with salmon on board, must meet the gear restrictions listed below for specific areas or seasons.

a. U.S./Canada Border to Point Conception, California: No more than one rod may be used per angler; and no more than two single point, single shank barbless hooks are required for all fishing gear. [Note: ODFW regulations in the state-water fishery off Tillamook Bay may allow the use of barbed hooks to be consistent with inside regulations.]

b. Cape Falcon, Oregon, to Point Conception, California: Anglers must use no more than two single point, single shank, barbless hooks.

c. Horse Mt., California, to Point Conception, California: Single point, single shank, barbless circle hooks (below) are required when fishing with bait by any means other than trolling, and no more than two such hooks shall be used. When angling with two hooks, the distance between the hooks must not exceed five inches when measured from the top of the eye of the top hook to the inner base of the curve of the lower hook, and both hooks must be permanently tied in place (hard tied). Circle hooks are not required when artificial lures are used without bait.

C.3. Gear Definitions:

a. *Recreational fishing gear defined*: Angling tackle consisting of a line with no more than one artificial lure or natural bait attached. Off Oregon and Washington, the line must be attached to a rod and reel held by hand or closely attended; the rod and reel must be held by hand while playing a hooked fish. No person may use more than one rod and line while fishing off Oregon or Washington. Off California, the line must be attached to a rod and reel held by hand or closely attended. Weights directly attached to a line may not exceed four pounds (1.8 kg). While fishing off California north of Point Conception, no person fishing for salmon, and no person fishing from a boat with salmon on board, may use more than one rod and line. Fishing includes any activity which can reasonably be expected to result in the catching, taking, or harvesting of fish.

b. *Trolling defined*: Angling from a boat or floating device that is making way by means of a source of power, other than drifting by means of the prevailing water current or weather conditions.

c. Circle hook defined: A hook with a generally circular shape and a point which turns inward, pointing directly to the shank at a 90° angle.

TABLE 2. Recreational management measures proposed by the SAS for non-Indian ocean salmon fisheries, 2008. (Page 4 of 4)
C. REQUIREMENTS, DEFINITIONS, RESTRICTIONS, OR EXCEPTIONS (continued)

C.4. Control Zone Definitions:

a. *The Bonilla-Tatoosh Line*: A line running from the western end of Cape Flattery to Tatoosh Island Lighthouse (48°23'30" N. lat., 124°44'12" W. long.) to the buoy adjacent to Duntze Rock (48°28'00" N. lat., 124°45'00" W. long.), then in a straight line to Bonilla Point (48°35'30" N. lat., 124°43'00" W. long.) on Vancouver Island, British Columbia.

b. *Grays Harbor Control Zone* - The area defined by a line drawn from the Westport Lighthouse (46° 53'18" N. lat., 124° 07'01" W. long.) to Buoy #2 (46° 52'42" N. lat., 124°12'42" W. long.) to Buoy #3 (46° 55'00" N. lat., 124°14'48" W. long.) to the Grays Harbor north jetty (46° 36'00" N. lat., 124°10'51" W. long.).

c. *Columbia Control Zone*: An area at the Columbia River mouth, bounded on the west by a line running northeast/southwest between the red lighted Buoy #4 (46°13'35" N. lat., 124°06'50" W. long.) and the green lighted Buoy #7 (46°15'09' N. lat., 124°06'16" W. long.); on the east, by the Buoy #10 line which bears north/south at 357° true from the south jetty at 46°14'00" N. lat., 124°03'07" W. long. to its intersection with the north jetty; on the north, by a line running northeast/southwest between the green lighted Buoy #7 to the tip of the north jetty (46°15'48" N. lat., 124°05'20" W. long. and then along the north jetty to the point of intersection with the Buoy #10 line; and on the south, by a line running northeast/southwest between the red lighted Buoy #4 and tip of the south jetty (46°14'03" N. lat., 124°04'05" W. long.), and then along the south jetty to the point of intersection with the Buoy #10 line.

d. *Stonewall Bank Groundfish Conservation Area*: The area defined by the following coordinates in the order listed:

 44°37.46' N. lat.; 124°24.92' W. long.;
 44°37.46' N. lat.; 124°23.63' W. long.;
 44°28.71' N. lat.; 124°21.80' W. long.;
 44°28.71' N. lat.; 124°24.10' W. long.;
 44°31.42' N. lat.; 124°25.47' W. long.;
 and connecting back to 44°37.46' N. lat.; 124°24.92' W. long.

e. *Klamath Control Zone*: The ocean area at the Klamath River mouth bounded on the north by 41°38'48" N. lat. (approximately six nautical miles north of the Klamath River mouth); on the west, by 124°23'00" W. long. (approximately 12 nautical miles off shore); and, on the south, by 41°26'48" N. lat. (approximately 6 nautical miles south of the Klamath River mouth).

C.5. Inseason Management: Regulatory modifications may become necessary inseason to meet preseason management objectives such as quotas, harvest guidelines, and season duration. In addition to standard inseason actions or modifications already noted under the season description, the following inseason guidance is provided to NMFS:

a. Actions could include modifications to bag limits, or days open to fishing, and extensions or reductions in areas open to fishing.

b. Coho may be transferred inseason among recreational subareas north of Cape Falcon on an impact neutral basis to help meet the recreational season duration objectives (for each subarea) after conferring with representatives of the affected ports and the Council's SAS recreational representatives north of Cape Falcon.

c. Chinook and coho may be transferred between the recreational and commercial fisheries north of Cape Falcon on an impact neutral basis if there is agreement among the representatives of the SAS.

d. If retention of unmarked coho is permitted in the area from the U.S./Canada border to Cape Falcon, Oregon, by inseason action, the allowable coho quota will be adjusted to ensure preseason projected mortality of critical stocks is not exceeded.

C.6. Additional Seasons in State Territorial Waters: Consistent with Council management objectives, the States of Washington and Oregon, and California may establish limited seasons in state waters. Oregon State-water fisheries are limited to Chinook salmon. Check state regulations for details.

TABLE 3. Treaty Indian ocean troll management measures adopted by the Council for ocean salmon fisheries, 2008.
(Page 1 of 1)

A. SEASON DESCRIPTIONS

Supplemental Management Information

1. Overall Treaty-Indian TAC: 40,000 Chinook and 25,000 coho.

U.S./Canada Border to Cape Falcon

- May 1 through the earlier of June 30 or 22,500 Chinook quota.

All salmon except coho. If the Chinook quota for the May-June fishery is not fully utilized, the excess fish cannot be transferred into the later all-salmon season. If the Chinook quota is exceeded, the excess will be deducted from the later all-salmon season. See size limit (B) and other restrictions (C).

- July 1 through the earlier of September 15, or 17,500 preseason Chinook quota, or 25,000 coho quota.

All Salmon. See size limit (B) and other restrictions (C).

B. MINIMUM SIZE (Inches)

	Chinook		Coho		
Area (when open)	Total Length	Head-off	Total Length	Head-off	Pink
North of Cape Falcon	24.0	18.0	16.0	12.0	None

C. REQUIREMENTS, DEFINITIONS, RESTRICTIONS, OR EXCEPTIONS

C.1. Tribe and Area Boundaries. All boundaries may be changed to include such other areas as may hereafter be authorized by a Federal court for that tribe's treaty fishery.

S'KLALLAM - Washington State Statistical Area 4B (All).

MAKAH - Washington State Statistical Area 4B and that portion of the FMA north of 48°02'15" N. lat. (Norwegian Memorial) and east of 125°44'00" W. long.

QUILEUTE - That portion of the FMA between 48°07'36" N. lat. (Sand Pt.) and 47°31'42" N. lat. (Queets River) and east of 125°44'00" W. long.

HOH - That portion of the FMA between 47°54'18" N. lat. (Quillayute River) and 47°21'00" N. lat. (Quinault River) and east of 125°44'00" W. long.

QUINAULT - That portion of the FMA between 47°40'06" N. lat. (Destruction Island) and 46°53'18"N. lat. (Point Chehalis) and east of 125°44'00" W. long.

C.2. Gear restrictions

a. Single point, single shank, barbless hooks are required in all fisheries.
b. No more than 8 fixed lines per boat.
c. No more than four hand held lines per person in the Makah area fishery (Washington State Statistical Area 4B and that portion of the FMA north of 48°02'15" N. lat. (Norwegian Memorial) and east of 125°44'00" W. long.)

C.3. Quotas

a. The quotas include troll catches by the S'Klallam and Makah tribes in Washington State Statistical Area 4B from May 1 through September 15.
b. The Quileute Tribe will continue a ceremonial and subsistence fishery during the time frame of September 15 through October 15 in the same manner as in 2004, 2005, 2006, and 2007. Fish taken during this fishery are to be counted against treaty troll quotas established for the 2008 season (estimated harvest during the October ceremonial and subsistence fishery: 100 Chinook; 200 coho).

C.4. Area Closures

a. The area within a six nautical mile radius of the mouths of the Queets River (47°31'42" N. lat.) and the Hoh River (47°45'12" N. lat.) will be closed to commercial fishing.
b. A closure within two nautical miles of the mouth of the Quinault River (47°21'00" N. lat.) may be enacted by the Quinault Nation and/or the State of Washington and will not adversely affect the Secretary of Commerce's management regime.

Agenda Item F.1.j
Summary of Public Comment
April 2008

SUMMARY OF WRITTEN PUBLIC COMMENT

The Council received eight written public comments on options for the ocean salmon management measures by the March 19 briefing book deadline. There was one recommendation to close the commercial fishery in 2008, one recommendation to close both commercial and recreational fisheries in 2008, one recommendation to preserve traditional state-waters commercial and recreational fisheries in Oregon, four recommendations for preserving ocean recreational opportunity, and one recommendation for preserving freshwater opportunity in the Sacramento Basin. Only one comment supported specific options; Option I or II for the ocean recreational seasons. An additional five public comments were received that identified either potential causes or solutions to the recent decline in salmon abundance.

PFMC
03/20/08

Agenda Item F.1.k
Public Comment
April 2008

Subject: Salmon season proposal
From: Steve N <fishhuntr1@yahoo.com>
Date: Tue, 11 Mar 2008 21:39:39 -0700 (PDT)
To: Chuck.Tracy@noaa.gov

Any proposals along the lines of alternating salmon days? Say 1 weekend day (alternating) and a couple week days (alternating)? This would give an opportunity to fish, help keep the partyboats alive and at the same time, greatly reduce pressure on the resource. Another alternative might be even or odd numbered days.

I'd suspect there'd be more than 50% reduction in contact rate. With the fish moving a bit each day and having to relocate them every couple days the contact rate would be further reduced. This could be instituted immediately as opposed to a punchcard.

1 fish per rod proposals are death, particularly to the partyboat industry. Alternating days would keep the fishermen fishing, the skippers running and help alleviate undue pressure on alternate species from effort shift.

The punchcard deal sounds OK at first glance, but I think it's better applied to activites that are more individualistic, such as abalone, river fishing, etc. Let's face it, boat owners, in general, are going to reach quota's first. Sturgeon is unique unto itself. The fish have a high releasability unlike salmon. You can catch dozens and never kill a one if that's your pleasure. How many owners are going to offer up rides for the less frequent fishermen once their salmon quota is filled?

Subject: [Fwd: shutting down salmon season]
From: PFMC Comments <pfmc.comments@noaa.gov>
Date: Wed, 12 Mar 2008 12:14:00 -0700
To: Chuck Tracy <Chuck.Tracy@noaa.gov>

Subject: shutting down salmon season
From: crumbs4@comcast.net
Date: Wed, 12 Mar 2008 17:52:42 +0000
To: pfmc.comments@noaa.gov

In regards to the possibility of shutting down the salmon season this year, 2008;

I feel it is in our best interests, and the salmon industry, to not only curtail this years season, but to find out why it has occurred and how to prevent this from happening.

I understand the consequences of those that make their living from harvesting salmon having their income slashed, but perhaps the long term result will have a more devastating effect if we don't do something immediately, meaning now, this year.

Wild salmon is a favorite of mine, but I am more than willing to not have its availability, this year or next, in order for the number of salmon to have a chance to survive and increase.

Do what is right, what is necessary to prolong the wild salmon industry,

Martie Visconti

shutting down salmon season.eml	**Content-Type:** message/rfc822 **Content-Encoding:** 7bit

Subject: Eureka Salmon Fishery
From: "Taylor, Bob" <BTaylor@co.humboldt.ca.us>
Date: Wed, 12 Mar 2008 12:48:43 -0700
To: Chuck.Tracy@noaa.gov

Hi Chuck,

I would like to briefly introduce myself and explain why I am writing you with my concerns.

My name, as you can obviously see in my signature line, is Bob Taylor. I have been living in Eureka for 20 years, a transplant from southern California. I have fished California lakes and oceans for most of my life. Since becoming more active in the ocean fishery in the Eureka area, I have purchased a bluewater boat to not only fish for salmon and groundfish, but for our seasonal search for albacore. Also, since the end of 2007, I have started the Humboldt Tuna Club which is a offshoot of the Bay Area Tuna Club, representing our local fishermen, not just limited to the "tuna crowd." Our web site, is very active and I would like to invite you to visit us at http://HumboldtTuna.com.

But today I am addressing the salmon fishery, it is in dire need of better management but with conservative restrictions. Many of the problems are not a result of the fisherman, but to the management of of our rivers and streams. But being a fisherman, I am going to suffer the consequences of this poor management. In the Eureka area, we are under the restrictions of the Klamath Management Zone. There latest reports show the the KMZ is not as bad off as the central valley zone, but the proposed rules look to impact the entire state.

The rules that the PFMC are going to recommend to limit or stop the salmon fishing season will be a minor affect on me. I am happy with a couple salmon every year since as I have other species that I can fish. But the biggest impact, as I see it, will be to the economy of the Eureka area and the higher than normal pressure placed on our groundfish fishery.

The local economy in Eureka is suffering and has been declining ever since the early '90s when the fish restrictions were put on the fishery. Many people who would travel to our town from out of the area are not coming here. Why? The reduced fishing season, reduced time on the water, the reduced limit of fish that can be caught. Of course, many of these issues have fluctuated over the years, but the tourist travel has not returned. Trailer parks are no longer booked all summer, hotel reservations are down, the large sportfishing fleet has been reduced to a few six pack charter businesses all due to the loss of our tourist trade.

So what will happen this year? The few six pack charter boats will have to consider our other fisheries, groundfish, halibut and tuna. But with the increase in gas prices, many of us will not be making the long travels to the bluewater for tuna like we have in the past, thus the impact will be heavier on the groundfish.

This creates an additional problem, the heavier than normal pressure on the few rocky deep water areas around Eureka, Cape Mendocino and Trinidad. With the pending studies of our areas for possible establishment of MPAs, the added pressure in these areas does not look good to us in the future. If we suffer from a loss in the salmon fishery, no or little groundfish, our fishing businesses which include boat dealers and tackle shops will greatly suffer.

What I would like you to consider and recommend to the rest of the board is a restricted season, Options 1 or 2 are reasonable. This would allow our local charters to stay in business, still have what tourists that do trickle in to fish for salmon and provide our local businesses a sustained means of income.

Thank you for your time. Please let me know if there is any other information that would help you in making your decision.

Sincerely,

Bob Taylor

http://Humboldttuna.com

Subject: Salmon recovery and closures.
From: "Fern River Resort (Dan Martin)" <fernriver@sbcglobal.net>
Date: Sat, 15 Mar 2008 14:28:00 -0700 (PDT)
To: Chuck.Tracy@noaa.gov

Dear Chuck Tracy. March 15, 2008
Please post this e-mail in the public comments section of your next meeting.

First let me tell you about me:

I am now 49 years old. I grew up in California living on the San Lorenzo River watching the Salmon and steelhead spawn and Fishing for Salmon in the Monterey bay. This property (Fern River Resort) I purchased from my parents in 1997. It is on the most productive spawning grounds on the whole river. Every year for the past 40 years I have watched the Salmon from the time the eggs are laid in the gravel beds through adulthood. I understand well the many problems for the salmon that have developed and in some cases even gone away.

When you have read my comments below you may think that I am only concerned about the fishermen but in all reality I am very environmentally conscious. I enjoy a flourishing environment and would not have it any other way. As far as the spawning grounds at Fern River Resort, they are only open for catch and release fishing but for now they should be closed. I do not fish here; I only police it so no salmon are poached.

Now lets discuss my issues with our salmon management programs:

I will start with the PFMC's most recent idea that a low Jack Salmon count has any merit. Honestly, we all know that jack salmon are out of place baby salmon that belong in the ocean and not in the streams. I have watched this cycle for the past 40 years. We have had huge counts of these in the river and we have had none. It has never had any relevance to how many adult salmon were in the river in the following years. The idea that a low jack salmon count has any indication of next years adult salmon returns is pure idiocy. This is just another hyped up reason to show cause for closure by those who want to see all fishing closed.

There are solutions that will greatly improve the salmon count than there are the actions that we are currently using. It is sad truth but we are now implementing strategies that will surely destroy the salmon as they have done here on the San Lorenzo.

My observations of the salmon her in the Monterey area:

In the 1970's the problem was silt, pollution and poaching. With severe penalties these problems have mostly disappeared and the river runs clear all winter. The water is even fairly clean and cool in the summer.

Another problem from the early 80's was the inflatable dam installed in Felton up stream from my property. This dam is only raised in the winter during medium water flow. Guess what, this is when the salmon are moving up stream. This dam caused the destruction of a very productive spawning area. This same dam even with a fish ladder is a major block for salmon. The fish ladder does not work well because the fish cannot find it. **Here it is the fishermen that save the salmon by volunteering their services** to work with fish and game. They spend a lot of time and energy getting the fish over the dam. There is no alternative for this dam because there will not be enough drinking water for Santa Cruz. Here we see a water diversion issue for the salmon. This has caused more fish losses than all the fishermen combined even back when we had poaching problems. The environmentalist answer: We have closed all the temp dams on the San Lorenzo including the rock pile dam at my property. These dams were only up in the summer when the fish don't travel up stream and they were used as swimming holes. Unfortunately with the non-native and protected Merganser ducks. This does not protect the salmon. In fact, it has the opposite effect. These temp dams are small. The water runs cool through them. These summer dams created deeper areas with lots of sticks and bushes for the salmon fry to hide in and escape the merganser ducks. The example of this is the rock pile dam that was built at my property every year since before 1950. In the winter, the salmon always spawned right on top of the knocked over rock pile. In the summer it was like a trout hatchery at my property. If you went to the river above the 2-foot dam at dusk, you would see 10's of thousands of salmon fry. Now with limited cover and about 10 to 20 merganser ducks a day, I am lucky to see 50 salmon fry. So removal of this dam destroyed thousands of salmon.

The last straw for the wild salmon in the San Lorenzo!

The environmental groups in their frenzy to protect the natural in the river bed spawning of wild the salmon finally succeeded in destroying the runs of wild salmon in the San Lorenzo River. This was done when they shut down the hatchery in Henry Cowell state park. Here is what happened. We have been building artificial habitat like wharf's and jetties for years. Than we protected the seals. With an abundance of fish, lots of safe habitat and humans feeding them, the seals and sea lions prospered until we now have triple the normal amount. These seals now feed regularly on the final adult breeder salmon entering the river full of eggs. During the spawning season there are 12 to 30 seals in the man made river mouth. They have no problem catching the salmon here while the salmon adjust to the fresh water. I sit on the bank and watch the same seal kill as many as 10 an hour. He is not killing them for survival because he just manes them and flings them aside. The mature eggs are spilling out of the salmons ripped open guts and the sea gulls gorge them selves on the spoils. Then he kills another and another. Kind of like catch and release but the seal does not carefully remove the hook under water and the fish dies. This is repeated up and down the mouth of the river by dozens of seals. When the hatchery fish were removed by closing the hatchery, all that was left were the wild fish. The seals in the mouth of the river slaughtered the reduced number of salmon. Within 3 years the salmon that spawn in the gravel in front of my resort have dwindled from 10 to 40 pairs spawning on any given day for 2 months to just 8 pairs a year.

Still the marine biologists that promoted all the closures and protections are proud of their accomplishments. I however am sad to say. Back in the 50’s when we shot all the seals in the river mouth, we had lots of salmon in the river. I know this sounds barbaric but the truth is we need to reduce the number of seals and sea lions in the rivers, not build artificial docks for them in the San Francisco bay.

Another huge problem is happening right here in the Monterey bay especially around Moss Landing. Hear at night in April while no one is noticing, there are several large 70’+ seine net boats netting up large bait schools. These net boats circle as much as a square mile of bait and salmon in a single scoop. They are operating right where the salmon tend to be at this time of year, The bait along with thousands of salmon is reduced to fertilizer. This again kills more salmon than all the sport fishermen in the bay combined. Honestly cannot we find a better source for fertilizer? Personally I would rather reduce the seals in the river mouth to fertilizer rather than take all the salmons food as well as the salmon who are there feeding on it and grind them up!

The solution for the salmon:

We need to manage our salmon correctly. Not blame every issue on the fisherman.

1. We need a large hatchery program with at least one hatchery on every river. Sell a salmon punch card to help finance the hatcheries. First 25 fish punch card for $25.00. Second card for 25 more fish at $100. Third punch card for 25 more fish at $200. This will generate funds in relation to how much a person catches.
2. We need to manage our dams and water diversions so they do not block wild salmon from returning to their spawning grounds. This includes allowing enough water flow past the dams to keep the juvenal salmon healthy. Additionally the spillways need to be the fish ladders. This way the fish can find the spillway rather than trying to jump the dam!
3. Restore our rivers with a low or lost population of salmon by introducing hatchery fish.
4. Stop the seine netting of bait in front of Moss Landing.
5. We need to remove the seals and sea lions form the rivers. Taking them to the sea and releasing them has been proven not to work. I am sure a few could be introduced to some entertainment parks like Monterey Aquarium. The rest I am sorry to say need to be euthanized.

What not to do:

1. First and foremost, we cannot close sport salmon fishing based on jack salmon returns. This is a huge industry. It will cost our state billions. It will cost my resort thousands in tourist dollars for April alone.

2. The local businesses in the harbor have stated without a salmon season they are going out of business forever.
3. Do not implement a salmon punch card to support hatcheries and than close hatcheries. This was done with the delta enhancement stamp. Now the striper hatcheries are closed and the stripers are also disappearing but the stamp is still required to fish there. Like what kind of bullshit is that?
4. When there is a disease-infested section as we saw on the Klamath in 2006. Lets truck the salmon around it! This is just common sense. Lets see we have created the problem by diverting water but we cannot fix it by transporting the fish?

Our currant biologists in control of most of our natural resource management offices have this mind set that we can return salmon and all our natural resources to what they were before the influence of humanity. Kind of like we are the infection on the earth. Man however is now the dominant creature on the earth. We cannot return to nature as it was before we were here without greatly reducing our population. Therefore our only option is to manage our environment. That means hatchery fish. Hatchery salmon are genetically the same as wild salmon. Lets stop operating under the myth that there is a difference. Lets make up for the lost natural habitat by providing an artificial one. Providing a salmon a clean place for birth and for the babies to grow is no different than taking your wife to the hospital when she is giving birth. Should we not do the same for our salmon?

Thank you for your consideration.

Dan Martin
5250 Hwy. 9
Felton, Ca. 95018
831 335 5426

Subject: Fw: Request for Traditional State Waters Opportunity
From: Spirit.Spirit@verizon.net
Date: Sun, 16 Mar 2008 11:09:01 -0700
To: Chuck Tracy <Chuck.Tracy@noaa.gov>, Ron Boyce <Ron.R.Boyce@state.or.us>, Roy Elicker <roy.elicker@state.or.us>, tjosi@co.tillamook.or.us
CC: Jim Welter <jswltr@verizon.net>, Richard Heap <fiskare@Charter.net>, J Holloway <RFAoregon@comcast.net>, Jessica Hamilton <Jessica.Hamilton@state.or.us>, Michael Carrier <Michael.Carrier@state.or.us>, Deborah Boone <rep.deborahboone@state.or.us>, Lucie LaBonte <labontel@co.curry.or.us>, Betsy Johnson <sen.betsyjohnson@state.or.us>, Arnie Roblan <rep.arnieroblan@state.or.us>, Darus Peake <boathouse@oregoncoast.com>, Doug Whitset <sen.dougwhitsett@state.or.us>, file <Spirit.Spirit@verizon.net>, Frank Warrens <frank@frankwarrensauto.com>, Jeff Kruse <sen.jeffkruse@state.or.us>, Joanne Verger <sen.joanneverger@state.or.us>, John Griffith <jgriffith@co.coos.or.us>, Onno Husing <onno_husing@class.orednet.org>, Rod Moore <seafood@integra.net>, Val & Jeff Folkama <vfolk@oregoncoast.com>

Tim, Roy, Ron, Chuck
This request is nothing NMFS can screw up, they should go ahead as usual. I realize the Coastal Chinook Stocks are down from the past few years, but these local communities, Garibaldi, Brookings and Port Orford have evolved with these late Terminal Chinook Opportunities. These fisheries are very inportant to the Coastal Communities
Don

----- Original Message -----
From: Ray Monroe
To: Curt MELCHER ; Ron Boyce ; Craig Foster ; Patty.M.Burke@STATE.OR.US
Sent: Sunday, March 16, 2008 8:57 AM

Dear Kurt, Ron and Craig and Patty, Just touching basis with you on the status of our traditional state water terminal fisheries that were put in place in the 90's. Those three fisheries off of the Tillamook, Elk and Chetco River have traditionally provided for a Recreational and Commercial opportunity after October. They have also been proved to be a very clean fishery. In subsequent seasons every fish landed in Brookings is checked and counted. I hope that these small and limited opportunities can stay intact throughout the process.

Thank You very much, Ray Monroe, Pacific City

rmonroe2@earthlink.net
EarthLink Revolves Around You.

Subject: recreational salmon season
From: Larry Morton <laselvabch@yahoo.com>
Date: Sun, 16 Mar 2008 16:27:03 -0700 (PDT)
To: Chuck.Tracy@noaa.gov

MR. Tracy :

my name is larry morton and i would like to suggest a 1 salmon per boat limit in a limited recreational salmon season.

this way, sport fisherman could still go fishing, but the 1 fish per boat limit would keep many from going, and still help the local economies.

i am a sport fisherman in moss landing calif.

please give this consideration.

p.s.
i am aware that only .87 fish were caught per boat last year, but by restricting the season some and having a 1 fish per boat limit, the fishing would be reduced significantly.

Thank You.

Subject: [Fwd: SALMON AND FISHING PLANS]
From: PFMC Comments <pfmc.comments@noaa.gov>
Date: Mon, 17 Mar 2008 09:55:05 -0700
To: Chuck Tracy <Chuck.Tracy@noaa.gov>

Subject: SALMON AND FISHING PLANS
From: Richard Reedy <reedyrm@gmail.com>
Date: Mon, 17 Mar 2008 09:34:29 -0500
To: pfmc.comments@noaa.gov

Dear Council, Stop and think, NOW is the time to help what people have done to nature. I live in Austin Texas and I see the changes in streams, lakes and rivers here by industries and companies who just build and abuse the countryside. The zoning board just want to have the money from building to help the tax base in letting the cities grow and supply the people with water and electricity.

Stop the fishing NOW. Give it a rest. Look at what the endangered species act did to help the bears, eagles and other threatned species. I can't help you from here but I can thank you for doing what you can to help my children even see a live salmon or just any other type of fish tomorrow. I don't want them to see a picture of one, something that seems to be happening more and more now days. Give the fish time to grow again. SAVE them now.

ENACT, BE PROACTIVE. Do what is right. We can eat something else for awhile. Who knows, maybe the movie movie "Soylent Green" will happen soon. STOP THE FISHING.

Thanks you,

Richard Reedy
Austin, Texas

SALMON AND FISHING PLANS.eml	**Content-Type:**	message/rfc822
	Content-Encoding:	7bit

Subject: UPCOMING SALMON SEASON IN SACRAMENTO AND FEATHER RIVERS 2008
From: Chris Hobbs <fishfivedays@hotmail.com>
Date: Tue, 18 Mar 2008 12:31:54 -0400
BCC:

Dear Chuck Tracy,

My name is Chris Hobbs. I am a concerned angler who has fished for many years in the Feather River for Salmon. I have been reading about the Closure of the commercial fishing season. I am upset and hope very much that the upcoming river salmon season is not closed as well. I was at the Salmon Festival held last summer at the end of September at the Hatchery in Oroville. My friend has a friend who works there and he told us that the hatchery is understaffed and that the hatchery is not able to spawn as many salmon as they have in years past. I am writing because I really love fishing in the Feather River and maybe it would be possible for you to speak with someone there at the hatchery to encourage as much spawning as possible for our future seasons. I don't know where the other hatcheries are in different CA rivers, but hopefully the government of CA will realize that a full and thorough spawning process and management, that the Chinook Salmon numbers will grow if we continue to actively spawn as many as possible each year!!

Thanks for anything you can help with to keep the Salmon season open this year in the rivers.

Sincerely,

Chris Hobbs

Concerned Angler

Subject: [Fwd: Salmon fishery suggestion]
From: PFMC Comments <pfmc.comments@noaa.gov>
Date: Tue, 11 Mar 2008 10:27:27 -0700
To: CHuck Tracy <Chuck.Tracy@noaa.gov>

Subject: Salmon fishery suggestion
From: James Beatty <dustnlight@gmail.com>
Date: Tue, 11 Mar 2008 05:11:38 -0700
To: pfmc.comments@noaa.gov

TWIMC,
Please consider collecting the runoff from the roads in the watersheds of Salmon runs and purifying it. Thank you, Jim Beatty

Salmon fishery suggestion.eml	**Content-Type:**	message/rfc822
	Content-Encoding:	7bit

Subject: Save the Salmon
From: Michael Shephard <shephard@sbcglobal.net>
Date: Wed, 12 Mar 2008 07:22:46 -0700 (PDT)
To: Chuck.Tracy@noaa.gov

Chuck, the problem is not the fisheman it's the water management in CA. Can you people do anything about the water going south? Closing fishing isn't going to save the fish, but proper water management and hatchery programs will. I'm not sure what you do, but your name has salmon next to it and they are very close to shutting the salmon fishing season down. This to me means one thing, you and your co workers have failed!!!

I'm sure your job isn't easy.... What's the world coming to when we can't take our kids fishing...

MS

Subject: My 2-cents for what its worth, on the Salmon Decline
From: JRSACTO@aol.com
Date: Wed, 12 Mar 2008 15:33:16 -0400 (EDT)
To: Chuck.Tracy@noaa.gov, SDAD111@aol.com, jnahie@att.net

Dear Gentlemen, I want to introduce myself. My name is Joseph Jurkovich Jr. I moved to Sacramento some 9-yrs age from Chicago to only experience some of the best Salmon fishing I have every experienced in my life anywhere-- the Fall-Winter run of 1998. What insight I would like to convey is not any way disrespect to your respective educational backgrounds. I myself entertain the study of animal husbandry, ecosystems, symbiotic living arrangements, to the 400 level Per-Vet Med, Microbiology/ Virology and turned my curriculum toward Marketing.

I have a deep rooted, gut feeling, much of this population decline stems from 3 factors, none of which address poaching. **1)** My main concern is the Dredge hole that was created in, memory is foggy, 2001 or 2002, just at the base of the fish latter at the fish gate (Nimbus Dam, American River). According to DGF officials, this dredge hole was designed to capture the eggs of spawning salmon while waiting their turn up the fish latter. **2**) Combined this with the ravenous appetite of the Squaw Fish, this dredge hole can only serve as a silver platter and dinner bell to the Squaw fish. Now matter where you fish you'll hook a Squaw fish up-river-or down with a bead or roe. During the salmon season, I have personally taken a Squaw fish home, removing the entrails only to find a handful and 1/2 of fresh roe in the bait stealers tummy. Now I have also seen fisherman after catching a Squaw fish on their beaded leaders, return this species of fish to the water, as if it were on the endanger species list. Is there a catch and remove like the Lake Davis Pike, I don't know, should there be-- I can suggest **YES**. E.G. Chicago rivers allowed the Carp to proliferate back in the late 70's without mandatory removal. TODAY you have Carp Derbies on the Chicago River, WHY, because, the Carp is the only fish left that is fishable (coined). Once home to big trophy Bass and Muskie and Trout is now the home to the Chicago Carp.
Lastly number **3**) Adaptation. This one is hard to address. DFG is not adapting to the change in the ecosystem of the American River. Steelhead I believe have adapted with survival learning instinct. They have learned that a free lunch is ever so close should their run become closer to that of the Salmon, which it has. The last 3-seasons Steelhead have come in early. Fisherman--steelheaders, were standing on shore or sitting in boats in January and February, waiting for the steelhead to arrive, most did not realizing that the run was in and done some 8-weeks earlier. Fisherman catching 8-10 lbs steelies at Goethe Park on the American River in early November. As I say this one is hard to counter the effects of, as it is by design within natural selection and natural adaptation or over a loner period we called evolution.

I believe you Gentlemen get a feel for what I believe is the problem. Some of which combine with your data may hold true or most of this could be just a frustrated fisherman reaching for a solution and applying his two cents. I wish you luck as your cerebral input helps fill my fridge with the Chinook and I thank you for that.

Subject: [Fwd: salmon collapse]
From: PFMC Comments <pfmc.comments@noaa.gov>
Date: Mon, 17 Mar 2008 09:55:28 -0700
To: Chuck Tracy <Chuck.Tracy@noaa.gov>

Subject: salmon collapse
From: richard sauerheber <richsauerheb@hotmail.com>
Date: Sat, 15 Mar 2008 17:55:26 -0700
To: pfmc.comments@noaa.gov

Donald Hansen and Chuck Tracy,

The recent AP reports on salmon collapses have caused me to write you this note. I am a medical research scientist and for 35 years have fought against any addition of calcium chelator chemicals, including rat poisons and insecticides containing the elemental ion fluoride into public water supplies. The following letter I sent to our local newspapers. I also sent information to the Sacramento Water District who began adding fluosilicic acid, a potent calcium chelator, into the drinking water about Jan., 2006. Even reverse osmosis cannot eliminate fluoride ion below a fixed minimum because the free ion is so small. Its material diameter is 2.6 angstroms which is smaller than the water molecule. Reclaimed water that is reintroduced from toilets/laundry, etc. from reclamation plants increase artificial fluorides in Sacramento River water that will indeed harm salmon. Their navigation skills are not well understood but are exquisitely sensitive to only 0.3 ppm fluoride in the Pacific Northwest because of it being such low calcium soft water. People have blood calcium that helps mitigate its effects and of course bone that accumulates it to help protect peoples' blood. Fish are helpless and cannot navigate upstream to spawn while they must swim in it 24 hours a day every day forever. If you really want to help bring back a flourishing salmon population, then we must request that the Dept of Health Services stop ordering the injection of this noxious diluted rat poison into public water because salmon are far more sensitive than other organisms to this insult. The Columia River experience proves that this can be reversed by removing artificial fluoride release into affected rivers. Donald Nelson at the CA Department of Health Services and Dr. Maas at the Centers for Disease Control in Atlanta, Georgia cannot for some reason understand the difference between natural calcium fluoride that that is not a toxic compound and occurs in some waters the Southwest that started this 'fluoridation' program, vs. unnatural artificial lab-synthesized fluorides that also usually contain arsenic and lead as well nor do they measure the calcium content of city water into which they silicofluoridate to 1 ppm and assume nothing else will be affected. I have sent a petition to the FDA to ban this practice and it is under review but a possible ban would be a long way off even though the FDA has never approved this practice, being an uncontrolled use of a drug.

We appreciate you considering this information.
Richard Sauerheber, Ph.D chemistry

In 1985, salmon disappeared from the Columbia River when fluoride discharges elevated the river to only 0.5 ppm. University of Oregon researchers found it narcotized salmon, blocking navigation upstream for spawning. After stopping the discharge, the river cleaned itself and salmon returned. Sacramento started fluoridating last year. It's no surprise salmon populations disappeared there (see recent AP news releases) when fluoride, smaller than the water molecule, cannot be eliminated before treated water returns to the river.

Dr. Kennedy posted a you-tube video on horses killed from drinking silicofluoridated water in a Colorado town. During winter the horses refused to drink city water from their troughs and ate snow instead. In summer they had no choice and then developed severe stomach pain, hoof and bone defects, and allergic skin reactions. Because horses drink 15 gallons daily, they were soon killed. Cornell pathologists analyzed tissues and proved severe chronic fluoride poisoning. The arsenic in the impure fluosilicic acid caused their lung cancer. After Hooper Bay, Alaska, where humans were poisoned, fluoridation should have been stopped. It's now spread even into open horse country. Colorado citizens protested and eventually their water district stopped silicofluoridation. Our Southern CA water districts haven't stopped yet.

Here are necessary references for this letter:

1.Dr. Kennedy, Youtube video called "Poisoned Horses", with interview of Pathologist from Cornell University who examined the horses and the horse ranch owners, available online.
2. Earth Island Journal, Foulkes, M.D., review article on effects of fluoride on fish, available online, 2008.

3. North American Journal of Fisheries Management, vol. 9, 1989, p. 154, “Evidence for Fluoride Effects on Salmon Passage at the John Jay dam, Columbia River, 1982-1986”.
4. Neuhold JM, Sigler WF. “Effects of Sodium Fluoride on Carp and Rainbow Trout”. Transactions, American Fisheries Society, 89 358-370 1960.
5. Pimental R. Bulkley RB. “Influence of-water hardness on fluoride toxicity to Rainbow trout”, Environmental Toxicology and Chemistry, 2 381-386 1983;
6. Progress in Water Technology, volume 7, p. 579, 1975, “Effects of Extended Exposure to Low Concentrations on Estuarine Fish and Crustacea.”

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salmon collapse.eml	**Content-Type:** message/rfc822 **Content-Encoding:** 7bit

Subject: Pacific Fishery Management Council Meeting
From: Vello Aring <varing@sbcglobal.net>
Date: Mon, 10 Mar 2008 12:41:50 -0700
To: Chuck.Tracy@noaa.gov
CC: SDAD11@aol.com, emvlsport@aol.com, cho@willapabay.org

Chuck,

I am a sports fisherman. I particularly look forward to catching a salmon or two while fishing the American and Sacramento Rivers. I have certainly noticed the decline in salmon the past three years. While fellow fishermen and I catch nothing, we witness many being bagged by sea lions. The sea lion population has grown each year and they appear to be getting plenty of fish. They are throughout the river system during the fall salmon run. Can something be done to curb these heavy feeders from contributing to the problem? Thank you for any help in this matter. Maybe this could be brought up at upcoming Pacific Fishery Management Council meetings.

Thanks again,
Vello Aring
Orangevale, CA

Subject: [Fwd: 2008 sport salmon season]::: For Supplemental
From: PFMC Comments <pfmc.comments@noaa.gov>
Date: Thu, 20 Mar 2008 14:44:55 -0700
To: Chuck Tracy <Chuck.Tracy@noaa.gov>

Agenda Item F.1.k
Supplememtal Public Comment
April 2008

Subject: 2008 sport salmon season
From: Shirley Barnhart <barnhart2@suddenlink.net>
Date: Thu, 20 Mar 2008 12:14:25 -0700
To: pfmc.comments@noaa.gov

I am one of a large number of small boat owners from northern California who greatly enjoy the opportunity to fish for ocean salmon. I'd like to comment on one of your proposed 2008 recreational fishery options for the Klamath Management Zone (KMZ).

Option 3 proposes 3 separate holiday fishing periods totalling a 10 day season in the KMZ. This may be an easy answer for the fishery manager, but it is not a good way to provide opportunities to fish, particularly for small boat owners. Very likely 10 days of fishing will not happen. Last year during the 3-day Memorial Day holiday there were 2 days with small craft advisories and gale warnings. These are hazardous conditions for fishermen who may attempt to fish because they know it is their only opportunity to do so. The larger party boats might get a full 10 day season but not those anglers with smaller boats.

The holiday-only fishing also would concentrate fishing pressure, severely crowding launching and parking facilities. Most small boaters fishing out of Trinidad, California, must use the cable-launch which results in a long line of boats waiting to be launched and a floatilla of returning fishermen waiting to be brought ashore.

I propose a 20-salmon or 10-salmon punch card which would allow fishing over a longer period and provide safe, enjoyable trips planned according to ocean conditions. Party boat operators would probably be fully booked during the holidays but would also be able to make other trips when they had enough reservations.

We don't need to keep many ocean salmon, but we would like to have opportunities to fish.

Dr. Roger A. Barnhart
Fishery Scientist (Retired)
Bayside, California
(707) 822-6089
barnhart2@suddenlink.net

2008 sport salmon season.eml	**Content-Type:**	message/rfc822
	Content-Encoding:	7bit

Subject: [Fwd: No Salmon fishing]
From: PFMC Comments <pfmc.comments@noaa.gov>
Date: Thu, 20 Mar 2008 14:45:19 -0700
To: Chuck Tracy <Chuck.Tracy@noaa.gov>

Subject: No Salmon fishing
From: HERBHOLM@aol.com
Date: Thu, 20 Mar 2008 16:01:55 -0400 (EDT)
To: pfmc.comments@noaa.gov

Its about time that this nonsense about hatchery fish is inferior and more hatcheries be built. Indian tribe's must be stopped from putting nets across the river. The last count more than seven hundred and fifty nets are in the Klamath river. They sell salmon door to door and on the streets in Eureka and Arcata California. Then the fish and game say that it can't be stopped.

I have been a fisherman for the past thirty years. I don't wish for welfare from the government. Its time that you stop politicizing the resources. This is bull crape at its worst. These problems didn't start till you started your management program of the salmon.
Herb Holm
2821 Fairfield Street
Eureka, Ca. 95501

No Salmon fishing.eml	**Content-Type:**	message/rfc822
	Content-Encoding:	7bit

Subject: [Fwd: `salmon closure]
From: PFMC Comments <pfmc.comments@noaa.gov>
Date: Fri, 21 Mar 2008 08:08:12 -0700
To: Chuck Tracy <Chuck.Tracy@noaa.gov>

Subject: `salmon closure
From: Mark Gavasse <twoboys@cruzio.com>
Date: Thu, 20 Mar 2008 18:21:23 -0700
To: pfmc.comments@noaa.gov

I believe that all you do is see the problem in the past.With all the political decisions that have been made concerning the uses of the rivers you have the nerve to tell the fisherman that they are the only ones that need to pay a price for the mis-managed rivers and fisherys.With the water diversions and all the other corporate interests why is it that the fisherman are the only ones that seem to be responsible or taking a financial hit.Shut down a power plant,close off water to the farmers,tell los angelos that we have no water,why is that with all the corporate mis-management that the poorist of all the people involved,the one that really has the least effect on the problem bears the brunt of the entire problem.If you can answer my concerns you should run for president.Look at the source not the easy target;how can you possibly feel good about who is bearing the brunt of the mismanagement of our fisherys.Please feel free to to let me know when your ready to explain the reallity of the problem.I have two children 3 and 5,they have not caught their first salmon yet,my greatest memories growing up was fishing for salmon,if you think that my children don't deserve to catch a salmon please come over for dinner some time and explain to them that it was the fishermas fault. I would love for you to respond to me.Good luck in life,Mark Gavasse /fishing for life

`salmon closure.eml	**Content-Type:**	message/rfc822
	Content-Encoding:	7bit

Subject: [Fwd: 2008 Salmon Season Suggestion]
From: PFMC Comments <pfmc.comments@noaa.gov>
Date: Fri, 21 Mar 2008 11:46:55 -0700
To: Chuck Tracy <Chuck.Tracy@noaa.gov>

Subject: 2008 Salmon Season Suggestion
From: Norman & Charlotte Dolan <cndolan@sbcglobal.net>
Date: Fri, 21 Mar 2008 11:43:31 -0800
To: pfmc.comments@noaa.gov

Gentlemen,

The predicted size of the Pacific Coast Salmon Fishery is admittedly a major concern for those that commercially take fish for profit. These are people that work hard to earn a living and support their families. Sport fishing is however another mater and should be considered on its own merits. The support industries of sport fishing bring in millions of dollars annually to merchants selling rods, reels, boats and repair services to mention only a few sources where our money is spend.

A **"Catch and Release Program"**
for Salmon is an opportunity for the Federal and State management to minimize the economic effect of the coming two years of fishing restrictions and at the same time minimize the issue of further depletion of our Salmon fisheries.

Please reply.

Capt. Norm

4722 Santa Rosa California, 95405

cndolan@sbcglobal.net

2008 Salmon Season Suggestion.eml	**Content-Type:** message/rfc822 **Content-Encoding:** 7bit

Subject: [Fwd: Salmon Closure]
From: PFMC Comments <pfmc.comments@noaa.gov>
Date: Fri, 21 Mar 2008 13:57:09 -0700
To: Chuck Tracy <Chuck.Tracy@noaa.gov>

Subject: Salmon Closure
From: Trent Alexander <talexander@sportchalet.com>
Date: Fri, 21 Mar 2008 11:56:14 -0700
To: pfmc.comments@noaa.gov

I read the three options for possible closure of the Salmon season along the pacific coast. I vote for complete closure, no commercial or sport fishing of salmon this year. Even though I am an avid fisherman I say give the fish a break. It will be better for the fish and the fisherman in the long run. Maybe next year allow a short season with a very low daily bag limit for sport fishing and no commercial fishing at all.

Thank you,

Trent Alexander

Salmon Closure.eml	**Content-Type:**	message/rfc822
	Content-Encoding:	7bit

Subject: [Fwd: California/Oregon Chinook Salmon fishing 2008]
From: PFMC Comments <pfmc.comments@noaa.gov>
Date: Mon, 24 Mar 2008 09:26:56 -0700
To: Chuck Tracy <Chuck.Tracy@noaa.gov>

Subject: California/Oregon Chinook Salmon fishing 2008
From: John Tribuzio <jtconcrete@charter.net>
Date: Sun, 23 Mar 2008 16:46:23 -0700
To: pfmc.comments@noaa.gov

To Whom it may concern,

Close it down completely this year. For 5 to 10 years if that is what it takes to save this run.
Get together and screen the pumps. Cut flows if needed. Re-build habitat for the delta smelt, etc.
You will be remembered as the ones responsible for this extinction if you do not do everything possible to prevent it.
Letting it get to this point is a criminal act in my opinion.
I would like to see the various agencies work together and accomplish the seemingly impossible.
This is a chance to show what can be done when we come together as a united team of concerned groups and individuals.
We owe it to our children and grand children.
Apathy and cynicism are growing toward state and Federal Government. It is up to you to do what is right. You will sleep better, too.

Sincerely,
John G.Tribuzio
3995 Bobolink Circle
Reno, NV 89508

California/Oregon Chinook Salmon fishing 2008.eml	**Content-Type:**	message/rfc822
	Content-Encoding:	7bit

Subject: [Fwd: IMPORTANT Salmon Season Closure: Good idea]
From: PFMC Comments <pfmc.comments@noaa.gov>
Date: Mon, 24 Mar 2008 09:27:13 -0700
To: Chuck Tracy <Chuck.Tracy@noaa.gov>

Subject: IMPORTANT Salmon Season Closure: Good idea
From: "Shamshoian, Peter" <Peter.Shamshoian@kla-tencor.com>
Date: Sun, 23 Mar 2008 18:03:17 -0700
To: pfmc.comments@noaa.gov

Hello,

I'm a recreational fisherman in the Monterey Bay. I like to fish but I always fish alone. I live in the south San Jose area and work in a professional capacity so I don't have a lot of buddies ready to go fishing. What I notice on the water is a handful of regulars that always have a full boat (whoever is available that day to count as another person to increase the boats legal take) and take 6 to 10 Salmon and seem to fish 3 to 5 times per week. They always talk about going to work in the afternoon like they're self employed. Don't get me wrong, they're really nice people.

My problem is that most of us don't have that kind of time. I fish every other week at best and frankly I'm not a good fisherman. I consider myself lucky to get one fish and it seems I only get one about every third time I fish. However I think I put more into the fishing economy than the regulars. I bought a lifetime license and a boat. I buy all new gear every time I fish because I really don't have the whole thing organized like the regulars. I don't have the time. My wife complains that every Salmon I get is $500. I think I caught a total of 5 fish last season and I went as much as I could find the time to do so. But I do really enjoy getting out on the water and occasionally getting my son or daughter to go along.

I think there's a lot of people like me. I think we spend the majority of the money spent at the fishing shops and piers. I would be happy if there was simply a one fish per boat limit or a 6 salmon per season limit. I'm in heaven catching one fish and I listen to all these local guys who say they got 7 fish and they're looking for their go-home fish. They've got freezers full of the stuff and distribute it to their neighborhoods.

If you want to destroy the livelihood of people in the sportfishing business, close the season. If you want to throw them a lifeline at the least cost in terms of numbers of fish; Limit the take to a fish per day per boat, or a fish per rod and a 2/boat limit. I bet you'll reduce the fish take by 80% and keep the spending on fishing at 80% of normal. The regulars actually buy very little. They put everything together themselves. Guys like me that fish once a month are the ones that keep the tackle shops in business. We buy everything new every time we fish.

Please consider the idea. Keep the dream alive and the interest in the younger generation. Let a father take his son and try to catch just one fish. Limit the experts who are taking 300 to 400 fish in a season trolling 5 lines in their big boats.

Thanks for your consideration,

Peter Shamshoian

IMPORTANT Salmon Season Closure: Good idea.eml	**Content-Type:**	message/rfc822
	Content-Encoding:	7bit

Subject: [Fwd: support Option III]
From: PFMC Comments <pfmc.comments@noaa.gov>
Date: Mon, 24 Mar 2008 09:27:33 -0700
To: Chuck Tracy <Chuck.Tracy@noaa.gov>

Subject: support Option III
From: jim <owenevan@sti.net>
Date: Sun, 23 Mar 2008 04:34:22 -0700
To: pfmc.comments@noaa.gov

```
Need to shut down completely the commercial and sports fishery to save the salmon.
Jim Evans
Mariposa CA
```

support Option III.eml	**Content-Type:**	message/rfc822
	Content-Encoding:	7bit

David Allan
Commercial Nearshore Fisherman,
Ca. Lic. #L08224, Ca. Fish Receiver Lic#60374-00
P.O. Box 3073, Carmel, Ca 93921
davidallan7@hotmail.com, Phone: 831-624-6059

Pacific Fisheries Management Council
pfmc.comments@noaa.gov
Pacific Fishery Management Council
7700 NE Ambassador Place, Suite 101
Portland, OR 97220

Subject: Salmon Season Restriction Issue/Groundfish Fishery Idea

Dear Council members,

The frightening issue of the severe shortage in the Sacramento River fall-run salmon stock has been headline news and the economic impact of the proposed actions are sure to be catastrophic on all the West Coast fishing industry, the coastal communities of both California and Oregon. There may be no alternative but to impose deep restrictions to save what was, in the past years, a robust stock upon which thousands of citizens and communities have depended. The impact will go beyond the fishermen themselves, as stakeholders. As described in major newspapers across the nation, the blow will also negatively impact the restaurant, food market, and the tourism industries along the West Coast, and probably nationwide. Combining this with the recession our nation is experiencing, the coastal communities and the fishery stakeholders are in for severe injury. There may be no alternative to this catastrophe.

However, as a stakeholder in the West Coast fisheries, I would like to submit an idea that might provide at least a bit of mitigation to the damage. My idea arose from reading news comments by salmon fishermen. Among the comments, the interviewed fishermen stated that with a severe salmon closure, they would have to resort to available crab or rockfish fisheries to which they may have access. **So, my idea would be to provide some temporary access to these alternatives. Specifically, you might consider reopening the March/April rockfish closure, as well as the lingcod closure for the month of April**. It is well known that the rockfish and lingcod stocks have made significant rebounds in most areas over the recent years as a result of the restrictions enacted over the past decade (including the closure months, rockfish size limits in California, and limited access to certain groundfish like the Nearshore Fishery in California, of which I am a permit-holder). This idea which I provide may be rather insignificant in the "big picture", and only covers a month or so, but in such a desperate situation, **any** sort of economic mitigation for our coastal communities would be welcome. Implementing such an idea might provide salmon fisherman who would seek alternative fisheries like the open access rockfish (including Slope and Shelf, as well as Nearshore to those who also hold such permits) could provide a bit of economic relief, and **summed up with other similar ideas**, could help to save the livelihoods of fishermen and community stakeholders from complete destruction.

To have any sort of positive effect, you would have to decide on and enact this mitigating measure as quickly as possible...on the first day of your meetings.

Thank you for listening to my small idea, and I hope you give it some consideration.

Sincerely,

David Allan

March 20, 2008

Mr. Chuck Tracy
Pacific Fisheries Management Council
7700 NE Ambassador Place, Suite 101
Portland, OR 97220-1384

Dear Mr. Tracy,

I am writing in response to the recent article in The Oregonian, "Salmon season looks dead" about the projected numbers of Sacramento River fall Chinook salmon returning to spawn this season. The low numbers of salmon are truly alarming.

As David Ortman states in your press release, "ocean conditions have been poor, and there are a lot of things that can go wrong for salmon in freshwater." Many of the things that can go wrong for salmon are within our control. The salmon are struggling to survive because their ecosystem has been disrupted in too many ways. They cannot cope with low water levels because too much river water is diverted for irrigation, they cannot cope with chemicals from farming and industry in the water. They have lost spawning habitat from logging and from dams that alter river currents and temperatures. And once they are in the ocean they cannot survive if there is not enough food or if too many of them are caught before they can mature and return to spawn.

I do not work in the salmon fishing industry and I realize that if the Pacific coast salmon season is closed or very limited this year it will not directly affect my income. I realize this puts me in a very different position from the many people whose income does depend on salmon fishing either directly or indirectly. I am merely someone who really enjoys eating salmon. But when your news release uses words like "dire, sudden collapse, and unprecedented low level" when describing this year's salmon runs it certainly captures my attention.

In spite of the work that the Council and many groups in California, Oregon and Washington do to protect the salmon, we are clearly not doing enough. It is obvious that the salmon need our help now more than ever. Reduced fishing for a season will hurt, but losing the salmon forever is unthinkable and irreversible. A year of reduced fishing will hopefully be a step in the right direction.

Sincerely,

Jan Steinbock

Jan Steinbock
2736 SE Palmquist Road
Gresham, OR 97080

Milstein, Michael. "Salmon season looks dead." The Oregonian. 15 Mar 2008

Subject: [Fwd: Salmon data]
From: PFMC Comments <pfmc.comments@noaa.gov>
Date: Wed, 26 Mar 2008 16:26:41 -0700
To: Chuck Tracy <Chuck.Tracy@noaa.gov>

Subject: Salmon data
From: Bob Hather <rkhather@charter.net>
Date: Wed, 26 Mar 2008 15:22:37 -0800
To: pfmc.comments@noaa.gov
CC: Melvin de la Motte <mdelamotte@gmail.com>

Please enter for the record my comments for the March 29 2008 hearing regarding salmon.

In my 35 years of actively sport fishing for salmon along the Pacific Coast I have probably observed more about the habits of salmon than any of your consulting biologists.

In my humble opinion, I believe the alarmingly low counts of salmon last year, especially in the Sacramento River system were do the salmon deciding not to return up the rivers after a 137 year drought. If I'm correct, the return this year will be substantially higher than normal. We won't know until the salmon season is over. Evidence for this lies in the fact that since the rockfish season opened south of Point Conception, many more incidental salmon catches have occurred than normal. In fact, for there to be any incidental catches of salmon taken with rockfish gear, the fish stocks have to be very strong.

I suggest you provide for a sampling by opening the salmon season for a week or two in April so you can make an accurate assessment of the condition of the salmon stocks beyond your river count.

Thank you for your consideration.

Bob Hather
3675 Sequoia Dr.
San Luis Obispo, CA 93401

(805) 541-4992

owner- Fishreports.net
Director- Central Coast Fisheries Conservation Coalition

Salmon data.eml	**Content-Type:**	message/rfc822
	Content-Encoding:	7bit

Everett E. Baldwin
P.O. Box 1611
Aberdeen, Wa 98520

Ph. (360) 533-0178
Cell: (360) 500-0084
E-mail: everettrobyne_41@msn.com

March 13, 2008

Pacific Fishery Management Council
Attn: North of Falcon Comments
7700 NE Ambassador Place, Suite 101
Portland, OR 97220-1384

RE: NORTH OF FALCON PROCESS-2008. SEASONS SET FOR COMMERCIAL AND SPORT FISHERS.

Dear Ladies and Gentlemen of the:

As you know there are hundreds of thousands of sport fishers here in the Pacific Northwest contributing millions annually to fish programs and other conservation efforts.

Despite that, we the sport fishers have been deliberately shut out of the debate over how seasons are set and in the amount of salmon, crab and halibut we are allowed to catch.

In 2000, in the final version of the Interior Appropriations bill, a provision was included that eliminated preference for the Native American fishers under the Endangered Species Act, the preference that had been present in Secretarial Order 3206- The Department of the Interior which is an amendment to the Endangered Species Act. That year, in FY2000, in Section 127 of the Appropriations bill, language was inserted that eliminated from Secretarial Order 3206 the following item: Principle 2. Paragraph C., subsection (ii) …"the conservation purpose of the restriction cannot be achieved by reasonable regulation of non-Indian activities". Or more plain terms the playing field was leveled, and in conservation situations Indian fishers no longer had preference, not over time on the water, not over the fish taken, not over affected habitat, not over anything.

The Endangered Species Act was never intended to give one group preference over the other. Unfortunately, due to the language that was eliminated in 2000 in a bill signed by then President Clinton, prior to 2000 that was exactly what happened.

You would think that with this law change, that there would have been a change in management practices to match the letter of the law-but no, things have continued as before in violation, since 2000 of federal law.

I am a salt water fisherman who enjoys fishing in the ocean and especially the bays, including the Willapa and especially Grays Harbor, particularly area 2-2 east of the Buoy 13 line- also known as the John's River Fishery. This had been a well developed highly participated in fall salmon fishery which was bringing a lot of money into the local economy. At one time this season opened in August. It then went to a Sept. 1st opener which was later pushed back to a Sept. 16th opener. Then last year the coup de grace for the whole thing, the October 1st opener, at a time when the weather is dangerous due to sudden "screamer" wind storms that come out of nowhere and the rough water so bad that many who used to fish that area in September in nicer weather were no longer able to fish. Many have sold their boats and said the hell with it-they are tired of getting screwed by WDFW and their "back-door" deals with the tribes. Not me. Me and some others I know who also love to fish for salmon are going to exercise our rights under federal law and insist that whether the fish are ESA listed or not, that if we are not going to be allowed to fish in <u>our</u> usual and customary places and times for salmon due to <u>any</u> conservation action, (this includes shortened or impractically placed seasons) that the tribal fishers are not going to fish either.

The runs for Grays Harbor and in fact, for the ocean, are not looking good for 2008 as you well know. Now the big question is: "How is this going to be handled?" Every time I ask what the tribes are doing to help conserve the low runs in Grays Harbor and tributaries, and elsewhere, I either get-no comment, or if I write I hear back-nothing. This is no longer acceptable and I am aware of fishermen who are prepared to get arrested fishing out of season out there to take this matter to Federal Court if that is what it takes to get us some equity and parity with season lengths and times compared to the tribal fishers. <u>What has happened is that we have steadily and incrementally been taken off the water by the fish managers while in the meantime the tribal non-discriminatory gillnets continue to clog the bays and lay across the rivers-business as usual while our boats sit in our driveways. This is no longer going to be acceptable.</u>

If the runs are so low the sport fishers are not even allowed to start fishing until the season is nearly over-then why are you allowing commercial gillnet fishers to continue to fish at the expense of the sport fishers? If the runs are that low, if conservation is needed, whether the run is listed under the ESA or not, then shut it down-to everyone! Let's have everyone make some sacrifices and if we don't get to fish at least the sport fishers will see they are getting treated fairly for the first time in history. If WDFW is so afraid of their tribal “co-managers” that they are too intimidated to take the enforcement action they have already been empowered to take for at least the past 8 years, then perhaps we need to bring in U.S. Fish & Wildlife Service enforcement officers to help them do their job. Maybe in the process they can help figure out why half the salmon, halibut, clams, etc., the Indians are taking don’t even get fish tickets attached to them so they can be claimed against the tribal quota. This is an ugly problem that has been hiding in plain sight for too long. Everyone knows they do it, but no one can get the responsible parties to do anything about it-the sport fishers just get to fish less and take less fish as a result.

Fish managers try to say they know what the tribes are doing. They don’t. There is no way they can know. There are too many fish being sold out of the back of pickups. With taxpayers paying $200,000.00 per fish and more to try and conserve endangered species of salmon, this is an enforcement shortcoming we the taxpayers can no longer afford. As my brother has said, “Where the tribes are concerned, who’s counting the fish?” The answer is no one! This is an arrangement that so far has worked quite well for the tribes.

So this is what we expect this year. Fair and equitable treatment in the setting of seasons and quotas. The Boldt decision in 1974 guaranteed the tribes up to 50% of the fish. It didn’t say they <u>had</u> to take half the fish each year. Since the Boldt decision however WDFW has managed the fish runs as though it does. This is wrong-headed and certainly hasn’t contributed to the conservation environment needed to conserve and maintain our fish runs. The ability to discriminate and return protected fish to the water lies solely with the hook and line fishermen, not the netters who wait until the fish dies thrashing in the net before they check to see what it so they won’t have to return a protected fish back to the water alive. These behaviors haven’t been occurring in a vacuum. Many of us have witnessed the behaviors indicated in this letter and as I have already indicated we expect the fish program managers, both state and federal, to step up to the plate and do the right thing starting with this year’s North of Falcon process.

Sincerely,

Everett E. Baldwin

Subject: salmon problems
From: Charles Tamagni <atarborists@yahoo.com>
Date: Fri, 14 Mar 2008 06:20:17 -0700 (PDT)
To: Chuck.Tracy@noaa.gov

Chuck, I have been keeping track of the chatter regarding the non-existant 2008 salmon season. While I have read about potential reasons for the low count, ie. Calif current, pollution, over pumping to the southland, etc. While we cannot alter the Calif. current, we can alter some of the other potential problems. Just closing down the season is not good enough for us fisherman. We want to know what you are doing or going to do about the problems that can be altered. If it takes shutting down pumping stations at different times of the year to allow for the smolt to make it down stream so be it. I am well aware that is not an easy thing to do, however some tough decisions are ahead. Once the decision is made to close the season, we demand to hear what is being done to fix it. I have been fishing salmon for 34 years and to see it get voted away is not right. I would love to hear back from you but doubt you have the guts to call one of us lowly fisherman. Chip Tamagni Paso Robles, California (805) 431-2602

Chip Tamagni, Certified Arborist #WE 6436-A

Office: (805) 434-0131
Cell: (805) 431-2602
Fax: (805) 466-1528

Subject: Please pass the Salmon harvesting ban.
From: Sky Skach <sky.skach@gmail.com>
Date: Fri, 28 Mar 2008 11:25:12 -0700
To: "Chuck.Tracy@noaa.gov" <Chuck.Tracy@noaa.gov>

I am writing to provide my support for the salmon harvesting ban along the Oregon and California coast. As a native Oregonian I am aware of the economic impact of this decision but believe the survival of the salmon runs is priceless. As I am sure you know, the salmon evolved with the landscape and are an important method of returning nutrients from the ocean to the landscape making Oregon and California the fertile landscapes we enjoy and prosper from. I am writing to encourage your organization to finalize and implement the ban on salmon harvesting and give depleted population several seasons to recover.

Sincerely,

Sky Skach

Subject: [Fwd: 2008 Salmon Season]
From: PFMC Comments <pfmc.comments@noaa.gov>
Date: Mon, 31 Mar 2008 08:13:16 -0700
To: Chuck Tracy <Chuck.Tracy@noaa.gov>
CC: Jennifer Gilden <Jennifer.Gilden@noaa.gov>

Subject: 2008 Salmon Season
From: Jim Gaumer <jgaumer@shocking.com>
Date: Sun, 30 Mar 2008 12:49:14 -0700
To: pfmc.comments@noaa.gov

Ms. Jennifer Gilden
Communications Officer
Pacific Fishery Management Council

Dear Ms. Gilden:

I recommend you adopt Option 3, a total closure on both the commercial and sport fishing season for salmon along the west coast of the United States. The biologist report that the fall Chinook run for the Sacramento River drainage is projected to be 58,200 spawning salmon. Conservation goals for this run is 122,000 to 180,000 spawning Chinook. To allow any harvest of this stock would be unconscionable, and it would make a mockery of the conservation goals. I can see no way you can in good conscience allow any harvest to occur in 2008. This said, if during the fall it is determined that enough fall Chinook have returned, or are returning, to the Sacramento River drainage, an emergency opening should be considered. I make this recommendation even though I am an avid salmon fisherman.

Thank you for the opportunity to comment on this important issue.

Jim Gaumer
580 Paseo Companeros
Chico, CA 95928

2008 Salmon Season.eml	**Content-Type:** message/rfc822 **Content-Encoding:** 7bit

Subject: [Fwd: Chinook Salmon 2008 Season Guide Lines]
From: PFMC Comments <pfmc.comments@noaa.gov>
Date: Mon, 31 Mar 2008 08:13:39 -0700
To: Chuck Tracy <Chuck.Tracy@noaa.gov>

Subject: Chinook Salmon 2008 Season Guide Lines
From: Michael Edwards <deenmike@msn.com>
Date: Thu, 27 Mar 2008 20:01:27 -0700
To: pfmc.comments@noaa.gov

To whom it may concern.

Thank You for taking the time to read my opinion for the 2008 season. (Salmon)
I have written many letters in the Past few months with Very few reply's if any at all. Most have been written to the ODFW members in different and many Derpartments. Most of my reply's came back as, we are sorry we do not have any jurisdiction on this matter and will send it on to the right Dept. I'm hoping that this leter is read and has some meaning by you.
First! My pet pieve since 2005 has been the problems we are having with the Chinook, Coho, Salmon up and down the Pacific North West.
I have fished these waters for some 45 plus years and no I have never seen the numbers of our Salmon Stocks going south. They have been for at least 4 and maybe 5 seasons. It is definetly not a new problem that has come about in the last couple of season, even though they have definetly been the worst.
After reading an article in the Orgonian today as it was sent by fax to me to take a look at and what the councel is proposing. In this article there are a couple issues I have stressed to the ODFW for Months. In my opinion it is not Ocean conditions where our problem lies. If we continue to address this as if that is the major concern adressing Salmon Runs we are going to run completely out of Salmon in the next few season, sooner than later.
We have seen over the years a lot worse ocean conditions than we had 3 years ago. Infact, according to my caculations 3 years ago we had pretty good conditions outside. But! Reguardless the ODFW can't seem to ever have any other excuses of why we are having proplems unless it is ocean related.
I have listened and spoke with many Biologist in the last couple of decades and its always the same thing, Ocean Conditions, Ocean Conditions. Our problems are with large numbers of Salmon up and down the pacific North West from California to the Washington/Alaska Border. Not a river here and one there with a little smaller runs than usual this season because of warm water, bait numbers down, and a few other factors. Our Salmon fishery is in the Toilet.
In the Orgonian the ODFW Guru MR. Bales indicated that our Spring Runs havn't been hit as hard as our Fall fishy has. Well! If that was right maybe we would have a Springer Run in the Rogue River would we not? Or the Umpqua, would we not? But explained MR Bales, we are not having a Spring Chinook Problem because these fish travel in completely different areas. Forign Fleets, Hake ,Polic cannery boats. Well, MR Bales if the Fall fish returned as early as the Springers maybe there wouldn't be as big of a problem as we are having. The Columbia Springers are the only Springers not having a Problem and that has not proven to be a fact Quite yet.
This isssue is State wide not one river here one river there All the Rivers are affected by low Runs. The Willamett Springers all time Lows but they are letting them fish those fish when it should be closed. So where are the Springer Runs?
Also indicated was the Sacrewmento River which makes up the BULK of Oregon's offshore Salmon catch each summer. Wow! does that ever put a pot on to boil. Why? is it that the Sacremento River makes up of most of the Catch in Oregon? Are we saying the Sacremento puts way more fish into its system than all the rivers in Oregon? I don't think we can go that far But! they have a much better system than the ODFW has that is for sure. For its size we don't see an 1/8 of those numbers in the Rogue River. Just a long as the SAC! The Umpqua as long as the Sac. All in All we need more fish in

these systems once the problem is taken care of (The No Fish Problem).
Here we go with the Real culprit to our fisheries!!!!!! Net fishing off shore from the Forign Polic to Hake fisheries, The offshore cannery fleet taking everything that can't swimm through a net and is prosessed. If we don't think million of pounds of Salmon are not being intersepted by these fisheries someone needs to have there heads examined. Literally!! The second huge problem is the Alaskan and Canadian offshore net fisheries targeting Salmon of all species. When the ports of Alaska closed for 3 weeks due to having too many Salmon being proccesed you don't think that might be a hint of the numbers they are catching and let me tell you they are not Alaskan Fish, definetly not there own. So you think Wasshington and Oregon Salmon might be in those nets?
When Canada broke the treaty with the US because they blamed Alaskan offshore commercial fleets as targeting there fish, then indicated scew you we can play that game too. So they start supposedly targeting Alaskan fish. You don't think they are doing the same? fishing on our fish. Hell yes they are. The Odfw Does not have a clue where these fish go from the time they enter the river untill they return. When they indicate Sacremento fish don't stray to far north, and that is a huge problem for that fishery if the water conditions are not working in the fishes favor. But in the same turn they indicate that the majority of Salmon caught in Oregon are Sacremento fish. Then how in the hell do they know how far North they actally go? They do not know!
If the ODFW would work together with the STEP program in each of our streams we would have a hell of a better return. The STEP has proven that. But! The ODFW doesn't want to look bad to the general public. At this point and for quite a few years they couldn't look any worse than they do now. When writing to the ODFW if you can get by the Assistant to the Assistant to find whom you'd like to read what you have to say should be justifies also. Everyone else is suffering through hard times but the ODFW has more people sitting on there ---than any other public servant. Losen up a few of these seats, put that money into the works to get our fishery back on track.
Is there such a thing that the sportsman of the State that purchase license and tags each season to catch a fish will ever see that money go directly to the funding of our fish and game. We don't have the dollars to get the issues done now, like watch the 200 mile limit on forign fleets targeting our fish, more dollars in our hatchery programs to raise more fish larger, people whom know actually what they are doing at the hatchery facilities instead of wiping out hatchery fry because of neglect. I feel for this councel having to find plus issues to get us on the right track.
Remember one thing, Down the road if the Commercial net fishery by Forign fleets and Alaska are not looked into you have not seen anything yet. The Ocean is not the Culprit here. We would have been better off with Mother Nature running things than the ODFW.
Thank you for your Time and I hope you are able to put this together. Mike Edwards

Chinook Salmon 2008 Season Guide Lines.eml	**Content-Type:** message/rfc8 **Content-Encoding:** 7bit

Subject: [Fwd: Please choose option III for salmon closure]
From: PFMC Comments <pfmc.comments@noaa.gov>
Date: Mon, 31 Mar 2008 08:19:44 -0700
To: Chuck Tracy <Chuck.Tracy@noaa.gov>

Subject: Please choose option III for salmon closure
From: Jeff Richelieu <jeffstreamline@sbcglobal.net>
Date: Sat, 29 Mar 2008 08:32:15 -0700 (PDT)
To: pfmc.comments@noaa.gov

Dear fisheries managers,

I am writing this letter regarding the salmon fishing regulations for the Sacramento River for the 2008 season. I am 41 years old and have fished the Sacramento river for the last 35 years, and I would like to see it available for future generations. I have no commercial interest in the salmon fishery. I am mostly a catch and release fisherman now, but I will occasionally keep a bright king salmon or two in the fall for eating.

With the collapse of the salmon stocks on the Sac. this year, I see no options, but to close the fishing season on the ocean and the river including the Feather and the American. Over the past 10 years there has been a huge increase in the number of guides on these river systems. These guides are out there everyday with up to 5 lines in the water and they are extremely good fishermen. They are pounding these fish at every turn, on every run, and are taking thousands of ripe salmon each year. Their goal is to "limit" their clients, so most dark salmon are killed and thrown in the box regardless of the quality of the meat.

These are extremely valuable fish because they are on the verge of spawning and returning millions of eggs to the system as well as their carcasses. They have survived all the many obstacles to reach this point in their life. I would speculate that every salmon taken in the river is worth 5 to 10 fish taken out in the ocean.

I have heard very few freshwater salmon fishermen stand up and take responsibility for their impact on the system. Everyone wants to point their fingers at everyone else, but the truth is that **we all have an impact**. Many guides will fish 5 days a week from July through December on the Sac. At a conservative average of 2 fish per day, that's about 200 fish per guide! I bet if you polled the guides they take a lot more fish per year than my estimate. Now multiply that by the number of eggs per fish and the number of guides. Say 10,000 eggs per fish multiplied by 100 females = 1 million eggs per guide !!! I have seen 20 guides at one launch ramp in one day, so the numbers are astounding if you do the math.

I am not writing this to pick on the guides, but to make the point that the sport fishermen have a significant impact on the fishery, as do the ocean fishermen, delta pumps, and ocean conditions.

We obviously can't regulate the ocean conditions, but we can regulate the fishermen and the delta pumps. **I would strongly encourage you to take the best course of action by closing the season to all salmon fishing in the <u>ocean and rivers</u> and to severely restrict the delta pumping activity**.

With the dramatic drop in the run that occur ed last year, we don't have time on our side to wait and see what happens this year. These fish need our help now, so please act accordingly.

Thank you for your time,

Sincerely,

Jeff Richelieu, concerned fisherman

Jeff Richelieu, PE
President, Streamline Engineering
Office: (530) 892-1100
Fax: (530) 892-1115
60 Independence Circle
Suite 201
Chico, CA 95973

Please choose option III for salmon closure.eml	**Content-Type:** message/rfc822 **Content-Encoding:** 7bit

Subject: [Fwd: Salmon Closure +]
From: PFMC Comments <pfmc.comments@noaa.gov>
Date: Mon, 31 Mar 2008 08:22:41 -0700
To: Chuck Tracy <Chuck.Tracy@noaa.gov>

Subject: Salmon Closure +
From: Bob Rist <ristr@sbcglobal.net>
Date: Sun, 30 Mar 2008 15:12:36 -0700
To: pfmc.comments@noaa.gov

I am a 71 year old person that has been involved in the fishing sport for many years. I would like to offer a few of my unscientific solutions to decline in the salmon population. The following are not necessarily in order of importance.

In reference to the Sacramento River influence on the salmon decline.

1. Reopen the Mill Creek hatchery south of Red Bluff. The more hatched, the more salmon. In my thinking this approach would be less costly than subsidizing the fisherman that have been put out of business by the decreased supply of their livelihood.

2. Curtail the increase in the population of the voracious striped bass in the San Joaquin Delta. Many times I have caught and released as many as twenty five under size stripers during an outing in the delta I am sure these fish are consuming many, many smolt released from the hatcheries.

Ocean and bay waters

1. Sea Lions: Conduct a study to ascertain the influence of the San Francisco Bay sea lions on the returning salmon to the Sacramento River/San Joaquin Rivers. The narrow straits of the Golden Gate Bridge provide an excellent source of food and easy pickings for the lazy lions who only have to float back to the docks to bask in the sun for the rest of the day. The so called animal friendly societies have allowed the sea lions to displace boat owners at the wharfs surrounding San Francisco as a tourist attraction... Wrong.

2. Russian River entrance into the sea: I have personally observed sea lions rolling off the shore at the entrance to the Russian River catching salmon and perhaps steelhead tossing them into the air as part of their eating regimen then returning the shore to bask again in the sun. Yes, I know that we all have to survive, however, get to the problem.

3. From my reading, I have learned that the curtailed upwelling of the ocean due to the change in the jet streams has had significant influence on the sustainability of the ocean food source beginning at the bottom of the food chain. This of course is something that we have no control of. Fish like others animals will go where they can eat and survive. As salmon have a wide migration pattern I would like to see documentation on how many other countries are taking out salmon as they roam the waters of the Pacific. I have a suspect that these records will not be made publicly for political reasons. What ever, cut to the chase.

As a closing remark; I have spoken to several individuals who reportedly have personal knowledge that the seas lions are having a dramatic influence on the supply of salmon returning to the major rivers in Oregon and California. He also remarks that here used to be a bounty on the animals, shortly thereafter the salmon supply increased dramaticlty. I have read articles that sea lions are stationing themselves below the fish ladders on various rivers and voraciously devouring the soon to be spawning salmon.

If I am misinformed or incorrect please set me straight. I await your unpolitiical response.

Robert M. Rist
531 S. Merrill Ave.
Willows, CA 95988

Salmon Closure +.eml	**Content-Type:**	message/rfc822
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Subject: Salmon Public Hearing Locations Unfair to Thousands of Fishermen
From: "McMillan, Terry" <terry.mcmillan@lmco.com>
Date: Fri, 28 Mar 2008 14:42:37 -0600
To: Chuck.Tracy@noaa.gov

Chuck,
The choice of Eureka, Coos Bay, and Westport for Salmon public hearing locations seems quite unfair to thousands of other concerned fishermen. The impending Salmon fishing season decisions affect a whole bunch of folks unable to attend your sessions.

Although I am not an avid Salmon fisherman, I still desire to have the opportunity participate in Salmon recreational fishing. In the likely event the Salmon season will not open in Central/Southern California this year, can I suggest that you and your fisheries management group support a report card catch and release program so we can help you determine the extent of the Salmon population problem?

As recreational fisherman, we, like you and your group, desire to rebuild our Salmon fishery and will do whatever it takes to accomplish that goal. Putting down our fishing poles and waiting for the resurgence of Salmon is not the only way we can help.

Sincerely,

Terry McMillan
805-937-8951(W) 805-260-9169 (C)
email: centralcoastfisherman@calmac.net

"Any sufficiently advanced bureaucracy is indistinguishable from molasses."
Unknown
Quotations by unknown authors

Subject: [Fwd: Comments on the Proposed Options for the 2008 Salmon Season]
From: PFMC Comments <pfmc.comments@noaa.gov>
Date: Mon, 31 Mar 2008 13:11:22 -0700
To: Chuck Tracy <Chuck.Tracy@noaa.gov>

Subject: Comments on the Proposed Options for the 2008 Salmon Season
From: "Promani, Rudy" <RxP8@pge.com>
Date: Mon, 31 Mar 2008 12:50:16 -0700
To: pfmc.comments@noaa.gov

Ladies and Gentlemen,

I have been a confirmed offshore salmon angler off the Northern California coast around San Francisco since I was 16 years old, a total of more than 36 years now. I am gravely concerned about how the options will affect the small businesses that have formed to allow anglers to take advantage of this fishery and their ability to survive. I believe some form of aid, both state and federal will be needed to allow these folks to maintain some semblance of a livelihood. I am also a Marine Biologist by both degree and formal training and completely understand that drastic measures are required. As a result I support the complete closure of the fishery to allow the maximum number of fish to return for spawning. This closure may have to be re-evaluated annually and extended as needed. Please remember that the fish that make it back to spawn this year will have an impact on the fish available 3-5 years from now! I also remember the banner season of just a few years ago and hope we can see a return of similar numbers.

Rudy Promani

Comments on the Proposed Options for the 2008 Salmon Season.eml	**Content-Type:** message/rfc822 **Content-Encoding:** 7bit

Subject: [Fwd: nor-cal salmon fishing meeting april 1, 2008]
From: PFMC Comments <pfmc.comments@noaa.gov>
Date: Tue, 01 Apr 2008 13:17:51 -0700
To: Chuck Tracy <Chuck.Tracy@noaa.gov>

Subject: nor-cal salmon fishing meeting april 1, 2008
From: Dan Wenzel <bookmdano95570@yahoo.com>
Date: Tue, 01 Apr 2008 11:00:29 -0700 (PDT)
To: pfmc.comments@noaa.gov

I will not be able to attend this meeting as I am not driving my truck in favor of the truckers fuel strike. I do however would like to voice my opinion on the Salmon fishing question.
I feel that I am an intelligent and rational human. Why is it that the Salmon in the Sac. river have anything to do with the salmon in the far northern Cal. and Or. waters, these fish only go back to where they are hatched, if it does not effect the Washington and Alaska fish, then it won't effect the fishery north of the Sacramento. A fairer solution that would not cripple the economy, is to open the season to 2 fish which would include COHO (silvers as we say it). OH YEAH, these are on the in dangered list, even though we hook up with 8 COHO to every 1 KING, and when we let them loose the are killed by sea lions or seals or just die from trauma, The Feds took the wolves off the list and there is only 1,300 of them DUH. Anyhow why not 2 fish any specie, it would save the ECONOMY. I would however save over a $1,000. that I would normally spend going fishing and enhancing the economy of the area and oh yeah license fees to CDFG, that'l help Californias economy, if you stop fishing altogeather.

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nor-cal salmon fishing meeting april 1, 2008.eml	**Content-Type:**	message/rfc822
	Content-Encoding:	7bit

Subject: [Fwd: Salmon Closures]
From: PFMC Comments <pfmc.comments@noaa.gov>
Date: Tue, 01 Apr 2008 14:49:15 -0700
To: Chuck Tracy <Chuck.Tracy@noaa.gov>

Subject: Salmon Closures
From: "Dr. Edward Bruno" <drbruno-drb@pacbell.net>
Date: Tue, 01 Apr 2008 14:40:51 -0700
To: pfmc.comments@noaa.gov
CC: Jim Gaumer <jgaumer@shocking.com>

Dear Sirs:
Complete closure is clearly the best option. The other options allow the loss of salmon already below stated conservation levels. If those levels had relevence when they were established, they must be respected at this point.

Additionally, complete closure will be less of a problem for enforcement. Complexity leads to abiguity which creates additional problems for enforcement. Zero catch is clear and unambiguous.
Ed Bruno
1665 Park Vista Drive, Chico, CA

Salmon Closures.eml	**Content-Type:**	message/rfc822
	Content-Encoding:	7bit

Subject: [Fwd: 2008 Salmon]
From: PFMC Comments <pfmc.comments@noaa.gov>
Date: Wed, 02 Apr 2008 10:19:26 -0700
To: Chuck Tracy <Chuck.Tracy@noaa.gov>

Subject: 2008 Salmon
From: Chris Marshall <chris_marshall@dot.ca.gov>
Date: Wed, 02 Apr 2008 10:02:14 -0700
To: pfmc.comments@noaa.gov

I attended the public hearing in Eureka last night. As the meeting went long and somewhat off topic, I thought I would voice my preference here.

For recreational fishing, Option 1 provides for fishing on Memorial Day, July 4th, and Labor Day weekends. A total of 10 days of fishing. While this seems better than Options 2 & 3, it is terribly flawed for the following reasons:

Here on the northcoast of California, the ocean conditions limit our time to safely pursue salmon. My educated guess would be that of the 10 days allowed for fishing, the most days to safely fish would not exceed four. And conceivably, there could be no safe days to fish due to dangerous ocean conditions. With this limited opportunity on specific dates, you are indirectly encouraging boats to venture into unsafe conditions. Since these will be the only dates we're allowed to fish, boaters will no doubt take chances they ordinarily would avoid. This could lead to disaster. I wonder what the Coast Guard thinks of this option as proposed?

Another flaw of Option 1 is concentrating all salmon fishing opportunities on three holiday weekends. There are only three boat launching facilities in the Eureka/Trinidad area. And most people don't use Trinidad because of the cost and the hassle. Option 1, as proposed, would create such chaos at the launch facilities that most of the fishermen I know won't even bother to fish. There are just too many inexperienced boaters who clog the ramps with their ineptness. It could take hours to launch and pull out you boat. And the parking problems this would cause are inconveivable.

Only allowing salmon fishing on the specific dates proposed is short sighted. More convenient for regualtory and enforcement agencies, sure. But you're asking for trouble and disaster if Option 1 is adopted as proposed.

As mentioned at the meeting last night several times, I beleive some kind of punch card system would help aleviate the problems stated above. If a person was provided a punch card with a limited number of salmon allowed to be harvested, the season could be spread out where fisherman could fish in safer conditions and the boat ramps would be able to handle the pressure. A safer and less congested opportunity to fish would result.

A modified version of Option 1, with some kind of puch card system in place, is my preference.

Thank you for your consideration.

Chris Marshall
Fisherman & Voter

RECEIVED

MAR 2 1 2008

PFMC

To: Manager, Pacific Fisheries Management Council, 7700 NE Ambassador Place, #101, Portland, OR 97220

From: Ms. Phoebe Lenhart, 1518 Castillo, #2B, Santa Barbara, CA 93101

Date: 3-13-2008

Regarding: "Salmon fishing season"

This letter is sent in reference to the frightening news in reference to the low numbers of salmon.

I support suspending all fishing of salmon until the numbers recover sufficiently to sustain the population for generations to come. I hope you do not succumb to pressure from the fishing industry, recreational fishers, etc I am very disappointed that your organization has allowed this to happen. This bad news regarding the salmon population should not be a surprise to you or anyone else in your organization. Please stop all salmon fishing immediately and suspend any further fishing until the species makes a full recovery. Their and our future depends upon your decisions and actions. Please be responsible.

Tom Peters
221 Dollison St.
Eureka, CA 95501
707-445-1666
tpete@reninet.com

April 1, 2008

Pacific Fisheries Management Council:
Re: 2008 salmon season disaster relief

I am writing to ask for your support for including SPORTFISHERMEN, along with commercial fishermen and fishing related businesses, in any proposed disaster relief for the 2008 Pacific salmon fishery. Your active support is critical for many reasons.

For many sportfishermen, salmon is the mainstay of our recreational activity. Switching to other fisheries and other areas, when possible, costs us considerable amounts for new equipment, longer ocean trips, travel, and license fees. Even in Eureka, Ca, the local charterboats will have to charge much more to compensate for the much longer runs to the bottomfishing grounds or for offshore albacore trips. Fuel is expensive!

The California DFG has data from salmon punchcards through 2007 showing fishermen's names and addresses and how many days they actually fished. Using this data, I would propose excluding 'casual' fishermen who fished for salmon 5 days or less last year. For fishermen who logged 6 days or more last year, there should be a 'per day' compensation allowed to offset other increased costs. I don't know what funds will be available, but a figure of maybe $50/day seems appropriate and would cost only a small fraction of any relief package.

I doubt you will get many letters about this request. Most fishermen are in shock and have not thought through what it will take to switch to other fisheries or to travel to other locations. Sportfishermen have worked very hard and given much to restore and rebuild salmon populations. Whatever the reasons for the poor 2007 returns, it is crucial to the salmon to maintain this support. Participating in any disaster relief would both acknowledge our contributions and keep us engaged in restoration efforts. Ignoring us could seriously erode that commitment. We want more fish and will do whatever we can to help achieve that goal. If you decide we need the draconian measures you propose this year, we will support you to help rebuild stocks.. But please consider us and our sacrifice by urging our inclusion in disaster relief efforts.

We sportfishermen have considerable investments of time and money in our boats and equipment for the salmon fishery. For many of us, it is our MAJOR recreational activity for the entire year. Under the BEST option offered, the PFMC is about to render it all worthless unless relief becomes available to help us adapt.

You would help minimize our loss and help retain our support by making a real effort to include sportfishermen in any disaster relief that may result from your actions for the 2008 sport salmon season..

Thank you.
Tom Peters
Tom Peters

Cc: Senator Diane Feinstein
Senator Barbara Boxer
Congressman Mike Thompson
CA State Assemblywoman Patty Berg

John H. Roush Jr. D.B.A
600 Deer Valley Road, #2-E
San Rafael, CA 94903-5517
(415) 499-5776
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E-Mail: coljhroush@comcast.net

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OUTDOOR WRITERS ASSOCIATION *of America*

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MAR 21 2008
PFMC

March 12, 2008

Pacific Fishery Management Council
7700 N.E. Ambassador Place, Suite 101
Portland, Oregon 97220 503-820-2280

Dear Sirs,

May I suggest that you consider that as one of the principal threats to the diminishment of our salmon runs is the gross overfishing by large scale commercial boats utilized by Korean, Japanese and Russian fleets in the far northern waters and Bering Seas.

Some of us believe that they are rampantly exploiting the immature salmon which tend to thickly school and are thus readily located by sophisticated sonar used by those unscrupulous boat captains. Using small mesh nets of great length the juvenile stock can be wiped out, with no thought given to the consequences of taking immature fish in vast numbers.

That technique was proven to be the principal causation of sudden severe diminishment of atlantic salmon runs in the Scandinavian countries. Enterprising seiners had located massed schools of juvenile fish in far northern waters and had grossly over-harvested the fish with small-mesh nets. I believe both races of salmon range far north in their juvenile stage.

The Coast Guard has patrolled the 200 mile limit in northern waters and has found rampant disregard by these foreign vessels. They tell me that outward of the 200 mile limits the foreign boats have stripped the seas of all fish, thus their willingness to risk capture in invasion of our waters with their severe taking with ten mile or more long nets. The limited capacity of the Coast Guard to patrol, by virtue of insufficient ships, personnel and budget, has allowed the foreign scavengers to take the serious risks capture and loss of their boats by their intrusions.

We need to strengthen our ability to protect salmon runs by doubling the capacity of the Coast Guard to patrol our waters and enforce fisheries restrictions. That would be the most cost effective alternative to taking effective action to protect our important fisheries. We should advocate a considerable increase in the CG budget that would be needed to implement this proposal.

We need also to curtail the excessive diversion of our waters to the south. They should be encouraged to develop desalination and such other projects as may be needed as alternatives to over-exploiting our northern California waters, to our serious detriment.

Since the expenditure of large sums are being considered to mitigate the severe reduction in salmon runs, the above considerations should be thoroughly considered.

Please advise with your thoughts..

Sincerely,

John H Roush Jr.

JOHN H. ROUSH, JR., D.B.A.

Pacific Fisheries Management Council
Seattle, Washington Meeting
April 7 – 11, 2008

April 4, 2008

IN-RIVER SPORTS FISHING ISSUES

The In-River Sports Fishing and the Trinity River Guides Association support the proposed Option I of 18,600 of the Klamath Fall Chinook Preseason Report II for the 2008 Fall Chinook harvest. We also ask that you provide the Ocean Recreational harvest of Option I: three days for the Memorial Day weekend, Three days for the 4th of July and with the extension of the last two weeks of August in the KMZ.

The reasoning for this request and consideration is that by keeping the In-River Recreational harvest to the lower number of 18,600 Fall Klamath Chinook it would allow for the extra harvest if KMZ Klamath Fall Chinook to go to the Ocean Recreation Sports Fishery. It also would allow for a third year in a row for the 40.7 escapement floor. This consideration is based upon:

1) the Sacramento Fall Chinook would be into the San Francisco Bay area staging to enter or already entering the Sacramento River and therefore not be affected by the late harvest of KMZ fish.
2) The reduction of salmon fishing for the Ocean Recreation Sport Fisheries will cause a great economical hardship to the coastal businesses as it did in 2006 to the IN-River businesses. A twenty day fishery with a limited Salmon Report Card (10-20fish) could very possible help to stop an economical collapse during this recessional period of the economy.
3) A 100% marking of hatchery Chinook released from the IGH &TRH would help assure some type of In-River and Ocean Recreational fishing restricted to hatchery fish only during those years of low returns.

We thank you for your serious consideration of our recommendations.

E. B. Duggan, Representative

F.1.k
Supplemental Public
Comment 3

Pacific Fisheries Management Council
Seattle, Washington Meeting
April 7 – 11, 2008

April 4, 2008

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We thank you for your serious consideration of our recommendations.

E. B. Duggan, Representative

Agenda Item F.1.k
Supplemental Public Comment 4
April 2008

PRN DATA
SERVICES

April 8, 2008

Mr., Donald McIsaac
Executive Director
Pacific Fishery Management Council
7700 NE Ambassador Place Suite 101
Portland, OR 97220

Dear Mr. McIsaac;

RE: Public testimony regarding 2008 Salmon Season

Thank you for the opportunity to present testimony for your consideration. I am a Commissioner for the Port of Brookings-Harbor and am very concerned about the options that have been presented for the council decisions for the 2008 salmon season. Included in my testimony, for your consideration, are two studies that reflect the potential economic impact of a severely curtailed salmon season this year. The first is a Preseason Option Analysis prepared by The Research Group for the Oregon Department of Fish and Wildlife and the Oregon Coastal Zone Management Association. The second is an excerpt from the 2006 report on Economic impact for Sport fishing prepared by The American Sportfishing Association.

While the methodology is different both reports indicate the severe impact our coastal communities will experience with any of the options proposed by the PFMC. According to the ASA report Salt water recreational fishing contributes over $150,000,000 to our coastal communities creating 2400 jobs. While there will be other saltwater fishing that occurs with the implementation of any of the options, it is clear that the impact will be severe. Even using the more conservative report prepared by the Research Group one can see the dramatic impact. The Research group reports 62,300 ocean salmon angler days in 2006. Option one reduces this number by 81%, the other options reduce it by close to 100%.Regardless of the methodology used to measure the economic impact, one can see clearly the devastation. Our economy is extremely fragile. The loss of federal timber funds combined with high fuel prices and now a loss of the salmon season creates a “perfect storm” of economic devastation.

PRN DATA
SERVICES

In our area, Brookings, we are doubly disadvantaged by being in the Klamath Management Zone. In years past we have suffered the additional restrictions to support the return of Klamath Salmon. This year, although not completely finished, the Klamath River salmon returns look pretty good. But we are now faced with the collapse of the Sacramento Salmon. We believe much of this collapse is due directly to inappropriate water diversion and mismanagement of resource. But the most important element for us is that the Sacramento migration is generally beyond Oregon by mid August. so any fishing during the period of Aug 15 through September 15 should have a negligible effect on the Sacrament run.

As a result, we request that you reconsider option one to include an additional 28 days of salmon fishing in the August to September time frame. Bag limits and gear restrictions would be appropriate.

So Option one would include the proposed nine (9) holiday days, the limited fin clipped Coho season, June 22 –Aug 31 (10,000 Quota) and an additional 28 days between August 15 and September 15.

In the event you decide otherwise we would request that you exercise your procedure for establishing a Salmon Disaster Declaration with the appropriate funding requests.

Thanks you for the opportunity to testify .

Jim Relaford
Commissioner
Port of Brookings Harbor
Brookings, OR

Preseason Option Analysis

Oregon Economic Effects From Ocean Salmon Season 2008 Proposed Management Measures

prepared by

The Research Group
Corvallis, Oregon

prepared for

Oregon Department of Fish and Wildlife

and

Oregon Coastal Zone Management Association

April 2008

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Appendix

I. Introduction

The Pacific Fishery Management Council (PFMC) used unprecedented low Chinook abundance projections for stocks south of Cape Falcon to develop the most limiting ocean commercial fishing salmon management 2008 season proposed measures since the early 1990's.[1] This follows very restrictive fishing opportunities in this area in 2006 and 2007. The PFMC will take comments on the proposed measures and craft a preferred management package at its April 2008 meeting in Seattle, Washington. The PFMC decision must be approved by the Secretary of Commerce. States must meet to ratify the decision for territorial sea waters. Neither the Department of Commerce nor the states are expected challenge the decision.

This report provides more detailed economic impact descriptions about the proposed measures than are available in PFMC documents.[2] It also provides some background information about the Oregon salmon fishing industry. It is hoped the descriptions will be helpful in understanding the severity of the economic impacts and to provide information to those that possibly want to comment on the proposed measures.

The last five years (2003-2007) economic contribution measured as personal income to households from ocean commercial and recreational salmon fishing for Oregon has been $15 million for coastal communities and $17 million for the state in 2007 dollars. The last 10 years average was $13 million and $15 million, respectively. But these averages mask some good years in the early 2000's and some bad years in the late 1990's. For example, the four year average in 2002 through 2005 was $19 million and $22 million, respectively. The late 1990's plus the two most recent years average is 7.5 and 9.0, respectively.

These averages compare to the three proposed options that will result in coastal economic contributions being $3 million, $1 million, or less than $1 million. The options' decreases in economic contributions range from 79 percent to 96 percent as compared to the previous five year coastal average.

The above estimates are based on some broad assumptions to get the economic contribution and ex-vessel numbers. Decreases in landings may prop up prices for commercial fisheries and area restrictions may increase recreational bottomfishing. Unfortunately, recreational bottomfishing

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1. It has been estimated up to 60 percent of Oregon's ocean commercial and recreational fisheries south of Cape Falcon are from the California Central Valley Chinook salmon (CCVC) stocks, and the rest are mostly from Oregon coastal and the Klamath rivers. Data indicates that the number of returning adult spawners have fallen below the conservation objective for CCVC stocks as established by the Pacific Salmon Commission for the first time in 15 years. Predictors for the upcoming 2008 CCVC mean that adult returns will be the lowest on record. Oregon coastal Chinook stocks have seen declines in adult returns the last two years and predictors for 2008 show no turn-around.
2. The PFMC publishes a series of four reports each year to assist in deliberations and convey information about salmon management. The first report ("Review of Annual Ocean Salmon Fisheries") reviews harvests and impacts to management goals for the previous season. The second report ("Preseason Report I") discusses the current years expected abundance, management goals, and other regulatory considerations. The third report ("Preseason Report II") provides information about management options and the options' expected biological and economic impacts for the upcoming season. The fourth report ("Preseason Report III") describes the management regime selected from among the options for the upcoming season. The reports are authored by the PFMC Salmon Technical Team and staff economists.

is now under quotas for some species and that season could curtail early. The modeling also does not predict the effort shift to other fishing opportunities or from closed management regions to areas with more liberal fishing opportunities.

Economic studies should include other fisheries' economic contribution estimates, such as for commercial tuna and recreational bottomfishing, as well as inside recreational fisheries so that comparisons and contrasts could be made. The inside fisheries (i.e. estuary and river fisheries) generally decrease when there are projected decreases in ocean fisheries. However, this is an interesting year where there are access restrictions to relatively healthy abundances due to a single contributing weak stock.

The Department of Commerce can declare a disaster, but Congress must pass appropriations to fund programs. The OCMZA provided the information during the early 1990's and in 2006 to justify disaster declarations. The states and Congress appropriated funds and re-directed programs to assist the fishing industry for those declarations. Fishing industry participants in Oregon and California received direct assistance funds totaling over $60 million for the 2006 declaration. There has been a formal request dated March 14, 2008 by the states' governors to the Secretary of Commerce for this year's salmon fishery disaster declaration.

The appropriations for the early 1990's salmon disaster declaration were specified in the Northwest Emergency Assistance Plan (NEAP). The assistance was directed to all West Coast paricipants. The NEAP and other programs included direct subsidies to industry participants. The programs included relaxed qualifications for unemployment insurance, low interest loans, support if they left the fishery and participated in job retraining programs, offers for habitat restoration jobs, contracts for test fishing/data gathering, counseling and outreach services from Sea Grant Fishing Families Project, and a Washington license buyout. The 2006 salmon disaster declaration was accompanied by state assistance programs in Oregon (approximately $3.5 million in direct assistance and other programs) and California (mostly comprised of loan qualifying criteria and social services). After several delayed attempts, Congress finally passed legislation that included a $60.4 million appropriation for assistance. The Pacific States Marine Fisheries Commission used salmon industry recommendations and Oregon and California membership committees to determine assistance qualifying and amounts formulas.

II. Oregon Commercial Salmon Fisheries Year 2006

(Excerpt from Radtke, Hans D. and Shannon W. Davis. Oregon's Commercial Fishing Industry Year 2005 and 2006 Review and Year 2007 Outlook. Prepared for Oregon Department of Fish and Wildlife and Oregon Coastal Zone Management Association. June 2007.)

There were 312 vessels (87 percent of all vessels making deliveries and 28 percent of those with permits) that delivered more than $500 troll caught salmon in 2006. Their average salmon revenue was $8,608, which was about 18 percent of their total fisheries revenue. The average salmon revenue for the top 10 vessels was $44,804 and their dependency on salmon revenue was 56 percent. The top 63 (18 percent) vessels harvested 50 percent of this fishery's total value, and the top 197 vessels harvested 90 percent of this fishery's total value. The bottom 115 vessels (i.e. 312 minus 197 vessels or 45 percent of all vessels delivering more than $500) harvested 10 percent of the total value. There are 1,200 troll salmon vessel permits authorized and there are currently 1,175 permits issued. The ODFW has held a lottery to issue new permits to bring the number back up to the 1,200 authorized twice since the floor was established through legislation in 1995.

In the gillnet, non-tribal, Columbia River salmon fishery, there were 156 vessels (90 percent of all vessels making deliveries and 51 percent of those with permits) that delivered more than $500 revenue in that fishery in 2006. Their average salmon revenue was $11,716, which was about 77 percent of their total fisheries revenue. There were 571 Oregon permits grandfathered when a limited entry system went into effect in 1980. There have been 133 Oregon licenses retired through buyout programs and there has been attrition for other reasons since then. When attrition of permits for whatever reason falls below 200, a lottery may be held to offer permits to bring the number back up to 200. Treaty salmon fisheries landings do not identify vessels, so no vessel performance measures are available for this fishery.

There has been a general trend in price decreases since the early 1980's; however, troll Chinook salmon increased to an average price of $2.84 per round pound in 2005 and shot up to $4.76 per pound in 2006. Prices will generally be high when the season starts in spring, then decline during the summer, and rise again when ocean fisheries are finishing for the season. Except for the 2006 season, there has been early ocean season openings since 2003 for large sized Chinook. These have entered the market when river caught spring Chinook have traditionally fetched very high prices. The early ocean season management restrictions on landing small grade fish plus the influence from spring Chinook prices have helped buoy the troll caught Chinook early season prices which in turn statistically increased the annual price. Troll caught salmon prices in 2006 have increased by a factor of 1.68 times 2005 prices. Price increases for Columbia River net caught fish also increased rapidly in 2006.

The commercial fishing industry is an important business segment to many communities along the Oregon Coast, but there are certain segments of the industry that are experiencing severe disruption. Overall the Oregon fishing industry onshore landings were the second highest at 300.2 million pounds in 2006. (The highest was the previous year with 312.4 million pounds In terms of ex-vessel value, these landings are the highest since 1989 at $105.8 million. The 2006 landings are a 12 percent increase from the average of the previous three years, which was $94.3

SALMON FISHERY Year 2006		
Volume (thousands pounds)	1,813	
Ex-vessel value (thousands)	$4,947	
Change from 2005	-54%	
3 year average	-56%	
10 year average	-25%	
Economic contribution (millions)	$7.60	
Share onshore total	3%	
	Count	Share
Vessels >$500	476	87%
Average salmon revenue	$9,496	
Salmon share		19%
Vessels 50% value	91	17%
Vessels 90% value	291	53%
Top 10 vessels	10	2%
Average salmon revenue	$44,804	
Salmon share		56%

Type: Troll		
Volume (thousands pounds)	573	–
Price	$4.70	–
Ex-vessel value (thousands)	$2,696	–
Vessels >$500	312	87%
Average salmon revenue	$8,608	
Salmon share		18%
Vessels 50% value	63	18%
Vessels 90% value	197	55%
Permits authorized	1,200	floor
Permits	1,175	

Type: Net, Non-Tribal, Oregon Landings		
Volume (thousands pounds)	972	–
Price	$1.95	–
Ex-vessel value (thousands)	$1,893	–
Vessels >$500	156	90%
Average salmon revenue	$11,716	
Salmon share		77%
Vessels 50% value	31	18%
Vessels 90% value	94	54%
Permits authorized	200	floor
Permits	310	

Type: Net, Tribal, Oregon Landings		
Volume (thousands pounds)	264	–
Price	$1.32	–
Ex-vessel value (thousands)	$348	–

million, and a 24 percent increase from the average of the previous 10 years, which was $85.3 million.

All commercial fishing contributed about $421 million to the State's economy in the year 2006, including the distant water fishery revenue. This is a record and is a 52 percent increase from the average of the 1990's. The increases came mainly from higher Dungeness crab landings, continuation of the sardine fishery, and abundant stock of Pacific whiting. Landings for some of the different species constituting the groundfish fishery were severely constrained, due to reduced allowed catch and discard mortality in management rebuilding plans. The 10 percent increase in the sablefish fishery helped maintain the sum of this fishery's economic contributions at about a nine percent increase from the three year average. The economic contribution from the salmon fishery was about half less and the pink shrimp fishery was about a quarter less than the last three years' average. The 2006 economic contribution represents less than one percent of the State's earned income, but is about eight percent of all earned income along the Coast. At $30,000 income per year, the industry represented about 14,000 annual full time equivalent jobs in Oregon in 2006.

Twelve communities along the Oregon Coast are the mainstay harbors for the fishing fleet (Tables 1). The harbors are geographically combined to five port groups to simplify descriptions in this report. The communities have evolved around harbors and fishing grounds with different characteristics. Each has a presence of key facilities and services that make it unique. Some serve a locally based fleet and others are regional fisheries centers.

The comparative size of the port groups can be described by the number of home-port vessels moored there and how much volume and value of fish is delivered there.[3] The Astoria port group has the largest share (34 percent) of home-port vessels followed by Newport (22 percent), Coos Bay (17 percent), Brookings (15 percent), and Tillamook (12 percent) in 2006. Port Orford had the highest percentage of vessels with groundfish LE permits because of the strong participation in the sablefish fishery at this port. Astoria had the highest landings in terms of volume and value of any port group in Oregon. The landing order of ports following Astoria is the same as mentioned for the count of home-port vessels.

---

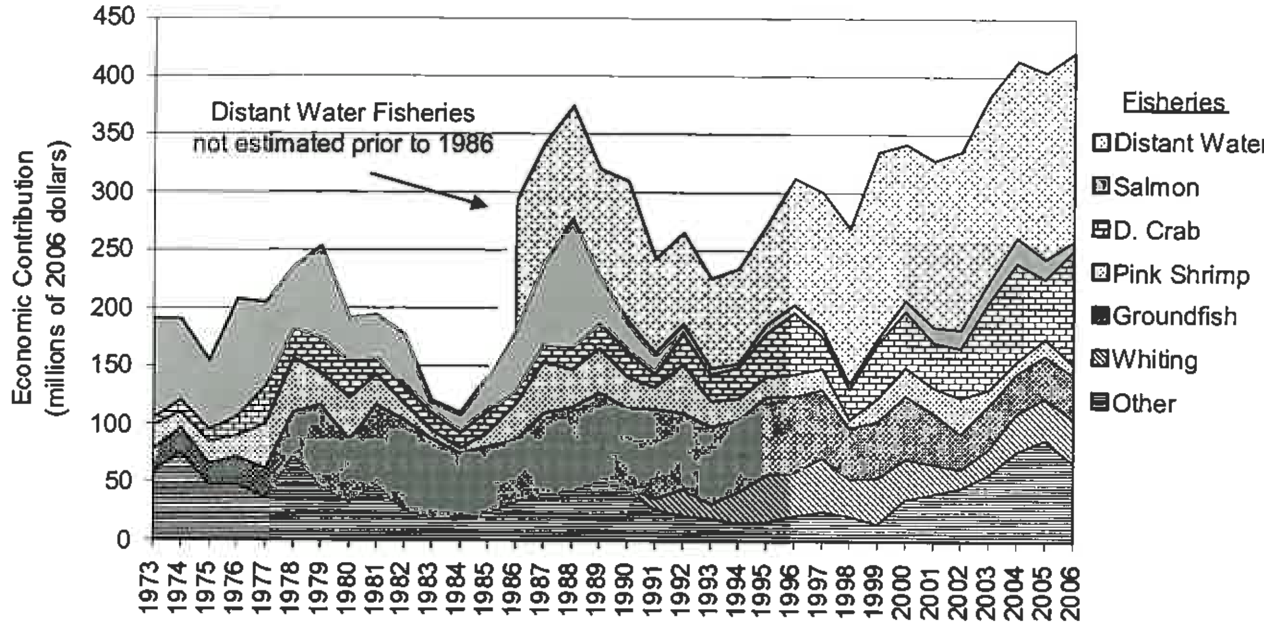
3. The dependency of the fishing industry in each community on the groundfish fishery is also explained by showing the share as compared to all landings. The groundfish fishery share for a vessel or buyer is when a majority of landing revenues or purchases is from that fishery. (The groundfish species are from the ODFW groundfish species list prior to 2003 and exclude Pacific whiting.) The purchasing entities may be processors, restaurants, etc. Purchase entities are not distinct across port groups. The same entity may issue tickets at several ports. The threshold value of $500,000 was assigned to show where processors may have facilities that include processing lines and inventory handling. The threshold value of $10,000 was assigned to filter vessel owners that sell retail from their boats. There are instances where processor and buyer counts are indicated as "c" when confidentiality rules (three or less entities) apply.

Table 1
Port Group Share of Onshore Landings and Home-Port Vessels in 2001 to 2006

Port Group/Communities	Local/ Regional	2001 Onshore Landings Volume	2001 Onshore Landings Value	2001 Home-Port Vessels	2002 Onshore Landings Volume	2002 Onshore Landings Value	2002 Home-Port Vessels	2003 Onshore Landings Volume	2003 Onshore Landings Value	2003 Home-Port Vessels	2004 Onshore Landings Volume	2004 Onshore Landings Value	2004 Home-Port Vessels	2005 Onshore Landings Volume	2005 Onshore Landings Value	2005 Home-Port Vessels	2006 Onshore Landings Volume	2006 Onshore Landings Value	2006 Home-Port Vessels
Astoria		45%	37%	31%	52%	39%	32%	52%	33%	31%	47%	24%	29%	53%	37%	30%	55%	33%	34%
Astoria and Warrenton	R																		
Tillamook		1%	3%	8%	2%	4%	9%	2%	4%	11%	1%	4%	10%	1%	4%	10%	1%	4%	12%
Garibaldi	L																		
Pacific City	L																		
Newport		40%	31%	26%	31%	27%	23%	31%	30%	24%	38%	30%	23%	35%	28%	23%	31%	31%	22%
Depoe Bay	L																		
Newport	R																		
Coos Bay		12%	21%	20%	13%	21%	21%	12%	22%	21%	10%	27%	24%	9%	22%	23%	10%	20%	17%
Florence	L																		
Winchester Bay	L																		
Charleston	R																		
Bandon	L																		
Brookings		2%	8%	14%	3%	7%	15%	3%	10%	13%	3%	14%	14%	2%	8%	13%	3%	11%	15%
Port Orford	L																		
Gold Beach	L																		
Brookings	R																		
Total		233.8 million pounds	$78.3 million ex-vessel	1,125 vessels	210.1 million pounds	$72.6 million ex-vessel	1,011 vessels	225.0 million pounds	$89.9 million ex-vessel	1,037 vessels	294.1 million pounds	$103.3 million ex-vessel	1,079 vessels	312.4 million pounds	$89.6 million ex-vessel	1,092 vessels	300.2 million pounds	$105.8 million ex-vessel	963 vessels

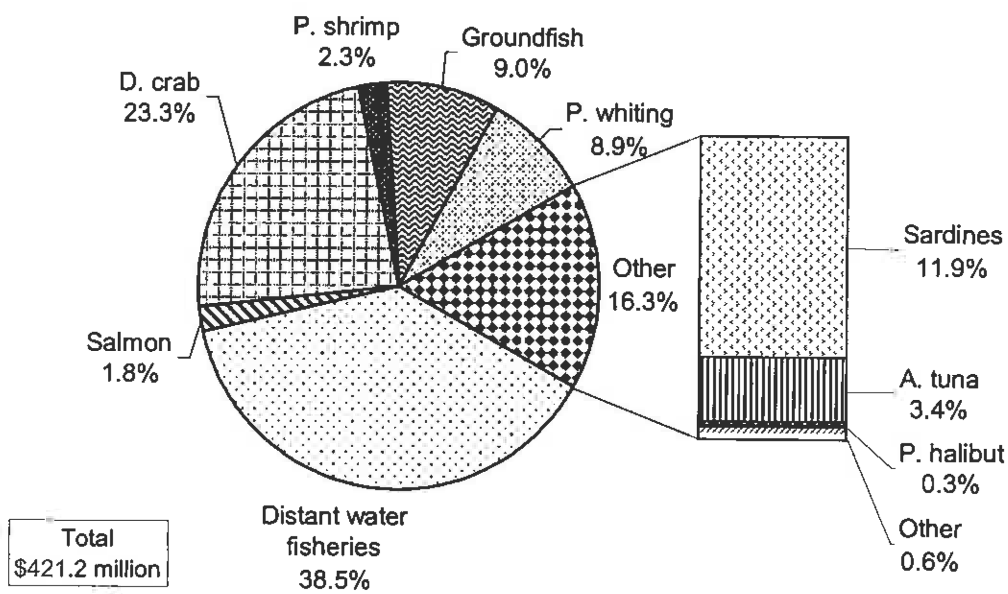
Notes:
1. Declaration of local or regional considers presence of vessel repair businesses, fishing equipment suppliers, ice services, cold storage, delivery services from buyers and processors, moorage and landing facilities, etc.
2. Value is in millions of 2006 dollars.

Figure 1
Economic Contributions From Onshore Landings in 1973 to 2006
and Distant Water Fisheries in 1986 to 2006



Notes: 1. Economic contributions are expressed as total personal income in millions of 2006 dollars.
2. Year 2006 is preliminary estimates.

Figure 2
Economic Contributions by Species Groups in 2006



Notes: 1. Economic contributions are expressed as total personal income in millions of 2006 dollars.
2. Year 2006 is preliminary estimates.

III. Oregon Recreational Salmon Fisheries in 2006

(Excerpted from The Research Group. Oregon Marine Recreational Fisheries Economic Contributions in 2006. Prepared for Oregon Department of Fish and Wildlife and Oregon Coastal Zone Management Association. June 2007.)

Recreational fisheries in the study area have two major segments: when salmon is the targeted species; and, when all other non-salmon species are the primary purpose for making the fishing trip.[4] These two recreational fishery segments can be further defined by where fishing occurs: ocean or inland. Trip expenses and consequently the local economic contributions generated are quite different for these locations. Ocean salmon fishing has much higher spending per trip, but there are more trips for the inland component. The ocean non-salmon fishery is often times referred to as the bottomfish fishery. Species targeted in this fishery are mostly bottom dwelling rockfish and halibut. There are also many charter and private boat trips for albacore tuna that are defined to be in this segment.

The total economic contributions for the analyzed recreational fisheries in 2006 are estimated to be $26.5 million, of which $16.2 million is when trips are for non-salmon ocean and inland fishing (Figure 3). There were an estimated 62.3 thousand ocean salmon fishing angler days generating $3.4 million economic contribution in 2006. From among the five port regions, most ocean salmon trips occur from ports in the Newport Port Group. Ocean non-salmon angler days were estimated to be 86.3 thousand in 2006. The non-salmon fishing trips will generate $6.7 million in economic contributions. Of this amount, $1.5 million is generated when halibut is the target species for a bottomfishing trip.

The total coastal inland estimated economic contribution for the 2006 season is $16.4 million to coastal communities. The inland recreational fisheries can be defined first by those fisheries in the lower Columbia River estuary, and second by all other estuaries. The lower Columbia River estuary is estimated to have had $2.4 million in economic contributions. Of this, the Columbia River fall salmon fishery in 2006 is estimated to have been 26.7 thousand angler days and generated $1.0 million in economic contributions. Salmon trips in other parts of the lower Columbia River estuary are estimated to have generated $0.4 million in economic contributions, if fishing is similar to the previous year's annual averages. The lower Columbia River estuary sturgeon fishery is estimated to have generated $0.9 million in economic contributions. Steelhead and other marine species trips in the lower Columbia River estuary were expected to have generated less than $0.2 million in economic contributions.

The other coastal inland recreational fisheries generated $14.0 million coastwide in economic contributions. Of this, salmon fisheries generated $5.6 million in coastal economies in 2006, if fishing is similar to the previous year's annual averages. This includes all spring, summer, and fall Chinook as well as hatchery coho fishing allowed in some rivers.

The non-Columbia River coastal inland other marine species (non-salmon) recreational fisheries are estimated to have generated $8.5 million in coastal economies. This includes $2.9 million for

4. There is cross over between these two fisheries' segments. When non-salmon species are caught when salmon is the primary target species, the trip is counted as a salmon trip.

trips where the primary purpose is for steelhead, $0.2 million for sturgeon, and $5.3 million for other marine species trips.

Of all recreational fisheries trips described above, trips to coastal inland areas are estimated to generate 61.8 percent of the economic contributions with the lower Columbia River estuary being 8.9 percent and other inland locations being 52.9 percent (Figure 4). The largest share is from non-Columbia River coastal inland salmon trips, projected to generate 21.0 percent of the economic contributions from recreational fishing. Other significant contributors are trips for lower Columbia River estuary sturgeon (3.2 percent), coast inland other marine (20.1 percent), and Columbia River fall salmon fisheries (3.5 percent).

Figure 3
Recreational Ocean and Inland Fisheries Economic Contributions in 2006

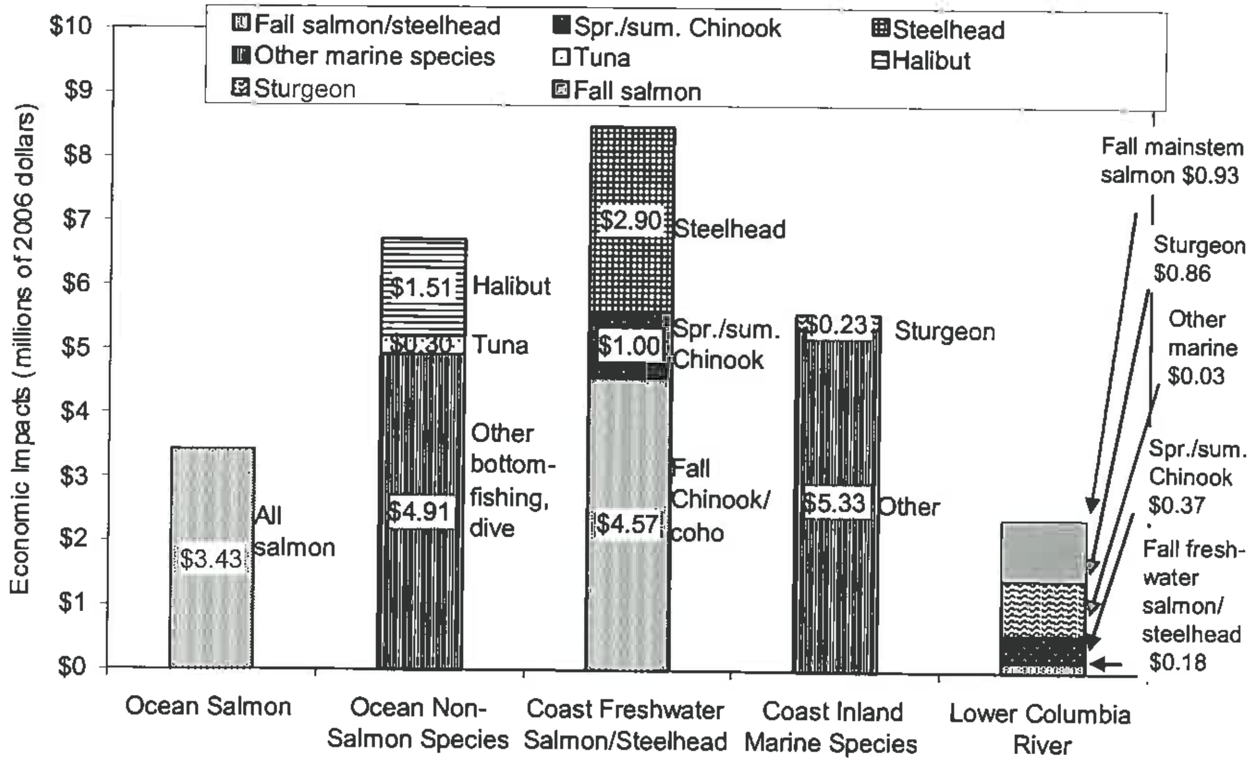
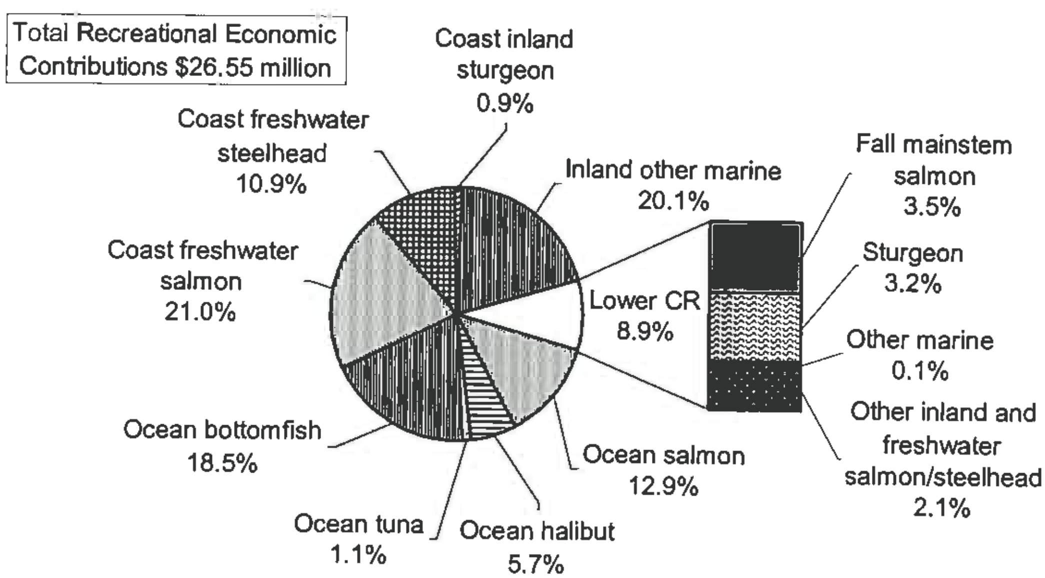
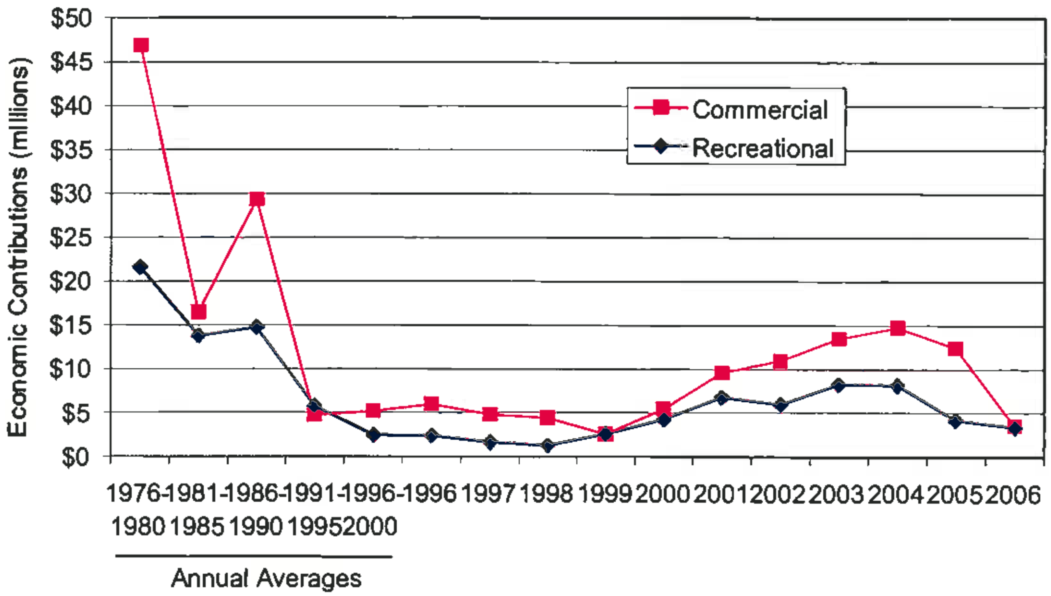


Figure 4
Recreational Ocean and Inland Fisheries Economic Contribution Shares for 2006



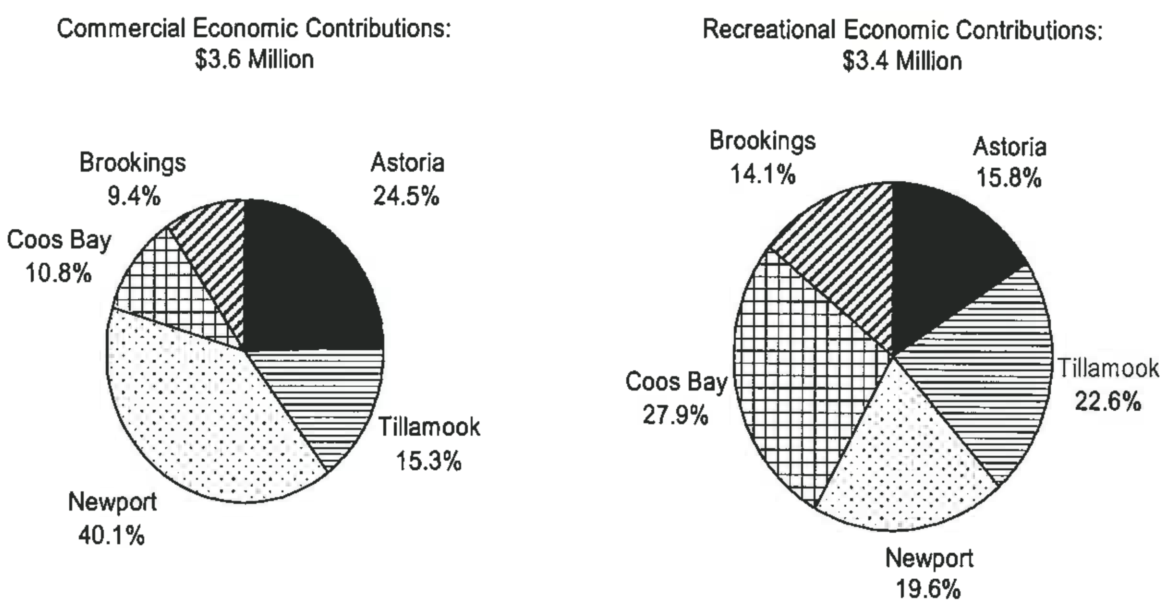
\\Sta6\save (d)\Data\Documents\swd\Salmon preseason Options 2008.doc

Figure 5
Ocean Commercial and Recreational Salmon Fisheries Economic
Contributions for Historical Period Averages and 1976 to 2006



Notes: 1. Expressed as personal income in millions of 2006 dollars adjusted using the GDP Implicit Price Deflator produced by the U.S. Bureau of Economic Analysis.
2. Contributions are at the coastwide level.
3. Contributions exclude Columbia River commercial and recreational fisheries.

Figure 6
Ocean Commercial and Recreational Salmon Fisheries
Economic Contribution Shares by Port Region in 2006



IV. Estimates of Economic Contribution and Ex-vessel Value of Proposed Ocean Salmon 2008 Season

The appendix presents tables for showing the expected economic contribution from ocean salmon fishing at state and port group levels. This is a refinement of information available from the PFMC which is for broad management areas. The disaggregation assumed that commercial and recreational fishing activity experienced over the last five years would be proportionately the same for the upcoming season. This assumption may not be valid because ocean management changed radically during that period and fishing responses to the upcoming season may be different. The following table summarizes the options economic effects at the coastal and state level economies.

Economic Contribution

Average 2003-2007 Troll and Rec
Oregon

Total	Troll	Rec
Coastal (2007 dollars, thousands)		
14,914	9,866	5,048
State (2007 dollars, thousands)		
17,217	11,011	6,206

Options
Oregon

Options	I	II	III
Troll	1,910	628	468
Change	-81%	-94%	-95%
Rec	1,153	727	101
Change	-77%	-86%	-98%
Total	3,063	1,356	569
Change	-79%	-91%	-96%

Ex-vessel Value

Oregon Average 2003-2007
Total (2007 dollars, thousands)
$6,713.4

Troll options ex-vessel value (2007 dollars, thousands)

Options	I	II	III
Oregon	1,285.8	391.7	294.5
Percent change	-81%	-94%	-96%

Notes:
1. Numbers may not add due to rounding.
2. Economic contribution measured by household and individual's personal income at the Oregon Coast economic level. Measurement at the state level will be about a factor 1.2 higher due to leakages from coastal economies and fishing industry spending outside of coastal economies.
3. It is assumed Astoria port group's 5 year average landings/effects represent Oregon's share of North of Falcon; and, Brookings port group's 5 year average landings/effects represents Oregon's share of Humbug to Horse Mountain.

V. Salmon Disaster Declaration Authorizations and Funding Programs

The Department of Commerce can declare a disaster as specified by MSA Section 312(a) and Section 315. Under Section 308(b) and 308(d) of the Interjurisdictional Fisheries Act, commercial fishermen who have suffered uninsured losses will be eligible for financial assistance under programs to be developed in cooperation with their state government agencies.

Section 312(a) of the Magnuson-Stevens Fishery Conservation that apply to actions for disaster declaration.

- Allows the Secretary of Commerce, at the Secretary's discretion or when requested by a Governor or affected fishing community, to determine if a commercial fishery failure occurred.

- The commercial fishery failure must be due to a fishery resource disaster of natural causes, man-made causes beyond the control of fishery managers to mitigate through conservation and management measures, or undetermined causes.

- If a commercial fishery failure due to a fishery resource disaster is determined, assistance requires an appropriation.

- If funds are appropriated, they may be used to assess the economic and social effects of the commercial fishery failure, or for any activity that the Secretary determines is appropriate to restore the fishery or prevent a similar failure in the future and to assist a fishing community affected by such failure.

- Before providing funds, the Secretary must determine that the proposed activity will not expand the size or scope of the commercial fishery failure in that fishery or into another fishery or geographic area.

- The Federal share of the cost of any assistance is limited to 75 percent. The State or fishing community must provide a cost share of at least 25 percent.

- Types of assistance funded under section 312(a) in the past include buybacks of permits or vessels, data collection, cooperative research activities, direct compensation, and training and employment opportunities.

Section 308(d) of the Interjurisdictional Fisheries Act, commercial fishermen who have suffered uninsured losses will be eligible for financial assistance under programs to be developed in cooperation with their state government agencies.

There has been significant federal support for salmon recovery in addition to State and other agency programs for operating hatcheries, protecting habitat, generating hydropower, and improving harvest practices. The Pacific Coastal Salmon Recovery Fund (PCSRF) for coastal and riverine salmon recovery efforts has annual spending of about $90 million. This funding is allocated to federal agencies that annually work towards salmon recovery as well as to assist states, tribes, and local governments that carry out additional salmon projects. Federal agencies contributing to salmon recovery include the U.S. Army Corps of Engineers, and Departments of Interior, Commerce, Agriculture, Energy, and the Environmental Protection Agency. The states and tribes have used PCSRF to protect and restore salmon habitat, conduct watershed assessments to determine factors limiting salmon productivity, develop plans to address limiting factors, develop resource management plans, conduct salmon enhancement and supplementation activities, monitor and evaluate recovery actions and outcomes, and conduct research and monitoring on salmon populations.[5]

5. http://www.nwr.noaa.gov/Salmon-Recovery-Planning/PCSRF/Index.cfm hydropower

Appendix A

Economic Effects at the State, Coast, and Port Group Levels

Economic Contributions of Salmon Fishing in 2008 to Oregon

	Washington							Oregon							California						
Year	NeahBay	LaPush	Westport	Ilwaco	Coastal	PS	State	Astoria	Tillamook	Newport	Coos Bay	Brookings	Coastal	State	Crescent	Eureka	Ft. Bragg	SF	Monterey	Coastal	State
Troll																					
1998	104	0	138	0	242	67	333	0	256	3,376	1,214	234	5,079	6,196	5	113	184	6,036	3,049	9,386	9,850
1999	246	9	324	17	596	308	970	46	143	820	1,544	403	2,957	3,571	17	153	175	16,320	5,306	21,970	22,681
2000	278	2	223	73	576	1	658	570	378	2,193	2,626	507	6,273	7,610	16	99	1,850	16,484	10,178	28,627	30,440
2001	290	0	603	40	934	0	1,010	354	723	5,410	2,842	584	9,912	12,065	14	288	949	9,978	2,111	13,340	13,846
2002	598	78	1,048	175	1,899	0	2,093	1,011	856	4,623	4,087	739	11,316	13,705	251	480	3,421	14,231	3,833	22,216	23,600
2003	1,085	183	895	131	2,294	41	2,660	989	896	5,977	5,434	640	13,936	16,862	202	35	13,886	14,469	2,282	30,875	34,338
2004	798	252	992	97	2,139	25	2,472	833	666	5,897	6,416	1,374	15,186	16,412	1,778	393	6,801	21,367	4,809	35,148	35,887
2005	654	391	1,006	124	2,175	1	2,458	690	1,149	4,911	4,865	1,152	12,767	13,796	133	400	4,957	12,344	6,479	24,312	24,920
2006	486	394	378	254	1,512	33	1,790	902	561	1,474	397	346	3,680	3,948	0	0	2,258	5,839	887	8,984	9,277
2007	215	218	892	111	1,435	19	1,596	266	377	614	1,790	712	3,761	4,037	304	764	3,054	7,383	1,506	13,011	13,242
10-yr Average	475	153	650	102	1,380	50	1,604	566	600	3,530	3,122	669	8,487	9,820	272	272	3,754	12,445	4,044	20,787	21,808
5-yr Average	648	288	833	143	1,911	24	2,195	736	730	3,775	3,781	845	9,866	11,011	483	318	6,191	12,280	3,193	22,466	23,533
Share								7.5%	7.4%	38.3%	38.3%	8.6%	100.0%								
N of Falcon calculated using coastal WA plus Astoria					2,647	27.8%	1.1							1.1							
N of Falcon from preseason II Figure 1 5-yr avg. (2007 doll					3,000	24.5%															
Falcon to Humbug calculated using Tillamook through Coos									8,285												
Falcon to Humbug from preseason II Figure 1 5-yr avg. (2007 dollars)									9,295												
Humbug to Horse calculated using Brookings, Crescent City, and Eureka												1,646	51.3%								
Humbug to Horse from preseason II Figure 1 5-yr avg. (2007 dollars)												1,770	47.7%								
Rec																					
1998	0	28	675	222	925	0	1,219	133	293	114	133	658	1,331	1,781	185	397	668	9,585	4,285	15,120	17,473
1999	409	146	1,660	1,057	3,273	0	4,385	490	554	500	411	759	2,713	3,552	325	701	740	10,802	2,238	14,805	16,721
2000	413	100	1,739	889	3,141	0	4,202	506	588	935	1,320	1,046	4,396	5,742	408	851	2,059	10,645	6,792	20,755	24,625
2001	732	149	5,441	3,447	9,769	0	11,412	1,301	700	1,653	1,386	967	6,008	7,363	329	715	1,931	6,963	2,802	12,740	13,706
2002	622	159	5,012	2,744	8,537	0	9,974	759	994	1,304	1,519	712	5,288	6,509	147	796	2,041	8,747	4,309	16,040	17,224
2003	905	253	5,645	3,656	10,459	0	12,236	1,107	1,150	2,607	1,899	558	7,321	9,006	83	599	1,542	6,327	2,082	10,633	11,389
2004	1,061	225	4,605	3,018	8,908	0	10,444	994	1,250	2,408	1,794	691	7,137	8,789	125	1,004	1,999	10,246	4,037	17,412	18,621
2005	727	227	4,203	2,444	7,601	0	8,901	721	516	818	1,115	461	3,631	4,450	95	635	1,617	7,726	2,933	13,006	13,937
2006	477	200	3,103	1,900	5,680	0	6,648	518	607	643	798	392	2,957	3,634	56	627	1,332	5,229	1,765	9,011	9,708
2007	486	155	3,184	2,483	6,309	0	7,376	727	820	1,246	998	402	4,192	5,153	79	819	1,072	3,677	1,288	6,934	7,532
10-yr Average	583	164	3,527	2,186	6,460	0	7,680	726	747	1,223	1,137	665	4,497	5,598	183	714	1,500	7,995	3,253	13,646	15,094
5-yr Average	731	212	4,148	2,700	7,791	0	9,121	813	869	1,544	1,321	501	5,048	6,206	88	737	1,512	6,641	2,421	11,399	12,237
Share								16.1%	17.2%	30.6%	26.2%	9.9%	100.0%								
N of Falcon calculated using coastal WA plus Astoria					8,605	9.5%															
N of Falcon from preseason II Figure 2 5-yr avg. (2007 doll					10,069	8.1%															
Falcon to Humbug calculated using Tillamook through Coos									3,734												
Falcon to Humbug from preseason II Figure 2 5-yr avg. (2007 dollars)									4,632												
Humbug to Horse calculated using Brookings, Crescent City, and Eureka												1,325	37.8%								
Humbug to Horse from preseason II Figure 2 5-yr avg. (2007 dollars)												1,591	31.5%								

Troll 2008 from Figure 1 (figure data table sent by Jim Seger on April 2, 2008) (thousands)

	I	II	III
North of Falcon	2,417	1,885	1,341
Falcon to Humbug	963	87	78
Humbug to Horse	535	33	33
Horse to Point Arena	425	0	0
South of Point Arena	335	0	0

Rec 2008 from Table 10 in thousands of 2007 dollars

	I	II	III
North of Falcon	2,862	2,216	1,071
Falcon to Humbug	830	518	0
Humbug to Horse	140	0	0
Horse to Point Arena	156	84	84
South of Point Arena	294	0	0

Average 2003-2007 Troll and Rec

Washington

Total	Troll	Rec
Coastal (2007 dollars, thousands)		
9,703	1,911	7,791
State (2007 dollars, thousands)		
11,316	2,195	9,121

Oregon

Total	Troll	Rec
Coastal (2007 dollars, thousands)		
14,914	9,866	5,048
State (2007 dollars, thousands)		
17,217	11,011	6,206

California

Total	Troll	Rec
Coastal (2007 dollars, thousands)		
33,865	22,466	11,399
State (2007 dollars, thousands)		
35,770	23,533	12,237

Options

Washington

Options	I	II	III
Troll	1,745	1,361	968
Change	-9%	-29%	-49%
Rec	2,591	2,007	969
Change	-67%	-74%	-88%
Total	4,336	3,367	1,938
Change	-55%	-65%	-80%

Oregon

Options	I	II	III
Troll	1,910	628	468
Change	-81%	-94%	-95%
Rec	1,153	727	101
Change	-77%	-86%	-98%
Total	3,063	1,356	569
Change	-79%	-91%	-96%

California

Options	I	II	III
Troll	1,020	16	16
Change	-95%	-100%	-100%
Rec	537	84	84
Change	-95%	-99%	-99%
Total	1,557	100	100
Change	-95%	-100%	-100%

Oregon Options by Port Group (2007 dollars, thousands, personal income impacts)

	Astoria	Tillamook	Newport	Coos Bay	Brookings	Coastal
Troll						
Option I	142	141	731	732	164	1,910
Option II	47	46	240	241	54	628
Option III	35	35	179	179	40	468
Rec						
Option I	186	198	353	302	114	1,153
Option II	117	125	223	190	72	727
Option III	16	17	31	26	10	101
Total						
Option I	328	340	1,084	1,034	278	3,063
Option II	164	172	463	431	126	1,356
Option III	51	52	210	206	50	569

Percent change from 5-yr average:

	Astoria	Tillamook	Newport	Coos Bay	Brookings	Coastal
Troll						
Option I	-81%	-81%	-81%	-81%	-81%	-81%
Option II	-94%	-94%	-94%	-94%	-94%	-94%
Option III	-95%	-95%	-95%	-95%	-95%	-95%
Rec						
Option I	-77%	-77%	-77%	-77%	-77%	-77%
Option II	-86%	-86%	-86%	-86%	-86%	-86%
Option III	-98%	-98%	-98%	-98%	-98%	-98%
Total						
Option I	-79%	-79%	-80%	-80%	-79%	-79%
Option II	-89%	-89%	-91%	-92%	-91%	-91%
Option III	-97%	-97%	-96%	-96%	-96%	-96%

Ex-vessel Value of Ocean Troll Salmon Fishing 2008

Pounds (thousands)

Year	Oregon Troll Chinook (Table IV-7) Astoria	Tillamook	Newport	Coos Bay	Brookings	Coastal	Oregon Troll Coho (Table IV-7) Astoria	Tillamook	Newport	Coos Bay	Brookings	Coastal
1998	0.0	66.0	953.0	326.0	52.0	1,397.0	-	-	-	-	-	-
1999	13.0	32.0	194.0	403.0	80.0	722.0	1.0	-	-	-	-	1.0
2000	89.0	97.0	532.0	648.0	114.0	1,480.0	71.0	-	-	-	-	71.0
2001	73.4	222.6	1,672.6	776.1	152.3	2,896.9	49.9	0.5	2.0	-	-	52.4
2002	330.1	274.9	1,441.8	1,223.4	217.6	3,487.8	5.9	4.7	-	-	-	10.7
2003	265.1	244.6	1,634.0	1,352.6	142.1	3,638.4	31.7	11.0	-	-	-	42.7
2004	134.0	113.0	1,121.0	1,214.0	267.0	2,849.0	47.0	22.0	-	-	-	69.0
2005	130.0	214.0	1,034.0	1,054.0	239.0	2,671.0	9.0	11.0	-	-	-	20.0
2006	99.0	67.5	218.1	56.2	45.0	485.8	7.6	5.5	-	-	-	13.1
2007	21.7	36.5	75.8	231.9	98.3	464.3	36.5	34.3	13.5	14.3	2.5	101.1
10-yr Average	115.5	136.8	887.6	728.5	140.7	2,009.2	26.0	8.9	-	-	-	38.1
5-yr Average	130.0	135.1	816.6	781.8	158.3	2,021.7	26.4	16.8	-	-	-	49.2
Share	6.4%	6.7%	40.4%	38.7%	7.8%	100.0%						

Price (real 2007)

Year	Oregon Troll Chinook (Table IV-3) Astoria	Tillamook	Newport	Coos Bay	Brookings	Coastal	Oregon Troll Coho (Table IV-3) Astoria	Tillamook	Newport	Coos Bay	Brookings	Coastal
1998						2.03						0.00
1999						2.37						1.26
2000						2.42						1.27
2001						1.88						0.92
2002						1.77						0.86
2003						2.22						0.96
2004						3.77						1.36
2005						3.36						1.98
2006						5.63						2.98
2007						5.66						1.90

Ex-vessel value (thousands 2007 dollars)

	Oregon Troll Chinook + Coho (Table IV-3) Astoria	Tillamook	Newport	Coos Bay	Brookings	Coastal	Total	WA Non-Indian Troll (Table IV-4) Total	California Troll (Table IV-2) Total
1998	$0.1	$134.3	$1,938.8	$663.2	$105.8	$2,842.1	$2,849.7	$152.5	$3,795.9
1999	$32.1	$75.9	$460.2	$956.0	$189.8	$1,714.0	$1,713.1	$484.2	$9,084.1
2000	$305.2	$234.5	$1,286.0	$1,566.5	$275.6	$3,667.8	$3,665.6	$309.2	$12,331.1
2001	$184.1	$419.3	$3,148.9	$1,460.3	$286.6	$5,499.2	$5,517.6	$447.5	$5,578.1
2002	$589.1	$490.3	$2,550.3	$2,164.1	$384.9	$6,178.7	$6,192.3	$870.3	$8,931.2
2003	$617.8	$552.4	$3,620.4	$2,997.0	$314.8	$8,102.3	$8,122.9	$1,114.7	$13,700.0
2004	$569.1	$456.0	$4,228.2	$4,579.0	$1,007.1	$10,839.4	$10,844.1	$1,295.5	$19,564.2
2005	$454.3	$740.2	$3,471.3	$3,538.5	$802.4	$9,006.6	$9,005.1	$1,365.7	$13,675.5
2006	$579.7	$396.0	$1,226.9	$316.4	$253.3	$2,772.3	$2,772.6	$1,072.8	$5,492.5
2007	$192.5	$271.9	$454.8	$1,339.7	$561.3	$2,820.1	$2,822.2	$952.9	$7,850.0
10-yr Average	$352.4	$377.1	$2,238.6	$1,958.1	$418.1	$5,344.3	$5,350.5	$806.5	$10,000.3
5-yr Average	$482.7	$483.3	$2,600.3	$2,554.1	$587.8	$6,708.2	$6,713.4	$1,160.3	$12,056.4
Share	7.2%	7.2%	38.8%	38.1%	8.8%	100.0%			

Options Table 2008 (Preseason Report II, Table 9) (2007 dollars, thousands ex-vessel value)

Area	I	II	III
North of Falcon	1,540.2	1,207.0	857.5
Falcon to Humbug	721.2	45.1	45.1
Humbug to Horse	265.8	21.6	21.6
Horse to Pt. Arena	253.0	-	-
South of Pt. Arena	198.3	-	-

Percent change from 5 year average

Area	I	II	III
North of Falcon	-8%	-28%	-49%
Falcon to Humbug	-88%	-99%	-99%
Humbug to Horse	-38%	-95%	-95%
Horse to Pt. Arena	-91%	-100%	-100%
South of Pt. Arena	-98%	-100%	-100%

Troll options ex-vessel value (2007 dollars, thousands)

Options	I	II	III
Washington	1,112.0	871.4	619.1
Percent change	-4%	-25%	-47%
Oregon	1,285.8	391.7	294.5
Percent change	-81%	-94%	-96%
California	580.7	10.5	10.5
Percent change	-95%	-100%	-100%

Oregon Troll Options by Port Group (2007 dollars, thousands ex-vessel value)

	Astoria	Tillamook	Newport	Coos Bay	Brookings	Coastal
Option I	92.5	92.6	498.4	489.6	112.7	1,285.8
Option II	28.2	28.2	151.8	149.1	34.3	391.7
Option III	21.2	21.2	114.2	112.1	25.8	294.5

Percent change from 5-yr average

Option I	-81%	-81%	-81%	-81%	-81%	-81%
Option II	-94%	-94%	-94%	-94%	-94%	-94%
Option III	-96%	-96%	-96%	-96%	-96%	-96%

Number of Anglers and Days of Fishing by State in 2006*

	Total Anglers†	Non-Resident Anglers	Total Fishing Days††	Total Non-Resident Fishing Days	Freshwater Anglers	Freshwater Fishing Days	Saltwater Anglers	Saltwater Fishing Days	Great Lakes Anglers	Great Lakes Fishing Days
Alabama	806,000	206,000	13,708,000	1,022,000	714,000	12,987,000	153,000	758,000	-	-
Alaska	293,000	156,000	2,687,000	762,000	191,000	1,826,000	180,000	974,000	-	-
Arizona	422,000	92,000	4,156,000	651,000	422,000	4,156,000	-	-	-	-
Arkansas	655,000	225,000	10,812,000	1,539,000	655,000	10,812,000	-	-	-	-
California	1,730,000	152,000	19,294,000	1,084,000	1,224,000	12,307,000	761,000	7,606,000	-	-
Colorado	660,000	171,000	6,374,000	845,000	660,000	6,374,000	-	-	-	-
Connecticut	302,000	51,000	5,860,000	457,000	204,000	4,354,000	157,000	1,691,000	-	-
Delaware	159,000	94,000	1,821,000	637,000	58,000	1,133,000	117,000	703,000	-	-
Florida	2,767,000	885,000	46,311,000	4,804,000	1,417,000	24,512,000	2,002,000	23,077,000	-	-
Georgia	1,107,000	136,000	17,375,000	1,070,000	1,025,000	15,646,000	146,000	1,707,000	-	-
Hawaii	157,000	65,000	1,471,000	171,000	22,000	67,000	154,000	1,411,000	-	-
Idaho	350,000	144,000	4,301,000	994,000	350,000	4,301,000	-	-	-	-
Illinois	873,000	78,000	16,881,000	723,000	777,000	15,631,000	-	-	56,000	728,000
Indiana	768,000	106,000	9,605,000	753,000	677,000	8,289,000	-	-	46,000	759,000
Iowa	438,000	40,000	6,215,000	152,000	438,000	6,215,000	-	-	-	-
Kansas	404,000	85,000	5,314,000	431,000	404,000	5,314,000	-	-	-	-
Kentucky	721,000	141,000	9,231,000	906,000	721,000	9,231,000	-	-	-	-
Louisiana	702,000	112,000	11,204,000	640,000	549,000	8,743,000	289,000	2,975,000	-	-
Maine	351,000	131,000	4,794,000	990,000	303,000	4,272,000	100,000	703,000	-	-
Maryland	645,000	242,000	8,223,000	2,470,000	364,000	4,799,000	372,000	3,114,000	-	-
Massachusetts	497,000	99,000	7,847,000	588,000	292,000	5,345,000	298,000	3,054,000	-	-
Michigan	1,394,000	318,000	24,822,000	2,290,000	1,192,000	19,677,000	-	-	461,000	6,981,000
Minnesota	1,427,000	319,000	24,832,000	2,077,000	1,381,000	24,041,000	-	-	48,000	272,000
Mississippi	546,000	80,000	7,648,000	514,000	508,000	7,095,000	66,000	590,000	-	-
Missouri	1,076,000	206,000	16,569,000	1,306,000	1,076,000	16,569,000	-	-	-	-
Montana	291,000	119,000	2,927,000	560,000	291,000	2,927,000	-	-	-	-
Nebraska	198,000	29,000	3,096,000	183,000	198,000	3,096,000	-	-	-	-
Nevada	142,000	27,000	1,526,000	90,000	142,000	1,526,000	-	-	-	-
New Hampshire	230,000	122,000	2,947,000	976,000	198,000	2,733,000	47,000	206,000	-	-
New Jersey	654,000	197,000	8,820,000	984,000	243,000	3,646,000	496,000	5,568,000	-	-
New Mexico	248,000	84,000	2,596,000	467,000	248,000	2,596,000	-	-	-	-
New York	1,153,000	221,000	17,060,000	2,100,000	741,000	10,994,000	291,000	3,950,000	247,000	2,060,000
North Carolina	1,263,000	395,000	17,221,000	2,205,000	884,000	13,923,000	519,000	3,434,000	-	-
North Dakota	106,000	-	953,000	-	106,000	953,000	-	-	-	-
Ohio	1,256,000	112,000	16,318,000	1,178,000	962,000	12,827,000	-	-	328,000	2,807,000
Oklahoma	611,000	66,000	10,580,000	737,000	611,000	10,580,000	-	-	-	-
Oregon	576,000	122,000	8,384,000	975,000	491,000	7,053,000	150,000	846,000	-	-
Pennsylvania	994,000	164,000	17,967,000	839,000	914,000	14,456,000	-	-	85,000	598,000
Rhode Island	158,000	82,000	1,745,000	451,000	50,000	541,000	122,000	1,236,000	-	-
South Carolina	810,000	283,000	12,325,000	1,415,000	612,000	10,658,000	325,000	2,174,000	-	-
South Dakota	135,000	45,000	1,697,000	291,000	135,000	1,697,000	-	-	-	-
Tennessee	871,000	214,000	15,103,000	1,882,000	871,000	15,103,000	-	-	-	-
Texas	2,527,000	218,000	41,141,000	2,199,000	1,860,000	27,074,000	1,147,000	15,143,000	-	-
Utah	375,000	87,000	3,822,000	434,000	375,000	3,822,000	-	-	-	-
Vermont	114,000	50,000	1,665,000	265,000	114,000	1,665,000	-	-	-	-
Virginia	858,000	218,000	9,629,000	1,033,000	622,000	6,417,000	352,000	3,313,000	-	-
Washington	736,000	95,000	8,882,000	633,000	538,000	7,524,000	286,000	1,550,000	-	-
West Virginia	376,000	86,000	6,885,000	443,000	376,000	6,885,000	-	-	-	-
Wisconsin	1,394,000	381,000	20,823,000	3,789,000	1,253,000	16,216,000	-	-	235,000	3,705,000
Wyoming	203,000	107,000	1,691,000	446,000	203,000	1,691,000	-	-	-	-
United States	**29,952,000**	**6,494,000**	**470,594,000**	**52,380,000**	**25,035,000**	**419,547,000**	**8,528,000**	**85,780,000**	**1,506,000**	**17,911,000**

* These numbers only report the number of anglers 16 years and older. Detailed data were not available for anglers 6-15 years of age.
† Includes both resident and non-resident anglers
†† Includes both resident and non-resident fishing days
Source: *2006 National Survey of Fishing, Hunting and Wildlife-Associated Recreation*, U.S. Fish and Wildlife Service

Economic Impact of Saltwater Fishing by State in 2006

	Retail Sales	Total Multiplier or Ripple Effect	Salaries, Wages and Business Earnings	Jobs	Federal Tax Revenues	State and Local Tax Revenues
Alabama	$226,709,771	$379,557,412	$106,466,400	3,762	$23,965,155	$20,436,730
Alaska'	$164,401,589	$249,483,820	$76,775,274	2,610	$16,627,636	$18,309,632
California	$1,290,348,917	$2,282,694,375	$736,747,304	19,903	$171,436,569	$160,795,994
Connecticut	$125,139,747	$207,072,810	$70,113,006	1,881	$19,064,910	$13,609,427
Delaware	$61,936,856	$78,930,191	$26,391,724	871	$5,885,383	$6,008,949
Florida	$2,997,500,518	$5,123,992,575	$1,566,389,759	51,588	$378,902,841	$311,265,319
Georgia	$132,577,408	$230,487,962	$64,961,592	2,010	$14,572,990	$12,228,856
Hawaii	$113,511,246	$161,950,005	$52,777,476	1,846	$11,435,096	$11,386,727
Louisiana	$472,092,061	$757,091,876	$210,847,634	7,733	$45,606,182	$49,976,489
Maine	$75,943,868	$102,463,593	$31,725,010	1,192	$7,026,466	$7,105,427
Maryland	$354,266,105	$581,574,245	$201,159,250	5,548	$46,526,261	$44,194,224
Massachusetts	$494,601,468	$823,279,883	$295,488,054	9,279	$74,718,749	$53,711,870
Mississippi''	$63,268,219	$102,347,443	$27,848,813	1,116	$5,831,236	$6,061,288
New Hampshire	$43,307,314	$68,690,766	$22,727,108	661	$5,693,190	$3,725,790
New Jersey	$643,669,836	$1,082,635,831	$356,499,180	9,912	$92,475,157	$68,470,510
New York	$373,610,499	$645,517,434	$220,514,366	6,396	$53,046,226	$49,341,307
North Carolina	$558,870,611	$913,124,494	$267,161,574	9,735	$64,755,879	$58,543,508
Oregon	$153,712,965	$250,235,372	$76,455,153	2,488	$18,146,340	$16,690,968
Rhode Island	$128,699,275	$188,547,745	$60,234,995	2,127	$15,112,308	$12,597,175
South Carolina	$680,636,923	$1,051,707,481	$333,399,436	11,896	$73,094,541	$63,506,134
Texas	$981,292,755	$1,793,001,667	$553,339,043	18,542	$118,914,671	$101,907,407
Virginia	$304,453,074	$494,067,280	$146,503,362	5,541	$35,316,630	$29,071,577
Washington	$344,843,969	$550,035,495	$164,295,418	4,649	$39,066,176	$29,612,899
United States'''	**$11,051,345,543**	**$30,327,313,593**	**$9,407,680,614**	**263,898**	**$2,211,291,290**	**$1,805,857,463**

' The Alaska Department of Fish and Game (ADFG) has expressed concerns regarding the expenditure estimates from the USFWS National Survey. Readers may want to defer to economic statistics produced by the ADFG

'' Small sample size (N = 10 to 30). Use results with caution.

''' Includes impacts from purchases made in inland states for saltwater fishing

Economic Impact of Great Lakes Fishing by State in 2006

	Retail Sales	Total Multiplier or Ripple Effect	Salaries, Wages and Business Earnings	Jobs	Federal Tax Revenues	State and Local Tax Revenues
Illinois''	$93,588,546	$175,073,792	$55,158,425	1,511	$13,127,472	$10,161,746
Indiana''	$224,588,422	$394,866,844	$117,320,804	4,170	$26,196,323	$20,151,842
Michigan	$562,654,437	$1,001,641,460	$312,197,079	8,283	$69,680,705	$58,095,286
Minnesota'	-	-	-	-	-	-
New York	$213,174,041	$369,194,521	$122,146,949	3,288	$29,561,160	$28,067,935
Ohio	$480,481,747	$801,817,327	$248,300,992	9,915	$64,129,803	$52,791,392
Pennsylvania''	$399,342,711	$725,705,398	$213,920,678	5,200	$48,804,352	$36,700,497
Wisconsin	$251,858,468	$418,844,626	$126,595,786	5,011	$28,794,854	$28,430,996
United States'''	**$2,524,266,182**	**$7,089,230,140**	**$2,189,490,038**	**58,291**	**$508,626,377**	**$401,701,070**

' Sample size too small to report (N < 10)

'' Small sample size (N = 10 to 30). Use results with caution

''' Includes impacts from purchases made in inland states for Great Lakes fishing

CLARIFY COUNCIL DIRECTION ON 2008 MANAGEMENT MEASURES (IF NECESSARY)

If the Salmon Technical Team (STT) needs clarification of the tentative management measures before completing its analysis, the STT Chairman will address the Council in this agenda item.

Council Task:

If requested, provide any needed guidance to assist the STT in its analysis of the tentative management measures.

Reference Materials:

None.

Agenda Order:

a. Agenda Item Overview — Chuck Tracy
b. Report of the STT — Dell Simmons
c. Reports and Comments of Advisory Bodies
d. Public Comment
e. Council Guidance and Direction

PFMC
03/19/08

Agenda Item F.2.b
Supplemental STT Report
April 2008

SALMON TECHNICAL TEAM

PRELIMINARY ANALYSIS OF TENTATIVE 2008 OCEAN SALMON FISHERY MANAGEMENT MEASURES

Wedenesday
April 9, 2008

TABLE 1. Commercial troll management measures collated by the STT for non-Indian ocean salmon fisheries, 2008. (Page 1 of 5)
North of Cape Falcon
A. SEASON DESCRIPTIONS
Supplemental Management Information
1. Overall non-Indian TAC: 40,000 Chinook and 25,000 coho marked with a healed adipose fin clip (marked). 2. Trade: none. 3. Non-Indian commercial troll TAC: 20,000 Chinook and 4,000 marked coho.
U.S./Canada Border to Cape Falcon • May 3 through earlier of June 30 or 11,700 Chinook quota. Saturday through Tuesday with a landing and possession limit of 50 Chinook per vessel for each open period north of Leadbetter Point ~~and~~ or 50 Chinook south of Leadbetter Point (C.1). All salmon except coho (C.7). Cape Flattery, Mandatory Yelloweye Rockfish Conservation Area, and Columbia Control Zones closed (C.5). See gear restrictions and definitions (C.2, C.3). Oregon State regulations require that fishers south of Cape Falcon, OR intending to fish within this area notify Oregon Department of Fish and Wildlife before transiting the Cape Falcon, OR line (45º46'00" N. lat.) at the following number: 541-867-0300 Ext. 271. Vessels must land and deliver their fish within 24 hours of any closure of this fishery. Under state law, vessels must report their catch on a state fish receiving ticket. Vessels fishing or in possession of salmon while fishing north of Leadbetter Point must land and deliver their fish within the area and north of Leadbetter Point. Vessels fishing or in possession of salmon while fishing south of Leadbetter Point must land and deliver their fish within the area and south of Leadbetter Point, except that Oregon permitted vessels may also land their fish in Garibaldi, Oregon. Oregon State regulations require all fishers landing salmon into Oregon from any fishery between Leadbetter Point, Washington and Cape Falcon, Oregon must notify ODFW within one hour of delivery or prior to transport away from the port of landing by calling 541-867-0300 Ext. 271. Notification shall include vessel name and number, number of salmon by species, port of landing and location of delivery, and estimated time of delivery. Inseason actions may modify harvest guidelines in later fisheries to achieve or prevent exceeding the overall allowable troll harvest impacts (C.8).
U.S./Canada Border to Cape Falcon • July 1 through earlier of September 16 or 8,300 preseason Chinook guideline (C.8) or a 4,000 marked coho quota (C.8.d). Open July 1-2, then Saturday through Tuesday thereafter. Landing and possession limit of 35 Chinook and 25 coho per vessel per open period north of Leadbetter Point ~~and~~ or 35 Chinook and 25 coho south of Leadbetter Point (C.1). All Salmon except no chum retention north of Cape Alava, Washington in August and September (C.7). All coho must have a healed adipose fin clip (C.8.d). Gear restricted to plugs six inches or longer. See gear restrictions and definitions (C.2, C.3). Cape Flattery, Mandatory Yelloweye Rockfish Conservation Area, and Columbia Control Zones closed (C.5). Oregon State regulations require that fishers south of Cape Falcon, OR intending to fish within this area notify Oregon Department of Fish and Wildlife before transiting the Cape Falcon, OR line (45º46'00" N. lat.) at the following number: 541-867-0300 Ext. 271. Vessels must land and deliver their fish within 24 hours of any closure of this fishery. Under state law, vessels must report their catch on a state fish receiving ticket. Vessels fishing or in possession of salmon while fishing north of Leadbetter Point must land and deliver their fish within the area and north of Leadbetter Point. Vessels fishing or in possession of salmon while fishing south of Leadbetter Point must land and deliver their fish within the area and south of Leadbetter Point, except that Oregon permitted vessels may also land their fish in Garibaldi, Oregon. Oregon State regulations require all fishers landing salmon into Oregon from any fishery between Leadbetter Point, Washington and Cape Falcon, Oregon must notify ODFW within one hour of delivery or prior to transport away from the port of landing by calling 541-867-0300 Ext. 271. Notification shall include vessel name and number, number of salmon by species, port of landing and location of delivery, and estimated time of delivery. Inseason actions may modify harvest guidelines in later fisheries to achieve or prevent exceeding the overall allowable troll harvest impacts (C.8).

TABLE 1. Commercial troll management measures collated by the STT for non-Indian ocean salmon fisheries, 2008.
(Page 2 of 5)

A. SEASON DESCRIPTIONS

South of Cape Falcon

Supplemental Management Information

1. Sacramento Basin recreational fishery allocation: 1,000.
2. Klamath River recreational fishery allocation: 20,500.
3. Klamath tribal allocation: 26,200.

Cape Falcon to Humbug Mt.

- May 1-31.
- June 1 through August 31: closed except for sufficient impacts to conduct experimental genetic stock identification study.

All salmon must be released in good condition after collection of biological samples.

In 2009, the season will open March 15 for all salmon except coho. This opening could be modified following Council review at its March 2009 meeting.

Humbug Mt. to OR/CA Border (Oregon KMZ)

- May 1 through August 31: closed except for sufficient impacts to conduct experimental genetic stock identification study.

All salmon must be released in good condition after collection of biological samples.

In 2009, the season will open March 15 for all salmon except coho, with a 28 inch Chinook minimum size limit. This opening could be modified following Council review at its March 2009 meeting..

OR/CA Border to Humboldt South Jetty (California KMZ)

- May 1 through August 31: closed except for sufficient impacts to conduct experimental genetic stock identification study.

All salmon must be released in good condition after collection of biological samples.

Humboldt South Jetty to Horse Mt.

- May 1 through August 31: closed except for sufficient impacts to conduct experimental genetic stock identification study.All salmon must be released in good condition after collection of biological samples.

Horse Mt. to Point Arena (Fort Bragg)

- May 1 through August 31: closed except for sufficient impacts to conduct experimental genetic stock identification study.All salmon must be released in good condition after collection of biological samples.

Pt. Arena to Pigeon Pt. (San Francisco)

- May 1 through August 31: closed except for sufficient impacts to conduct experimental genetic stock identification study.

All salmon must be released in good condition after collection of biological samples.

Pigeon Pt. to Pt. Sur (Monterey)

- May 1 through August 31: closed except for sufficient impacts to conduct experimental genetic stock identification study.

All salmon must be released in good condition after collection of biological samples.

Pt. Sur to U.S./Mexico Border (Morro Bay)

- May 1 through August 31: closed except for sufficient impacts to conduct experimental genetic stock identification study.All salmon must be released in good condition after collection of biological samples.

TABLE 1. Commercial troll management measures Collated by the STT for non-Indian ocean salmon fisheries, 2008. (Page 3 of 5)

A. SEASON DESCRIPTIONS

B. MINIMUM SIZE (Inches) (See C.1)

	Chinook		Coho		
Area (when open)	Total Length	Head-off	Total Length	Head-off	Pink
North of Cape Falcon	28.0	21.5	16.0	12.0	None
Cape Falcon to OR/CA Border	28.0	21.5	16.0	12.0	
OR/CA Border to Horse Mt.	28.0	21.5	-	-	None
Horse Mt. to U.S./Mexico Border					
Prior to July 1 and after August 31	27.0	20.5	-	-	None
July 1-August 31	28.0	21.5	-	-	None

C. REQUIREMENTS, DEFINITIONS, RESTRICTIONS, OR EXCEPTIONS

C.1. Compliance with Minimum Size or Other Special Restrictions: All salmon on board a vessel must meet the minimum size, landing/possession limit, or other special requirements for the area being fished and the area in which they are landed if the area is open. Salmon may be landed in an area that has been closed more than 96 hours only if they meet the minimum size, landing/possession limit, or other special requirements for the area in which they were caught. Salmon may be landed in an area that has been closed less than 96 hours only if they meet the minimum size, landing/possession limit, or other special requirements for the areas in which they were caught and landed.

States may require fish landing/receiving tickets be kept on board the vessel for 90 days after landing to account for all previous salmon landings.

C.2. Gear Restrictions: Salmon may be taken only by hook and line using barbless hooks.

a. Single point, single shank, barbless hooks are required in all fisheries.
b. Cape Falcon, Oregon, to the OR/CA border: No more than 4 spreads are allowed per line.
c. OR/CA border to U.S./Mexico border: No more than 6 lines are allowed per vessel, and barbless circle hooks are required when fishing with bait by any means other than trolling.

C.3. Gear Definitions:

Trolling defined: Fishing from a boat or floating device that is making way by means of a source of power, other than drifting by means of the prevailing water current or weather conditions.

Troll fishing gear defined: One or more lines that drag hooks behind a moving fishing vessel. In that portion of the fishery management area (FMA) off Oregon and Washington, the line or lines must be affixed to the vessel and must not be intentionally disengaged from the vessel at any time during the fishing operation.

Spread defined: A single leader connected to an individual lure or bait.

Circle hook defined: A hook with a generally circular shape and a point which turns inward, pointing directly to the shank at a 90º angle.

C.4. Transit Through Closed Areas with Salmon on Board: It is unlawful for a vessel to have troll or recreational gear in the water while transiting any area closed to fishing for a certain species of salmon, while possessing that species of salmon; however, fishing for species other than salmon is not prohibited if the area is open for such species, and no salmon are in possession.

TABLE 1. Commercial troll management measures collated by the STT for non-Indian ocean salmon fisheries, 2008. (Page 4 of 5)
C. REQUIREMENTS, DEFINITIONS, RESTRICTIONS, OR EXCEPTIONS (continued)

C.5. Control Zone Definitions:

a. *Cape Flattery Control Zone* - The area from Cape Flattery (48º23'00" N. lat.) to the northern boundary of the U.S. EEZ; and the area from Cape Flattery south to Cape Alava (48º10'00" N. lat.) and east of 125º05'00" W. long.

b. *Mandatory Yelloweye Rockfish Conservation Area* – The area in Washington Marine Catch Area 3 from 48°00.00' N. lat.; 125°14.00' W. long. to 48°02.00' N. lat.; 125°14.00' W. long. to 48°02.00' N. lat.; 125°16.50' W. long. to 48°00.00' N. lat.; 125°16.50' W. long. and connecting back to 48°00.00' N. lat.; 125°14.00' W. long.

c. *Columbia Control Zone* - An area at the Columbia River mouth, bounded on the west by a line running northeast/southwest between the red lighted Buoy #4 (46°13'35" N. lat., 124°06'50" W. long.) and the green lighted Buoy #7 (46°15'09' N. lat., 124°06'16" W. long.); on the east, by the Buoy #10 line which bears north/south at 357° true from the south jetty at 46°14'00" N. lat.,124°03'07" W. long. to its intersection with the north jetty; on the north, by a line running northeast/southwest between the green lighted Buoy #7 to the tip of the north jetty (46°15'48" N. lat., 124°05'20" W. long.), and then along the north jetty to the point of intersection with the Buoy #10 line; and, on the south, by a line running northeast/southwest between the red lighted Buoy #4 and tip of the south jetty (46°14'03" N. lat., 124°04'05" W. long.), and then along the south jetty to the point of intersection with the Buoy #10 line.

d. *Bandon High Spot Control Zone* - The area west of a line between 43º07'00" N. lat.; 124º37'00" W. long. and 42º40'30" N. lat; 124º 52'0" W. long. extending to the western edge of the exclusive economic zone (EEZ).

e. *Klamath Control Zone* - The ocean area at the Klamath River mouth bounded on the north by 41°38'48" N. lat. (approximately six nautical miles north of the Klamath River mouth); on the west, by 124°23'00" W. long. (approximately 12 nautical miles off shore); and on the south, by 41°26'48" N. lat. (approximately six nautical miles south of the Klamath River mouth).

C.6. Notification When Unsafe Conditions Prevent Compliance with Regulations: If prevented by unsafe weather conditions or mechanical problems from meeting special management area landing restrictions, vessels must notify the U.S. Coast Guard and receive acknowledgment of such notification prior to leaving the area. This notification shall include the name of the vessel, port where delivery will be made, approximate amount of salmon (by species) on board, and the estimated time of arrival.

C.7. Incidental Halibut Harvest: During authorized periods, the operator of a vessel that has been issued an incidental halibut harvest license may retain Pacific halibut caught incidentally in Area 2A while trolling for salmon. Halibut retained must be no less than 32 inches in total length, measured from the tip of the lower jaw with the mouth closed to the extreme end of the middle of the tail, and must be landed with the head on. License applications for incidental harvest must be obtained from the International Pacific Halibut Commission (phone: 206-634-1838). Applicants must apply prior to April 1 of each year. Incidental harvest is authorized only during May and June troll seasons and after June 30 if quota remains and if announced on the NMFS hotline (phone: 800-662-9825). ODFW and Washington Department of Fish and Wildlife (WDFW) will monitor landings. If the landings are projected to exceed the 37,707 pound preseason allocation or the total Area 2A non-Indian commercial halibut allocation, NMFS will take inseason action to close the incidental halibut fishery.

Beginning May 1, license holders may land no more than one Pacific halibut per each 2 Chinook, except one Pacific halibut may be landed without meeting the ratio requirement, and no more than 35 halibut may be landed per trip. Pacific halibut retained must be no less than 32 inches in total length (with head on).

A "C-shaped" yelloweye rockfish conservation area is an area to be voluntarily avoided for salmon trolling. NMFS and the Council request salmon trollers voluntarily avoid this area in order to protect yelloweye rockfish. The area is defined in the Pacific Council Halibut Catch Sharing Plan in the North Coast subarea (Washington marine area 3), with the following coordinates in the order listed:

48°18' N. lat.; 125°18' W. long.;
48°18' N. lat.; 124°59' W. long.;
48°11' N. lat.; 124°59' W. long.;
48°11' N. lat.; 125°11' W. long.;
48°04' N. lat.; 125°11' W. long.;
48°04' N. lat.; 124°59' W. long.;
48°00' N. lat.; 124°59' W. long.;
48°00' N. lat.; 125°18' W. long.;
and connecting back to 48°18' N. lat.; 125°18' W. long.

TABLE 1. Commercial troll management measures collated by the STT for non-Indian ocean salmon fisheries, 2008. (Page 5 of 5)
C. REQUIREMENTS, DEFINITIONS, RESTRICTIONS, OR EXCEPTIONS (continued)

C.8. Inseason Management: In addition to standard inseason actions or modifications already noted under the season description, the following inseason guidance is provided to NMFS:

a. Chinook remaining from the May through June non-Indian commercial troll harvest guideline north of Cape Falcon may be transferred to the July through September harvest guideline on a fishery impact equivalent basis.

b. NMFS may transfer fish between the recreational and commercial fisheries north of Cape Falcon if there is agreement among the areas' representatives on the SAS.

c. At the March 2009 meeting, the Council will consider inseason recommendations for special regulations for any experimental fisheries (proposals must meet Council protocol and be received in November 2008).

d. If retention of unmarked coho is permitted in the area from the U.S./Canada border to Cape Falcon, Oregon, by inseason action, the allowable coho quota will be adjusted to ensure preseason projected mortality of critical stocks is not exceeded.

C.9. Consistent with Council management objectives:

a. the State of Oregon may establish additional late-season fisheries in state waters.

b. the State of California may establish limited fisheries in selected state waters.

Check state regulations for details.

C.10. For the purposes of California Department of Fish and Game (CDFG) Code, Section 8232.5, the definition of the KMZ for the ocean salmon season shall be that area from Humbug Mt., Oregon, to Horse Mt., California.

TABLE 2. Recreational management measures collated by the STT for non-Indian ocean salmon fisheries, 2008. (Page 1 of 4)

A. SEASON DESCRIPTIONS

North of Cape Falcon

Supplemental Management Information

1. Overall non-Indian TAC: 40,000 Chinook and 25,000 coho marked with a healed adipose fin clip (marked).
2. Recreational TAC: 20,000 Chinook and 20,350 marked coho; all retained coho must be marked.
3. Trade: none.
4. Area 4B add-on fishery opens upon ocean closure with a quota of 4,000 marked coho and Chinook retention subject to the 950 Chinook guideline in the Neah Bay Subarea (C.5).
5. Buoy 10 fishery opens Aug. 1 with an expected landed catch of 3,500 marked coho in August and September.

U.S./Canada Border to Leadbetter Point

- June 1 through earlier of June 28 or a quota of 8,200 Chinook (C.5).

Tuesday through Saturday north of the Queets River (Neah Bay and La Push Subareas) and Sunday through Thursday south of the Queets River (Westport subarea). Chinook only, one fish per day. Chinook 24-inch total length minimum size limit (B). See gear restrictions (C.2). Inseason management may be used to sustain season length and keep harvest within the overall Chinook recreational TAC for north of Cape Falcon (C.5).

Leadbetter Point to Cape Falcon (Columbia River Subarea)

- June 1 through earlier of June 28 or a subarea guideline of 5,300 Chinook (C.5).

Seven days per week. Chinook only, one fish per day. Chinook 24-inch total length minimum size limit (B). See gear restrictions (C.2). Inseason management may be used to sustain season length and keep harvest within the overall Chinook recreational TAC for north of Cape Falcon (C.5).

U.S./Canada Border to Cape Alava (Neah Bay)

- July 1 through earlier of September 13 or 2,060 marked coho subarea quota with a subarea guideline of 950 Chinook (C.5).

Tuesday through Saturday. All salmon two fish per day, no more than one of which can be a Chinook and no chum retention August 1 through Sept. 13. Chinook 24-inch total length minimum size limit (B). All retained coho must be marked. See gear restrictions (C.2). Closed east of a true north-south line running through Sail Rock in July. Beginning August 1, Chinook non-retention east of the Bonilla-Tatoosh line (C.4.a) during Council managed ocean fishery. Inseason management may be used to sustain season length and keep harvest within the overall Chinook recreational TAC for north of Cape Falcon (C.5).

Cape Alava to Queets River (La Push Subarea)

- July 1 through earlier of September 13 or 540 marked coho subarea quota with a subarea guideline of 350 Chinook (C5).
- September 20 through earlier of October 5 or 50 marked coho quota or 100 Chinook quota (C5): In the area north of 47°50'00 N. lat. and south of 48°00'00" N. lat. (C.6).

Tuesday through Saturday through September 13. All salmon, two fish per day, no more than one of which can be a Chinook. Chinook 24-inch total length minimum size limit (B). All retained coho must be marked. See gear restrictions (C.2). Inseason management may be used to sustain season length and keep harvest within the overall Chinook recreational TAC for north of Cape Falcon (C.5).

Queets River to Leadbetter Point (Westport Subarea)

- June 29 through earlier of September 13 or 7,520 marked coho subarea quota with a subarea guideline of 5,100 Chinook (C.5).

Sunday through Thursday. All salmon, two fish per day, no more than one of which can be a Chinook. Chinook 24-inch total length minimum size limit (B). All retained coho must be marked. See gear restrictions and definitions (C.2, C.3). Grays Harbor Control Zone closed beginning August 1 (C.4.b). Inseason management may be used to sustain season length and keep harvest within the overall Chinook recreational TAC for north of Cape Falcon (C.5).

Leadbetter Point to Cape Falcon (Columbia River Subarea)

- June 29 through earlier of September 30 or 10,180 marked coho subarea quota with any remainder of the 5,300 Chinook subarea guideline from the May-June Chinook directed fishery (C.5).

Sunday through Thursday. All salmon, two fish per day, no more than one of which can be a Chinook. Chinook 24-inch total length minimum size limit (B). All retained coho must be marked. See gear restrictions and definitions (C.2, C.3). Columbia Control Zone closed (C.4.c). Inseason management may be used to sustain season length and keep harvest within the overall Chinook recreational TAC for north of Cape Falcon (C.5).

TABLE 2. Recreational management measures collated by the STT for non-Indian ocean salmon fisheries, 2008. (Page 2 of 4)

A. SEASON DESCRIPTIONS

South of Cape Falcon

Supplemental Management Information

1. Sacramento Basin recreational fishery allocation: 1,000.
2. Klamath River recreational fishery allocation: 20,500.
3. Klamath tribal allocation: 26,200.
4. All retained coho must be marked with a healed adipose fin clip (marked).

Cape Falcon to Humbug Mt.

- May 1 through June 15 (C.6).

Seven days per week. All salmon except coho; one fish per day (C.1). Chinook minimum size limit of 24 inches total length (B). See gear restrictions and definitions (C.2, C.3). Fishing in the Stonewall Bank groundfish conservation area restricted to trolling only on days the all depth recreational halibut fishery is open (see 70 FR 20304, and call the halibut fishing hotline 1-800-662-9825 for additional dates)

In 2009, the season will open March 15 for all salmon except coho, two fish per day (C.1). Chinook minimum size limit of 24 inches total length (B); and the same gear restrictions as in 2008 (C.2, C.3).

Cape Falcon to OR/CA Border

- June 22 through earlier of August 31 or a landed catch of 9,000 marked coho.

Seven days per week. Except as provided below in the Humbug Mt. to OR/CA border fishery for July 4-6 and August 28-31, all salmon except Chinook, two fish per day (C.1). All retained coho must be marked with a healed adipose fin clip. Fishing in the Stonewall Bank groundfish conservation area restricted to trolling only on days the all depth recreational halibut fishery is open (see 70 FR 20304, and call the halibut fishing hotline 1-800-662-9825 for additional dates) (C.3, C.4.d). Open days may be adjusted inseason to utilize the available quota (C.5).

Humbug Mt. to OR/CA Border. (Oregon KMZ)

- May 24-26; July 4-6; August 28-31 (C.6).

Except as provided above in the selective coho fishery, all salmon except coho, two fish per day (C.1). Chinook minimum size limit of 24 inches total length (B). See gear restrictions and definitions (C.2, C.3).

In 2009, the season will open March 15 for all salmon except coho, two fish per day (C.1). Chinook minimum size limit of 24 inches total length (B); and the same gear restrictions as in 2008 (C.2, C.3).

OR/CA Border to Horse Mt. (California KMZ)

- May 24-26; July 4-6; August 28-31 (C.6).

All salmon except coho, two fish per day (C.1). Chinook minimum size limit of 24 inches total length (B). See gear restrictions and definitions (C.2, C.3). Klamath Control Zone closed in August (C.4.e). See California State regulations for additional closures adjacent to the Smith, Klamath, and Eel rivers.

Horse Mt. to Point Arena (Fort Bragg)

- February 16 through March 31;
- May 24-26; July 4-6; August 28-31 (C.6).

All salmon except coho. Two fish per day (C.1). Chinook minimum size limit of 20 inches total length (B). See gear restrictions and definitions (C.2, C.3).

In 2009, season opens February 14 for all salmon except coho, two fish per day (C.1). Chinook minimum size limit of 20 inches total length (B); and the same gear restrictions as in 2008 (C.2, C.3).

Point Arena to Pigeon Point (San Francisco)

- May 24-26; July 4-6; August 28-31 (C.6).

All salmon except coho. Two fish per day (C.1). Chinook minimum size limit of 20 inches total length (B). See gear restrictions and definitions (C.2, C.3).

In 2009, the season will open April 4 for all salmon except coho, two fish per day (C.1). Chinook minimum size limit of 20 inches total length (B); and the same gear restrictions as in 2008 (C.2, C.3).

Pigeon Point to U.S./Mexico Border (Monterey South)

- May 18-26 (C.6).

All salmon except coho. Two fish per day (C.1). Chinook minimum size limit of 20 inches total length (B). See gear restrictions and definitions (C.2, C.3).

In 2009, the season will open April 4 for all salmon except coho, two fish per day (C.1). Chinook minimum size limit of 20 inches total length (B); and the same gear restrictions as in 2008 (C.2, C.3).

TABLE 2. Recreational management measures collated by the STT for non-Indian ocean salmon fisheries, 2008. (Page 3 of 4)

B. MINIMUM SIZE (Inches) (See C.1)

Area (when open)	Chinook	Coho	Pink
North of Cape Falcon	24.0	16.0	None
Cape Falcon to OR/CA Border	24.0	16.0	None
OR/CA Border to Horse Mountain	24.0	-	20.0
Horse Mt. to U.S./Mexico Border	20.0	-	20.0

C. REQUIREMENTS, DEFINITIONS, RESTRICTIONS, OR EXCEPTIONS

C.1. Compliance with Minimum Size and Other Special Restrictions: All salmon on board a vessel must meet the minimum size or other special requirements for the area being fished and the area in which they are landed if that area is open. Salmon may be landed in an area that is closed only if they meet the minimum size or other special requirements for the area in which they were caught.

Ocean Boat Limits: Off the coast of Washington, Oregon, and California, each fisher aboard a vessel may continue to use angling gear until the combined daily limits of salmon for all licensed and juvenile anglers aboard has been attained (additional state restrictions may apply).

C.2. Gear Restrictions: Salmon may be taken only by hook and line using barbless hooks. All persons fishing for salmon, and all persons fishing from a boat with salmon on board, must meet the gear restrictions listed below for specific areas or seasons.

a. U.S./Canada Border to Point Conception, California: No more than one rod may be used per angler; and no more than two single point, single shank barbless hooks are required for all fishing gear. [Note: ODFW regulations in the state-water fishery off Tillamook Bay may allow the use of barbed hooks to be consistent with inside regulations.]

b. Cape Falcon, Oregon, to Point Conception, California: Anglers must use no more than two single point, single shank, barbless hooks.

c. Horse Mt., California, to Point Conception, California: Single point, single shank, barbless circle hooks (below) are required when fishing with bait by any means other than trolling, and no more than two such hooks shall be used. When angling with two hooks, the distance between the hooks must not exceed five inches when measured from the top of the eye of the top hook to the inner base of the curve of the lower hook, and both hooks must be permanently tied in place (hard tied). Circle hooks are not required when artificial lures are used without bait.

C.3. Gear Definitions:

a. *Recreational fishing gear defined*: Angling tackle consisting of a line with no more than one artificial lure or natural bait attached. Off Oregon and Washington, the line must be attached to a rod and reel held by hand or closely attended; the rod and reel must be held by hand while playing a hooked fish. No person may use more than one rod and line while fishing off Oregon or Washington. Off California, the line must be attached to a rod and reel held by hand or closely attended. Weights directly attached to a line may not exceed four pounds (1.8 kg). While fishing off California north of Point Conception, no person fishing for salmon, and no person fishing from a boat with salmon on board, may use more than one rod and line. Fishing includes any activity which can reasonably be expected to result in the catching, taking, or harvesting of fish.

b. *Trolling defined*: Angling from a boat or floating device that is making way by means of a source of power, other than drifting by means of the prevailing water current or weather conditions.

c. Circle hook defined: A hook with a generally circular shape and a point which turns inward, pointing directly to the shank at a 90° angle.

TABLE 2. Recreational management measures collated by the STT for non-Indian ocean salmon fisheries, 2008. (Page 4 of 4)
C. REQUIREMENTS, DEFINITIONS, RESTRICTIONS, OR EXCEPTIONS (continued)

C.4. Control Zone Definitions:

a. *The Bonilla-Tatoosh Line*: A line running from the western end of Cape Flattery to Tatoosh Island Lighthouse (48°23'30" N. lat., 124°44'12" W. long.) to the buoy adjacent to Duntze Rock (48°28'00" N. lat., 124°45'00" W. long.), then in a straight line to Bonilla Point (48°35'30" N. lat., 124°43'00" W. long.) on Vancouver Island, British Columbia.

b. *Grays Harbor Control Zone* - The area defined by a line drawn from the Westport Lighthouse (46° 53'18" N. lat., 124° 07'01" W. long.) to Buoy #2 (46° 52'42" N. lat., 124°12'42" W. long.) to Buoy #3 (46° 55'00" N. lat., 124°14'48" W. long.) to the Grays Harbor north jetty (46° 36'00" N. lat., 124°10'51" W. long.).

c. *Columbia Control Zone*: An area at the Columbia River mouth, bounded on the west by a line running northeast/southwest between the red lighted Buoy #4 (46°13'35" N. lat., 124°06'50" W. long.) and the green lighted Buoy #7 (46°15'09' N. lat., 124°06'16" W. long.); on the east, by the Buoy #10 line which bears north/south at 357° true from the south jetty at 46°14'00" N. lat., 124°03'07" W. long. to its intersection with the north jetty; on the north, by a line running northeast/southwest between the green lighted Buoy #7 to the tip of the north jetty (46°15'48" N. lat., 124°05'20" W. long. and then along the north jetty to the point of intersection with the Buoy #10 line; and on the south, by a line running northeast/southwest between the red lighted Buoy #4 and tip of the south jetty (46°14'03" N. lat., 124°04'05" W. long.), and then along the south jetty to the point of intersection with the Buoy #10 line.

d. *Stonewall Bank Groundfish Conservation Area*: The area defined by the following coordinates in the order listed:
44°37.46' N. lat.; 124°24.92' W. long.;
44°37.46' N. lat.; 124°23.63' W. long.;
44°28.71' N. lat.; 124°21.80' W. long.;
44°28.71' N. lat.; 124°24.10' W. long.;
44°31.42' N. lat.; 124°25.47' W. long.;
and connecting back to 44°37.46' N. lat.; 124°24.92' W. long.

e. *Klamath Control Zone*: The ocean area at the Klamath River mouth bounded on the north by 41°38'48" N. lat. (approximately six nautical miles north of the Klamath River mouth); on the west, by 124°23'00" W. long. (approximately 12 nautical miles off shore); and, on the south, by 41°26'48" N. lat. (approximately 6 nautical miles south of the Klamath River mouth).

C.5. Inseason Management: Regulatory modifications may become necessary inseason to meet preseason management objectives such as quotas, harvest guidelines, and season duration. In addition to standard inseason actions or modifications already noted under the season description, the following inseason guidance is provided to NMFS:

a. Actions could include modifications to bag limits, or days open to fishing, and extensions or reductions in areas open to fishing.

b. Coho may be transferred inseason among recreational subareas north of Cape Falcon on an impact neutral basis to help meet the recreational season duration objectives (for each subarea) after conferring with representatives of the affected ports and the Council's SAS recreational representatives north of Cape Falcon.

c. Chinook and coho may be transferred between the recreational and commercial fisheries north of Cape Falcon on an impact neutral basis if there is agreement among the representatives of the SAS.

d. If retention of unmarked coho is permitted in the area from the U.S./Canada border to Cape Falcon, Oregon, by inseason action, the allowable coho quota will be adjusted to ensure preseason projected mortality of critical stocks is not exceeded.

C.6. Additional Seasons in State Territorial Waters: Consistent with Council management objectives, the States of Washington and Oregon, and California may establish limited seasons in state waters. Oregon State-water fisheries are limited to Chinook salmon. Check state regulations for details.

TABLE 3. Treaty Indian ocean troll management measures collated by the STT for ocean salmon fisheries, 2008.
(Page 1 of 1)

A. SEASON DESCRIPTIONS

Supplemental Management Information

1. Overall Treaty-Indian TAC: 37,500 Chinook and 20,000 coho.

U.S./Canada Border to Cape Falcon

• May 1 through the earlier of June 30 or 20,000 Chinook quota.
All salmon except coho. If the Chinook quota for the May-June fishery is not fully utilized, the excess fish cannot be transferred into the later all-salmon season. If the Chinook quota is exceeded, the excess will be deducted from the later all-salmon season. See size limit (B) and other restrictions (C).

• July 1 through the earlier of September 15, or 17,500 preseason Chinook quota, or 20,000 coho quota.
All Salmon. See size limit (B) and other restrictions (C).

B. MINIMUM SIZE (Inches)

	Chinook		Coho		
Area (when open)	Total Length	Head-off	Total Length	Head-off	Pink
North of Cape Falcon	24.0	18.0	16.0	12.0	None

C. REQUIREMENTS, DEFINITIONS, RESTRICTIONS, OR EXCEPTIONS

C.1. Tribe and Area Boundaries. All boundaries may be changed to include such other areas as may hereafter be authorized by a Federal court for that tribe's treaty fishery.

S'KLALLAM - Washington State Statistical Area 4B (All).

MAKAH - Washington State Statistical Area 4B and that portion of the FMA north of 48°02'15" N. lat. (Norwegian Memorial) and east of 125°44'00" W. long.

QUILEUTE - That portion of the FMA between 48°07'36" N. lat. (Sand Pt.) and 47°31'42" N. lat. (Queets River) and east of 125°44'00" W. long.

HOH - That portion of the FMA between 47°54'18" N. lat. (Quillayute River) and 47°21'00" N. lat. (Quinault River) and east of 125°44'00" W. long.

QUINAULT - That portion of the FMA between 47°40'06" N. lat. (Destruction Island) and 46°53'18"N. lat. (Point Chehalis) and east of 125°44'00" W. long.

C.2. Gear restrictions
a. Single point, single shank, barbless hooks are required in all fisheries.
b. No more than 8 fixed lines per boat.
c. No more than four hand held lines per person in the Makah area fishery (Washington State Statistical Area 4B and that portion of the FMA north of 48°02'15" N. lat. (Norwegian Memorial) and east of 125°44'00" W. long.)

C.3. Quotas
a. The quotas include troll catches by the S'Klallam and Makah tribes in Washington State Statistical Area 4B from May 1 through September 15.
b. The Quileute Tribe will continue a ceremonial and subsistence fishery during the time frame of September 15 through October 15 in the same manner as in 2004, 2005, 2006, and 2007. Fish taken during this fishery are to be counted against treaty troll quotas established for the 2008 season (estimated harvest during the October ceremonial and subsistence fishery: 100 Chinook; 200 coho).

C.4. Area Closures
a. The area within a six nautical mile radius of the mouths of the Queets River (47°31'42" N. lat.) and the Hoh River (47°45'12" N. lat.) will be closed to commercial fishing.
b. A closure within two nautical miles of the mouth of the Quinault River (47°21'00" N. lat.) may be enacted by the Quinault Nation and/or the State of Washington and will not adversely affect the Secretary of Commerce's management regime.

TABLE 5. Projected key stock escapements (thousands of fish) or management criteria for 2008 ocean fishery management measures collated by the STT. [a] (Page 1 of 3)

Key Stock/Criteria	Projected Ocean Escapement[b] or Other Criteria (Council Area Fisheries)	Spawner Objective or Other Comparative Standard as Noted	
		CHINOOK	
COLUMBIA RIVER:			
Columbia Upriver Brights	165.9	57.3	Minimum ocean escapement to attain 46.0 adults over McNary Dam, with normal distribution and no mainstem harvest.
Mid-Columbia Brights	55.1	16.6	Minimum ocean escapement to attain 5.75 adults for Bonneville Hatchery and 2.0 for Little White Salmon Hatchery egg-take, assuming average conversion and no mainstem harvest.
Columbia Lower River Hatchery Tules	55.4	31.1	Minimum ocean escapement to attain 14.1 adults for hatchery egg-take, with average conversion and no lower river mainstem or tributary harvest.
Columbia Lower River Natural Tules[c] (threatened)	36.2%	≤ 41.0%	ESA guidance met by a total adult equivalent fishery exploitation rate on Coweeman tules (NMFS ESA consultation standard).
Columbia Lower River Wild	8.9%	≤ 10.0%	AEQ exploitatio rate limit in southern U.S. fisheries (WDFW objective).
(threatened)	**3.8**	5.7	MSY spawner goal for N. Lewis River fall Chinook (NMFS ESA consultation standard).
Spring Creek Hatchery Tules	86.2	11.1	Minimum ocean escapement to attain 7.0 adults for Spring Creek Hatchery egg-take, assuming average conversion and no mainstem harvest.
Snake River Fall (threatened) SRFI	48.0%	≤ 70.0%	Of 1988-1993 base period exploitation rate for all ocean fisheries (NMFS ESA consultation standard).
CALIFORNIA:			
Klamath River Fall	40.7[e]	40.7	Minimum number of adult spawners to natural spawning areas. 2008 Council guidance.
Federally recognized tribal harvest	50.0%	50.0%	Equals 26.5 (thousand) adult fish for Yurok and Hoopa tribal fisheries.
Spawner Reduction Rate	47.1%	≤ 66.7%	Equals 36.2 (thousand) fewer natural dult spawners due to fishing.
Adult river mouth return	112.6	NA	
Age 4 ocean harvest rate	3.5%	≤ 16.0%	NMFS ESA consultation standard for threatened California coastal chinook.
KMZ sport fishery share	13.8%		No Council guidance for 2008.
CA:OR troll fishery share	63:37	50:50	2006 KFMC recommendation, no guidance for 2008.
River recreational fishery share	76.3%	≥ 15%	2008 Council Guidance. Equals 20.2 (thousand) adult fish for recreational inriver fisheries.
Sacramento River Winter (endangered)	Met	Recreational seasons: Point Arena to Pigeon Point between the first Saturday in April and the second Sunday in November; Pigeon Point to the U.S./Mexico Border between the first Saturday in April and the first Sunday in October. Minimum size limit ≥ 20 inches total length. Commercial seasons: Point Arena to the U.S./Mexico border between May 1 and September 30, except Point Reyes to Point San Pedro between October 1 and15. Minimum size limit ≥ 26 inches total length. (NMFS ESA consultation standard).	
Sacramento River Fall	**53.7**	122.0-180.0	FMP objective for Sacramento River fall natural and hatchery adult spawners.
Ocean commercial impacts	5.7		Includes fall (Sept-Dec) 2007 impacts of 3.1 SRFC.
Ocean recreational impacts	1.5		Includes fall 2007 (0.9 SRFC) and Feb-Mar 2008 Fort Bragg (0.01 SRFC) fishery impacts.
River recreational impacts	1.7		Include impacts from catch & release fishery and 1.0 (thousand) SRFC adult harvest.
Hatchery spawner goal	7.1	7.0	Coleman Hatchery: number of adults to achieve egg take goal.
	3.1	5.0	Feather River Hatchery: number of adults to achieve egg take goal.
	2.8	4.0	Nimbus Hatchery: number of adults to achieve egg take goal.

TABLE 5. Projected key stock escapements (thousands of fish) or management criteria for 2008 ocean fishery management measures collated by the STT. [a/] (Page 3 of 3)

Key Stock/Criteria	Projected Ocean Escapement[b/] or Other Criteria (Council Area Fisheries)		Spawner Objective or Other Comparative Standard as Noted
			COHO
Interior Fraser (Thompson River)	8.3%(2.9%)	≤ 10.0%	Total exploitation rate for all U.S. fisheries south of the U.S./Canada border based on 2002 PSC coho agreement.
Skagit	30.4%(2.9%)	≤ 35.0%	2008 total exploitation rate ceiling based on 2002 PSC coho agreement[c/]
	51.4	30.0	MSP level of adult spawners Identified in FMP.
Stillaguamish	37.8%(2.1%)	≤ 50.0%	2008 total exploitation rate ceiling based on 2002 PSC coho agreement[c/]
	25.5	17.0	MSP level of adult spawners Identified in FMP.
Snohomish	34.5%(2.1%)	≤ 40.0%	2008 total exploitation rate ceiling based on 2002 PSC coho agreement[c/]
	79.6	70.0	MSP level of adult spawners Identified in FMP.
Hood Canal	**46.0%**(3.0%)	≤ 45.0%	2008 total exploitation rate ceiling based on 2002 PSC coho agreement[c/]
	21.2	21.5	MSP level of adult spawners Identified in FMP.
Strait of Juan de Fuca	11.0%(2.1%)	≤ 40.0%	2008 total exploitation rate ceiling based on 2002 PSC coho agreement[c/]
	22.0	12.8	MSP level of adult spawners Identified in FMP.
Quillayute Fall	10.0	6.3-15.8	
Hoh	3.9	2.0-5.0	FMP objective MSY adult spawner range (not annual target). Annual management objectives may
Queets Wild	8.9	5.8-14.5	be different and are subject to agreement between WDFW and the Washington coastal treaty tribes
Grays Harbor	41.4	35.4	under U.S. District Court orders.
Lower Columbia River Natural (threatened)	**6.2%**	≤ 8.0%	Council area marine and mainstem Columbia River fishery exploitation rate (NMFS ESA consultation standard). Value depicted is ocean fishery exploitation rate only.
Upper Columbia	≥ 50%	≥ 50%	Minimum percentage of the run to Bonneville Dam.
Columbia River Hatchery Early	92.1	38.7	Minimum ocean escapement to attain hatchery egg-take goal of 16.0 early adult coho, with average conversion and no mainstem or tributary fisheries.
Columbia River Hatchery Late	67.9	15.2	Minimum ocean escapement to attain hatchery egg-take goal of 9.7 late adult coho, with average conversion and no mainstem or tributary fisheries.
Oregon Coastal Natural	7.9%	≤ 8.0%	Marine and freshwater fishery exploitation rate.
Northern California (threatened)	3.5%	≤ 13.0%	Marine fishery exploitation rate for R/K hatchery coho (NMFS ESA consultation standard).

a/ Projections for coho assume fishery harvest rate scalar values derived from the 2007 post-season Coho FRAM, which employs post-season observed fishery impact levels and 2007 pre-season abundance forecasts. Assumptions for Canadian and Southeast Alaska chinook fisheries operating under aggregate abundance based management regimes are based on allowable catch levels determined under the 1999 PST chinook agreement and the 2008 calibration of the PSC Chinook Model. The allowable catch levels are for an Alaska all-gear catch of 170,000, a Northern BC troll and Queen Charolette Islands catch of 124,800, and a WCVI troll and outside sport catch of 162,600.

b/ Ocean escapement is the number of salmon escaping ocean fisheries and entering freshwater with the following clarifications. Ocean escapement for Puget Sound stocks is the estimated number of salmon entering Area 4B that are available to U.S. net fisheries in Puget Sound and spawner escapement after impacts from the Canadian, U.S. ocean, and Puget Sound troll and recreational fisheries have been deducted. Numbers in parentheses represent Council area exploitation rates for Puget sound coho stocks. For Columbia River early and late coho stocks, ocean escapement represents the number of coho after the Buoy 10 fishery. Exploitation rates for OCN coho include impacts of freshwater fisheries.

c/ Annual management objectives may be different than FMP goals, and are subject to agreement between WDFW and the treaty tribes under U.S. District Court orders. Total exploitation rate includes Alaskan, Canadian, Council area, Puget Sound, and freshwater fisheries and is calculated as total fishing mortality divided by total fishing mortality plus spawning escapement.

d/ Includes minor contributions from East Fork Lewis River and Sandy River.

e/ If the management expectation was for 35.0 (thousand) natural area spawners, the tribal harvest would be 30.7 and river recreational harvest would be 24.4 (thousands).

TABLE 7. Expected coastwide lower Columbia Natural (LCN) Oregon coastal natural (OCN) and Rogue/Klamath (RK) coho, and Lower Columbia River (LCR) natural tule Chinook exploitation rates by fishery for 2008 ocean fisheries management measures collated by the STT. (Page 1 of 1)

	Exploitation Rate (Percent)			
Fishery	LCN	OCN	RK	LCR Tule
SOUTHEAST ALASKA	0.0%	0.0%	0.0%	2.1%
BRITISH COLUMBIA	0.1%	0.4%	0.2%	16.4%
PUGET SOUND/STRAIT	0.1%	0.2%	0.0%	0.4%
NORTH OF CAPE FALCON				
Treaty Indian Ocean Troll	1.5%	1.0%	0.0%	4.2%
Recreational	2.5%	0.7%	0.0%	2.5%
Non-Indian Troll	0.9%	0.4%	0.0%	3.0%
SOUTH OF CAPE FALCON				
Recreational:	1.1%			
Cape Falcon to Humbug Mt.		2.5%	0.2%	0.0%
Humbug Mt. OR/CA border (KMZ)		0.3%	0.5%	
OR/CA border to Horse Mt. (KMZ)		0.1%	0.5%	
Fort Bragg		0.1%	0.2%	
South of Pt. Arena		0.1%	0.1%	
Troll:	0.1%			
Cape Falcon to Humbug Mt.		0.1%	0.0%	0.6%
Humbug Mt. OR/CA border (KMZ)		0.1%	0.1%	
OR/CA border to Horse Mt. (KMZ)		0.3%	0.9%	
Fort Bragg		0.2%	0.4%	
South of Pt. Arena		0.1%	0.0%	
BUOY 10	0.6%	0.1%	0.0%	7.1%
ESTUARY/FRESHWATER	NA	1.2%	0.3%	
TOTAL	6.2%[a/]	7.9%	3.5%	36.2%

a/ Total does not include Southeast Alaska, British Columbia, Puget Sound/Strait of Juan de Fuca, or Buoy 10 fisheries for

TABLE 8. Sacramento River fall Chinook ocean impacts by fishery. Sacramento River fall Chinook impacts were estimated for the fall of 2007 and projected for the proposed fishing seasons. The impacts are displayed by fishery, port area, and month.

Commercial

Option I

Port	Fall '07		Summer '08					Summer	Year
Area	Sep	Oct	Apr	May	Jun	Jul	Aug	Total	Total
NO	0	0	-	720	32	28	24	804	804
CO	0	0	-	230	31	24	19	304	304
KO	0	0	-	26	20	29	18	93	93
KC	712	-	-	8	9	28	9	54	766
FB	-	-	-	55	34	34	38	161	161
SF	1,906	394	-	134	113	117	150	514	2,814
MO	100	-	-	157	158	143	175	633	733
Total	2,718	394	0	1,331	397	402	433	2,563	5,675

Recreational

Option I

Port	Fall '07			Summer '08							Summer	Year
Area	Sep	Oct	Nov	Feb	Mar	Apr	May	Jun	Jul	Aug	Total	Total
NO	0	0	-	-	-	-	1	2	7	6	16	16
CO	0	0	0	-	-	-	1	7	13	6	27	27
KO	0	0	-	-	-	-	4	2	18	11	35	35
KC	0	0	-	-	-	-	17	-	20	11	48	48
FB	0	0	0	4	8	-	9	-	32	16	69	69
SF	286	334	224	-	-	-	51	-	158	91	300	1,144
MO	92	0	0	-	-	-	83	-	-	-	83	175
Total	378	334	224	4	8	0	166	11	248	141	578	1,514

Agenda Item F.2.c
Supplemental SAS Report
April 2008

SALMON ADVISORY SUBPANEL REPORT ON RECREATIONAL MANAGEMENT MEASURES PROPOSED BY THE SAS FOR NON-INDIAN OCEAN FISHERIES, 2008

After receiving guidance from the Council the following changes have been made to Agenda Item F.1.i. This new proposal transfers fishing opportunity (and Sacramento River fall Chinook (SRFC) impacts) from the Fort Bragg, San Francisco, and Monterey areas to the Oregon and California Klamath Management Zone. Based on the impact table in Preseason Report II, the net effect will reduce impacts on SRFC, and should provide additional harvest of Klamath and other less critical stocks in ocean recreational fisheries.

A. SEASON DESCRIPTIONS
South of Cape Falcon
Supplemental Management Information
Humbug Mt. to OR/CA Border. (Oregon KMZ) • May 24-26; July 4-6; August 16-31 (C.6). Except as provided above in the selective coho fishery, all salmon except coho, two fish per day (C.1). Chinook minimum size limit of 24 inches total length (B). See gear restrictions and definitions (C.2, C.3). In 2009, the season will open March 15 for all salmon except coho, two fish per day (C.1). Chinook minimum size limit of 24 inches total length (B); and the same gear restrictions as in 2008 (C.2, C.3).
OR/CA Border to Horse Mt. (California KMZ) • May 24-26; July 4-6; August 16-31 (C.6). All salmon except coho, two fish per day (C.1). Chinook minimum size limit of 24 inches total length (B). See gear restrictions and definitions (C.2, C.3). Klamath Control Zone closed in August (C.4.e). See California State regulations for additional closures adjacent to the Smith, Klamath, and Eel rivers.
Horse Mt. to Point Arena (Fort Bragg) • February 16 through March 31; • July 4-6 (C.6). All salmon except coho. Two fish per day (C.1). Chinook minimum size limit of 20 inches total length (B). See gear restrictions and definitions (C.2, C.3). In 2009, season opens April 18 for all salmon except coho, two fish per day (C.1). Chinook minimum size limit of 20 inches total length (B); and the same gear restrictions as in 2008 (C.2, C.3).
Point Arena to Pigeon Point (San Francisco) • July 4-6 (C.6). All salmon except coho. Two fish per day (C.1). Chinook minimum size limit of 20 inches total length (B). See gear restrictions and definitions (C.2, C.3). In 2009, the season will open April 18 for all salmon except coho, two fish per day (C.1). Chinook minimum size limit of 20 inches total length (B); and the same gear restrictions as in 2008 (C.2, C.3).
Pigeon Point to U.S./Mexico Border (Monterey South) • May 24-26 (C.6). All salmon except coho. Two fish per day (C.1). Chinook minimum size limit of 20 inches total length (B). See gear restrictions and definitions (C.2, C.3). In 2009, the season will open April 18 for all salmon except coho, two fish per day (C.1). Chinook minimum size limit of 20 inches total length (B); and the same gear restrictions as in 2008 (C.2, C.3).

PFMC
04/09/08

PACIFIC SALMON COMMISSION (PSC) CODED-WIRE TAG WORKING GROUP REPORT

The Pacific Salmon Commission (PSC) established a coded-wire tag (CWT) Working Group to develop recommendations for an action plan to correct deficiencies in data collection and reporting throughout the CWT system and to improve analysis of CWT recovery data. The Working Group reviewed the past performance of the coastwide CWT program, assessed its current status, and developed guidelines to improve the statistical basis for the future program.

The CWT Working Group identified tasks that would address the CWT-related recommendations of the PSC's CWT Expert Panel Report, which was presented to the Council in March, 2006. The highest priority was to be placed on those tasks that need immediate action. Accordingly, the initial emphasis was to identify options to address current deficiencies in the CWT program, which were identified in the first four recommendations of the CWT Expert Panel:

RECOMMENDATION 1 – Substantial improvements must be made in the CWT system to insure that the quality and reliability of collected data are consistent with the increasing demands being placed on these data by fishery managers. Areas requiring attention include quality control/quality assurance, and various sampling design issues including expansion of catch and escapement sampling in areas where little or no sampling currently takes place.

RECOMMENDATION 2 – Explicit criteria should be developed for the precision of statistics to be estimated from CWT recovery data. New guidelines for CWT release group sizes and fishery and escapement sampling rates should be based on these explicit criteria.

RECOMMENDATION 3 – We recommend that the utility of a decision-theoretic approach, intergrading cost, benefits, and risk into a formal evaluation structure be investigated as a means of prioritizing potential improvements (e.g., measures to improve CWT data – reporting, sample design, and protocol) to the CWT system. The approach should identify the release group sizes and recovery programs required to meet the statistical criteria for CWT recovery data. Sampling programs should include all fisheries, hatcheries, and spawning ground areas where CWT exploitation rate indicator stocks are present.

RECOMMENDATION 4 – We recommend completion of a comprehensive survey and statistical analysis of all relevant published and unpublished CWT studies that concerns the correspondence between exploitation patterns and rates for hatchery indicator stocks as compared to their natural counterparts. This review should also include new analysis of relevant agency-collected data that have not yet been previously subject to analysis. Recommendations for additional studies should be made if they are judged necessary.

Dr. Marianna Alexandersdottir, biometrician for the Northwest Indian Fisheries Commission, chaired the Working Group, and will provide a summary of the Working Group's action plan.

<u>Council Task</u>:

Receive information and discuss implications.

<u>Reference Materials</u>:

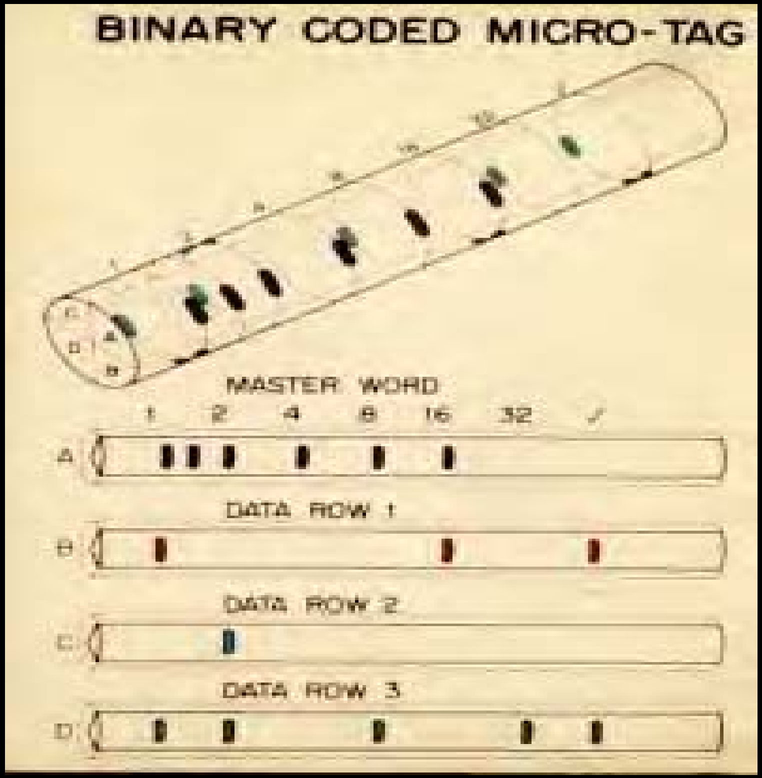
1. Agenda Item F.3.b, Supplemental PSC Report: An Action Plan in Response to Coded-wire tag (CWT) Expert Panel Recommendations: Executive Summary.

<u>Agenda Order</u>:

a.	Agenda Item Overview	Chuck Tracy
b.	PSC Report	Marianna Alexandersdottir
c.	Agency and Tribal Comments	
d.	Reports and Comments of Advisory Bodies	
e.	Public Comment	
f.	Council Discussion	

PFMC
03/21/08

CWT Workgroup Report



April 9, 2008

Marianna Alexandersdottir

CWT Workgroup Report

- Background
  - Importance of CWTs to Pacific Salmon Commission
  - Expert Panel Report
- What is the CWT Workgroup and report?
- How we approached our task.
- What were our recommendations?

Pacific Salmon Treaty Memorandum of Understanding

"The Parties agree to maintain a coded-wire tagging and recapture program designed to provide statistically reliable data for stock assessments and fishery evaluations."

CWT Program provides vital data

- Only historic record of *age and stock-specific* impacts over time, since 1970’s
- Fully integrated tagging, sampling and recovery programs coast wide
- Centralized database with standardized reporting protocol
- Cohort analysis provides estimates of exploitation rates and survival
- Evaluation of fishery impacts
- Fundamental management tool

Coastwide assessments

- Ability to assess and manage harvest of coho and Chinook salmon in multi-stock fisheries coast wide from Alaska to California

Coastwide assessments

- Chinook - Harvested as mature and immature fish over several years; PSC Indicator Stock Program
- Coho - Predominantly harvested as maturing fish during second year of marine residence; Regional tag groups

Fishery, stock and age specific ER

$$\text{ER (Age 3)} = \frac{\text{Catch(Age 3)}}{\text{Cohort(Age 3)}} = \frac{400}{4{,}439} = 9.0\%$$

Fishery, stock and age specific ER

- Conservation Goals
  - Annual management objectives
  - Basis of PST Chinook and coho implementation
- Socio-Economic Goals
  - Allocation of allowable impacts
  - Fishery shaping

Emerging problems with CWT program

- Quality of estimates of ER depends on:
  - Number of CWTs recovered
  - Quality of estimates of total catch and escapement
  - Data quality control

Emerging problems with CWT program

- Decrease in survival
- Decrease in fishery harvest
- Redistribution of CWTs to fisheries where CWT recoveries and accurate estimates of total catch are more difficult to obtain
- Increase in escapement including strays to natural spawning grounds

- Complications from mass marking and mark-selective fishing

Emerging problems with CWT program

- Decrease in number of CWTs recovered
- Increase in statistical uncertainty
- Increase in management risk

PSC concerns

- 2004 - PSC convened an eight member **Expert Panel** of scientists to examine the CWT program, consider new and emerging technologies, and provide recommendations to the PSC
- 2006 – Expert Panel Report (Hankin et.al. 2005) published (19 Findings, 14 Recommendations)

- **2006 – PSC appointed the CWT work group**

CWT work group

- Marianna Alexandersdottir (NWIFC, Chair)
- Ethan Clemons (ODFW)
- Carrie Cook-Tabor (USFWS)
- Allen Grover (CDFG)
- Annette Hoffmann (WDFW)
- Ron Josephson (ADFG)
- Scott McPherson (ADFG)
- Mike Matylewich (CRITFC)
- Gary Morishima (QIN)
- George Nandor (PSMFC)
- Chuck Parken (CDFO)
- Patrick Pattillo (WDFW)
- Brian Riddell (CDFO)
- Norma Jean Sands (NMFS)

Expert Panel Report

- ***Expert Panel Report - Finding 1.***

  The CWT system is the only technology that is currently capable of providing the data required by the PSC…..

Expert Panel Report

- ***Recommendations 1-3***

  Remedial measures should be undertaken immediately to correct deficiencies in data collection and reporting throughout the basic CWT system and to improve analysis of CWT recovery data

- ***GSI Steering Committee - Recommendation 1.*** **The PSC should recommend that agencies undertake measures to restore the structural integrity of the CWT system and improve its performance……**

Organization of CWT Workgroup Report
(PSC Tech. Rep. 25, March 2008)

- Four primary chapters plus extensive appendices to support summary tables and recommendations.
  - Chapters 1-3 Introduction & Context
  - **Chapter 4, Current Status of the CWT Program**
  - **Chapter 5, Criteria for Precision and Accuracy.**
  - **Chapter 6, Decision Theoretic Model**
  - **Chapter 7, Conclusions and Recommendations**
  - **Appendix containing Agency-specific recommendations for addressing issues**

Review and Recommendations

- General Status Review and Recommendations
- Regional Review and Recommendations

Components of Uncertainty in Estimates of ERs

- Precision (random sampling error)
  - Tags Recovered
    - Number of fished tagged,
    - Sample rates for fisheries and escapements.
  - Precision of estimates of total harvest or escapement used to calculate sample expansion.

Components of Uncertainty in Estimates of ERs

- Bias (non-random error)
  - Sample coverage for fisheries and escapements,
  - Non-representative sampling, and
  - Bias in catch or escapement estimates.

Current coast wide “standards” for CWTs

- Chinook Indicator tag groups release 200,000 fish per brood
  - Currently no formal coho indicator program.
- All fisheries encountering CWT’d fish sampled at 20%
- All escapement with CWT’d fish present sampled
- A minimum of 10 observed tagged fish per stratum

Chinook Indicator Stock Summary

STOCK INFORMATION								REGIONAL MARINE FISHERIES																				
		Key Issues						Fishery Specific Key Issues																				
Region	Stock	Release	Escapement (Hatchery)	Escapement (Sp Grou	Term Com	Term Native	Term Sport	SEAK TR	SEAK Sport	SEAK Net	NCBC Troll	NCBC Sport	NCBC Net	WCVI Troll	WCVI Sport	Geo Strait Troll	Geo Strait Sport	SBC Net	WAOcn Troll	WA Ocn Sport	PS Sport	WA Net	Col Riv Sport	Col Riv Net	OR Coast Troll	OR Coastal Sport	CA Troll	CA Sport
Alaska	Alaska Central Inside	1	1	1				1	2																			
	Little Port Walter	1	1	1				1																				
	Alaska Southern Inside	1	1	1	1			1	2																			
Canada	Big Qualicum	1	1		3	3	3	2				3					3											
	Chilliwack (Harrison Fall Stock)	2		2		3								1	3		2		1									
	Cowichan	1	1			3	3							2	3							2						
	Kitsumkalum	1				3	3	1				3	3															
	Puntledge	2	1		3	3	3	2				3					3											
	Quinsam	1	1	1	3	3	3	1				3																
	Robertson Creek	2	1	1	1	2	3	1				3			3													
	Snootli	3			3	3	3	2			2	3	2															
Washington	George Adams Fall Fingerling	1	1	3	2		3							1	3				1		1	2						
	Green River Fall Fingerling	1	1	2	1									1	3		3		2		1	1						
	Grovers Creek Fall Fingerling	1	1											1	3				1		1	1						
	Hoko Fall Fingerling	3	1	2				1			2																	
	Nisqually Fall Fingerling	1	1		1		3							1							1							
	Nooksack Spring Yearling	1	1											2			3											
	Nooksack Spring Fingerling	2	1	2				2						1	3		3											
	Queets Fall Fingerling	2		3	1			1			1	3																
	Samish Fall Fingerling	1	1				3							1	3		3		2		2	1						
	Skagit Spring Fingerling	1	1											1	3						2							
	Skagit Spring Yearling	2	1											1	3						1							
	Sooes Fall Fingerling	2	1		2			2			2	3																
	South Puget Sound Fall Yearling	1	2		2										3						2	2						
	Squaxin Pens Fall Yearling	3			2									2							1	2						
	Skagit Summer Fingerling	3						1				3		2	3		3											
	Stillaguamish Fall Fingerling	3	1	2										2	3		3				2							
	White River Hatchery Fingerling	1	1	3																	2							
	White River Hatchery Yearling	1	1																		2							
	White River Fall Fingerling	3	1											2							2							
	White River Spring Yearling	3	1																		2							
Oregon	Salmon River	2		1			2	1			1																	
Columbia Rive	Cowlitz Tule	1	1	3				2						2	3				2	2				2	2			
	Hanford Wild	1		2				1			2													1				
	Columbia Lower River Hatchery	1	1											1	3				1	2				1	1			
	Lewis River Wild	3						2			2			2	3				2					2	2			
	Lyons Ferry	3												2					1	1				1	2			
	Spring Creek Tule	1	1											1	3				1	1				1	1			
	Columbia Summers	1	1					1			1	3		1	3				1						1			
	Upriver Bright	1	1					1			2													1				
	Willamette Spring	1	1				2	1																1				
California	Sacramento falls	1	1	3			3																		1		1	2
	Sacramento winters	3	1	1			3																					3
	central valley spring	1	1	3			3																		1		1	2
	Klamath-Trinity falls	1	1	1		1																					1	
	California coast	3	3	3																							2	3

Results of status review

- Corrective actions can be taken at reasonable cost so that agreed objectives can be met to maintain the viability of the CWT program.
- This does require some increased investment in the CWT system.

Results of status review

- CWT program must be dynamic, capable of responding to changes in fisheries and environment
- All components of the CWT program require attention; tagging, sampling and database reporting and maintenance
  - Planning tool

Recommendations - Coverage

The workgroup identified gaps in geographic and stock-type tag representation (Section 7.1 and 7.3) which should be addressed by the PSC and agencies.

- Coho coverage. There is no formal coho coast-wide indicator stock program, but all tagged releases are used where appropriate. (See Table D-1).

Recommendations – QA/QC

Quality control for reporting and validation of CWT data needs to be improved

- A workgroup including members of the CoTC, CTC, Data Sharing, and SFEC should be established to provide recommendations to strengthen the current validation process (Sections 7.2 and 7.4).

Regional Reviews

- Regional representatives reviewed programs within their agencies, identified issues, and proposed solutions.
- Assigned priorities and, where possible, estimated costs

Recommendations - Regional Reviews

- Agencies will need to identify specific actions that most effectively and efficiently improve the CWT system (see Appendix A).
- Each agency should review its CWT tagging and sampling programs and provide the PSC with a written plan to address Workgroup recommendations by October 1, 2008

Regional Review (example)

ISSUE 10 (Bias): Incomplete Coverage of Fisheries or Escapement Areas

Problem	Consequences	Solution
All fishery or escapement locations where tagged fish are present are not sampled.	Estimates of tagged fish are missing for unsampled fishery or escapement strata. Therefore, estimates of cohort size and ERs are biased, generally overestimated or zero. This could result in over fishing or in unnecessary fishery closures.	All locations where tagged fish for indicator or regional stock groups are present should be reviewed for importance to estimation of total cohort size. If presence of tagged fish is substantial these locations should be sampled.

Regional Reviews (example)

ISSUE 10 (Bias): Incomplete Coverage of Fisheries or Escapement Areas

	Chinook		Coho	
Region	**Priority**	**Reason for priority**	**Priority**	**Reason for priority**
British Columbia	Low to Medium	Unsampled commercial fisheries are small and past sampling indicated few, if any, indicator stock CWTs. Some sport and Native fisheries are unsampled.	Low to Medium	Same comment as Chinook.
Columbia River	High	Increase sampling of summer sport fisheries in the Columbia River given appropriate funding.	Low	Escapement sampling is currently occurring to meet management objectives at ESU levels. Additional funding would be needed to implement directed fishery sampling programs beyond those that are currently prosecuted
	High	Modify sampling in lower Columbia River to allow for recoveries of DIT fish		
	High	Equip samplers with appropriate gear to collect tags in escapement.		

An Action Plan in Response to Coded Wire Tag (CWT) Expert Panel Recommendations

A Report of the Pacific Salmon Commission
CWT Workgroup

March 2008

Pacific Salmon Commission
Technical Report No. 25

The Pacific Salmon Commission is charged with the implementation of the Pacific Salmon Treaty, which was signed by Canada and the United States in 1985. The focus of the agreement are salmon stocks that originate in one country and are subject to interception by the other country. The objectives of the Treaty are to 1) conserve the five species of Pacific salmon in order to achieve optimum production, and 2) to divide the harvests so each country reaps the benefits of its investment in salmon management.

Technical Reports of the Pacific Salmon Commission present results of completed or ongoing investigations carried out by the Pacific Salmon Commission that are deemed of sufficient interest to be made available to the scientific community and the public.

Pacific Salmon Commission
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Pacific Salmon Commission
Technical Report No. 25

An Action Plan in Response to Coded Wire Tag (CWT) Expert Panel Recommendations

March 2008

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PACIFIC SALMON COMMISSION
CWT WORKGROUP

AN ACTION PLAN IN RESPONSE TO CWT EXPERT PANEL RECOMMENDATIONS

March 2008

CWT Workgroup Members

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Chuck Parken (CDFO)
Patrick Pattillo (WDFW)
Brian Riddell (CDFO)
Norma Jean Sands (NMFS)

ACRONYMS

ADFG	Alaska Department of Fish and Game
ASFEC	Ad-Hoc Selective Fishery Evaluation Committee
AUC	Area Under the Curve
BC	British Columbia
CAS	Cohort Analysis System (CTC database)
CDFG	California Department of Fish and Game
CDFO	Canadian Department of Fisheries and Oceans
CRITFC	Columbia River Inter-Tribal Fisheries Commission
CTC	Chinook Technical Committee
CoTC	Coho Technical Committee
CWT	Coded Wire Tag
CNR	Chinook Non-Retention
DIT	Double Index Tagging
ETD	Electronic Tag Detection
ER	Exploitation Rate
ISBM	Individual Stock Based Management
MM	Mass Marking
MOU	Memorandum of Understanding
MR	Mark Recapture
MRP	Mark Recovery Program
MSE	Mean Standard Error
MSF	Mark Selective Fishery
MSM	Mixed Stock Model
MU	Management Unit
NSF	Non-Selective Fishery
NWIFC	Northwest Indian Fisheries Commission
ODFW	Oregon Department of Fish and Wildlife
PEF	Production Expansion Factor
PSC	Pacific Salmon Commission
PSE	Percent Standard Error
PSMFC	Pacific States Marine Fisheries Commission
PST	Pacific Salmon Treaty
QIN	Quinault Indian Nation
RMIS	Regional Mark Information System
RMPC	Regional Mark Processing Center
SEAK	Southeast Alaska
SFEC	Selective Fishery Evaluation Committee
SUS	Southern United States
TBR	Transboundary
TCDS	Technical Committee on Data Sharing
USFWS	United States Fish and Wildlife Service
WCVI	West Coast Vancouver Island
WDFW	Washington Department of Fish and Wildlife

ACKNOWLEDGEMENTS

The CWT Workgroup wishes to thank the following individuals who are not listed as workgroup members but who contributed knowledge, time and effort to this document. This includes Jim Longwill and Dan Webb of the PSMFC, Gayle Brown, Rick McNicol, Roberta Cook, Kathy Fraser, Brenda Ridgway of CDFO, Melodie Palmer-Zwahlen of CDFG and Charmane Ashbrook and Kirt Hughes of WDFW. We would also thank the PSC staff for their assistance in coordinating our meetings.

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Executive Summary

The Expert Panel stated in their report (Hankin et.al. 2005) that "…it will be important to maintain a reliable coded wire tag (CWT) system during the transition period to ensure data continuity and to allow evaluation of the relative performance of some new technology or approach as compared to the CWT system". The Pacific Salmon Commission (PSC) established a CWT Working Group to develop recommendations to correct deficiencies in data collection and reporting throughout the basic CWT system and to improve analysis of CWT recovery data.

The Working Group reviewed the past performance of the coastwide CWT program, assessed its current status, and developed guidelines to improve the statistical basis for the future program. While changes to fisheries, marine survival rates, and budget limitations have impacted the CWT program, this review indicates that an effective and efficient program can be restored with agreement on reasonable objectives for tagging, sampling, and data sharing criteria. There will, however, be limitations to the program when marine survival becomes very poor, excessive fishery stratification is done, and if mass marking and mark-selective fisheries significantly expand. Data systems can be developed to address most aspects of the latter, but with significantly increased costs.

The Working Group addressed the first four recommendations of the CWT Expert Panel Report (Hankin et al. 2005) and the associated questions provided by the PSC (Section 1.3). This report is structured in four primary chapters addressing the assignments, plus extensive appendices to support summary tables, recommendations, etc.:

- i) Chapter 4, Current Status of the CWT Program,
- ii) Chapter 5, Criteria for Precision and Accuracy,
- iii) Chapter 6, Decision Theoretic Model (an initial tool developed to set tagging and sampling targets), and
- iv) Chapter 7, Conclusions and Recommendations.

The question of the representativeness of indicator stocks (Recommendation 4 of the Expert Panel Report) was not fully addressed, but the geographic coverage of indicator stocks is included in the issues considered in the chapters above, and in Appendix D. Additional studies regarding this topic for Chinook salmon are being conducted in Alaska, Canada, the Columbia River, and Oregon.

The Work Group identified issues in three broad categories:

- a) limited tag recoveries in fisheries and spawning escapements, these observed tags are the fundamental basis for all applications of CWT data,
- b) inadequate attention to sources of bias, such as unsampled catches, voluntary recovery of tags in some recreational fisheries, inaccuracy in spawning estimation, and
- c) incomplete coverage of indicator stocks representing salmon production regions, particularly for coho salmon.

The Work Group did not focus on additional issues associated with mass-marking and mark-selective fisheries (MSF), but emphasize that any current proposal to assess MSFs assumes a sound technical basis in the CWT program.

The recent status of the CWT program with respect to precision of estimates is thoroughly assessed in Chapter 4 and summarized for the coast wide indicator stocks in Figure 4-2 (Chinook) and Figure 4-3 (Coho). These figures present matrices of stocks (Rows) and tagging and sampling issues (Columns) to encapsulate the program in two figures. Agencies provided greater details of recognized limitations to their CWT program in Appendix A and section 7.3. Figures 4-2 and 4-3 do not provide information on potential sources of bias in CWT-based estimates (e.g., absence of an indicator stock or a fishery that is not sampled), but these issues are included in Appendix A and section 7.3.

Each of the issues identified can be addressed by a program design based on observed tag recoveries (not fixed numbers of tags released), and with greater responsiveness to change (treat the program as dynamic not static), representative sampling of all components of a cohort (excluding natural mortality), and a focus on issues limiting the data quality of the program coastwide (yellow and red columns in Figures 4-2 and 4-3). To address these issues, the Work Group recommends the following guidelines for improving the statistical basis for estimates produced by the CWT program:

i) achieve ten (10) observed tags within each sampling stratum (defined by fishery or escapement location, time period, and age for Chinook salmon) to provide a 30% percent standard error (PSE) on estimated tags within strata[1] that represent an important proportion of the stocks total exploitation rate (at least 2.5%) or escapement rate (Section 5.3, Figure 5-1);
ii) establish tagging and sampling rates to achieve these targets in eight of ten brood years (to account for observed variation in marine survival), see Section 6.1;
iii) recognizing the variability in survival rates over time and between stocks, and for quality assurance, use a model such as the Sampling Guidelines Model presented in this report to establish tagging and sampling rates for annual programs (Figures 6-3 to 6-5, and Appendix C) to achieve the first guideline;
iv) minimize potential biases by representative sampling of all catches and spawning escapements and achieving minimum sampling targets per strata;
v) identify sources of harvest impacts that may go unreported; and
vi) establish quality control measures and periodic reviews of the program's performance against these new guidelines.

To address limitations recognized in Chapter 4 and Appendix A, implement these design guidelines, and acknowledge the specific differences between stocks (e.g., ranges of survival rates, migration patterns, and variation in fishery stratification), agencies will need to review their CWT programs. It is important to note that each agencies CWT programs are not conducted in isolation of other agencies. Costs for restoring elements of the CWT program were

[1] It is important to note that the PSE achieved will increase if the precision of a catch or escapement estimate is greater than zero (0). If the PSE for catch or escapement is greater than zero, then the PSE on the estimated numbers of tags within those strata can not be less than the PSE of the estimated catch or escapement.

included by some agencies in Appendix A, but the full costs of the revised program can not be established until the inter-agency needs are assessed.

Summary Recommendations (Section 7.5).

1. The Chinook Technical Committee (CTC) and Coho Technical Committee (CoTC) should review the indicator stocks for adequate coverage in representing natural stocks. The workgroup identified gaps in geographic and stock-type tag representation (Section 7.1 and 7.3) which should be addressed by the PSC and agencies. A greater commitment to establishment and maintenance of indicator stocks is required to fully utilize the capability of the CWT program to support fishery management actions affecting the Parties under the PST.

2. Agencies and/or the CTC and CoTC should evaluate all Chinook indicator stocks and all tagged groups from coho regional groupings for consistency with statistical guidelines described above. The workgroup recommends that particular attention be paid to the adequacy of CWT release sizes in light of trends and variability in survival rates and changes in fishery exploitation rates.

3. Agencies should evaluate their escapement estimation and sampling programs where tagged Chinook and coho groups are present on the spawning grounds. A review of the sampling programs (Tables 4.2 and 4.3) indicates that spawning ground sampling is often not in place or inadequate and that quantitative estimates of escapement need to be improved, particularly to limit uncertainty

4. Agencies should evaluate their sampling programs with respect to their ability to provide representative samples of all tagged fish (marked and unmarked) in fisheries and in the escapement (Section 7.1.4).

5. The Work Group recommends that the PSC request a written response from each agency involved in the coast wide CWT program by October 1, 2008 and have the PSC technical committees review the collective response.

6. The workgroup recommends that the development of a multi-stock, multi-fishery decision theoretic model be supported to assess the efficacy, efficiency, and interactions of agency investments to improve the CWT program (see Appendix C).

7. The CWT workgroup recommends that a workgroup including members of the CoTC, CTC, Data Sharing and Selective Fishery Evaluation Committee (SFEC) be created and charged with reviewing the current validation process for CWT data and provide recommendations for improvement (Section 7.2 and 7.4).

8. Agencies should evaluate their sampling programs to ensure that data required for estimating impacts of MM and MSF are properly reported. Mark selective fishing impacts both sampling and reporting programs. Specifically, reporting of sample method (electronic vs. visual), fishery type (selective vs. non selective), tag group type (double

index tagging (DIT) vs. non-DIT) and mark status in release and recovery file are new data fields and are not consistently reported. In addition, the reporting of the tag/mark status in the catch-sample file has become more complicated and agencies should review their procedures.

1 Introduction

The coded wire tag (CWT) was introduced in the 1960s and has provided unparalleled information about ocean distribution patterns and fishery impacts for Pacific salmon along the Pacific coast. For the last 30 years, CWT data has provided the fundamental basis for assessment and management of Chinook (*Oncorhynchus tshawytscha*) and coho (*O. kisutch*) salmon. Prior to the advent of the CWT, large-scale troll and sport fisheries had developed in marine areas along the Pacific coast. Catches were sustained by large, but unknown, mixtures of hatchery and wild populations, the composition of which varied from year to year and area to area. Fishing mortality rates were unknown but the cumulative effect of fishery and other impacts were resulting in declining trends in spawning escapements for many natural populations. Fishery harvest rates (the proportion of fish available to a fishery that are killed by that fishery) could not be estimated or monitored, except for some fisheries in terminal areas. Competitive over-fishing and extensive debate amongst users and agencies was fueled by limited data and assessments. The ability to unambiguously identify specific groups of fish using CWTs provided the first opportunity to monitor and assess the harvest patterns and survival rates and a quantitative basis for development of management actions.

The CWT was originally developed for evaluation of individual release experiments carried out with hatchery fish (Jefferts et al. 1963). The CWT is a small piece of magnetized wire (usually 0.25 x 1.1 mm) which is implanted in the nasal cartilage of juvenile salmonids. Each piece of wire contains a code that uniquely identifies a group of fish. Because Pacific salmon are semelparous and have strong homing fidelity, adult fish escaping fisheries return to well-defined geographic areas, usually near their release site. Since CWTs are inserted into juvenile fish prior to ocean migration, the technology provides a means to track the fate of specific groups of salmon from release through to maturity (i.e., throughout their life cycle). Recovery of CWTs required an external mark since the tag was not visible externally. By agreement of management agencies in 1977, removal of the adipose fin (Ad) was sequestered (reserved) for fish that received a CWT (Ad+CWT). Fish could then be inspected visually for the presence of a tag and snouts removed from those with missing adipose fins. In the late 1970s, management agencies also agreed to institute catch sampling and reporting protocols to facilitate sharing of data on where and when tagged fish were recovered, as well as associated sampling information.

Through this coordinated, coast-wide system, CWT recovery data have enabled fishery scientists to determine exploitation patterns for individual groups of fish and have assisted decision-making required to conserve the resource. In the early 1980s, stock and fishery assessment methods based on CWT recovery data provided the means to estimate exploitation rates (ERs) for individual stocks. Cohort analysis methods (CTC 2001) applied to CWT recovery data permitted estimation of age and fishery-specific ERs, age-specific maturation rates, survival from release to age 2, and total mortality. These methods quantified and characterized the timing and location of fishery impacts for the entire migratory range and life cycle of individual stocks. Exploitation patterns of natural stocks were assumed to be the same as those determined for CWT release groups of hatchery fish that had similar brood stock origin, similar maturation schedule, and migration timing. The integration of CWT-based cohort analysis into fishery management models provided the means to assess how to constrain fishing mortality to levels appropriate for the status and productivity of individual stocks. These models were instrumental in enabling the U.S. and Canada to reach agreement on a coast-wide Chinook rebuilding program, which became a cornerstone for the 1985 Pacific Salmon Treaty (PST).

For three decades, the CWT has provided a practical, efficient, and cost-effective means for stock- and fishery-specific assessment. Coordinated, coast-wide sampling and reporting systems facilitate sharing of information on CWT releases and recoveries, and standardized methods for CWT data analyses reduce opportunities for misinterpretation. The capacity to conveniently analyze experimental results for individual CWT release groups in a timely manner has proven invaluable for salmon fishery management, research, and monitoring. The Pacific Salmon Commission's (PSC) Ad-Hoc Selective Fisheries Evaluation Committee (ASFEC 1995) summarized the main reasons why all salmon fishery management agencies in the Pacific Northwest rely upon the CWT:

1. *the CWT program includes fully integrated tagging, sampling, and recovery operations along the entire west coast of North America;*
2. *the CWT provides sufficient resolution for stock-specific assessments; and*
3. *the CWT is the only stock identification technique for which a historical record (generally back to the mid 1970s) of stock-specific assessments may be computed.*

No other practical mark-recovery system has yet been devised that is capable of providing this level of detail in such a timely fashion.

The historic success of the CWT program has been in no small part due to the high level of coordination and cooperation among the coastal U.S. states and British Columbia and to the consistency of CWT tagging and recovery efforts across the many jurisdictions. Despite the emergence of other stock identification technologies, including various genetic methods and otolith thermal marking, the CWT recovery program remains the only method currently available for estimating and monitoring fishery impacts on individual stocks of coho and Chinook salmon when implementing fishing agreements under the PST (Hankin et al. 2005).

1.1 Chinook and Coho Salmon in the Pacific Salmon Treaty

Chinook and coho are species of Pacific salmon. These species are anadromous and semelparous and exhibit a high degree of homing, leading to the development of populations that are relatively reproductively isolated and adapted to local environmental conditions.

Chinook are the largest and longest-lived species of Pacific salmon and tend to spawn in larger river systems. More than a thousand spawning populations (stocks) of this species are found in rivers along the eastern Pacific Ocean. Several distinct spawning populations - often characterized by river entry timing, e.g., spring, summer, fall, winter - defined by a combination of timing and physical location may be found in a single river system. The PSC fishery regimes for Chinook are directed at a subset of specific stocks (indicator stocks) originating from northern Oregon through Southeast Alaska. PSC fishery regimes for Chinook are designed to constrain fishery exploitation so as to achieve spawning escapement goals for individual stocks. Because individual stocks can migrate over thousands of miles and be impacted by fisheries over an extended period of time, PSC fishery regimes incorporate a complex set of elements, many of which depend on CWT analyses of these indicator stocks. The Chinook Technical Committee (CTC) of the PSC is charged to conduct annual analyses of CWT data to assess annual exploitation patterns and rates, variation in marine survival, annual abundance forecasts, compliance with requirements of PSC fishery regimes, etc. CWT data are also employed in stock-recruitment analyses (catch for many natural populations is unknown, but the ER can be estimated from an associated CWT indicator stock) to estimate recruitment used to develop spawning escapement goals.

Coho salmon spawn in numerous small, even intermittent streams. Several thousand populations of this species exist along the eastern Pacific Ocean. This species is characterized by an extended period of freshwater rearing (1 to 2 years) followed by approximately 18 months of rearing in marine areas prior to returning to the rivers to spawn. Coho tend to be distributed over a much smaller range in the ocean than Chinook, but their marine distribution appears to be much more variable than Chinook. PSC fishery regimes for coho are designed to constrain fishery exploitation on specified regional aggregates of stocks or management units (MUs) of naturally spawning coho, based on categorical conservation status (abundant, moderate, low). Under the PSC coho agreement, each party is required to constrain its fisheries so that cumulative ERs do not exceed negotiated limits. The Coho Technical Committee (CoTC) analyzes CWT recovery data using cohort analysis methods to provide historical perspectives on exploitation patterns and inform decision makers about the magnitude of fishery impact reductions required to meet target ER constraints. The annual estimation of ERs for CWT indicator stocks (for specific MUs) is used to estimate spawning escapements, stock compositions, and monitor compliance.

1.2 Emerging Problems with the CWT Program

Under conditions of changing fisheries, tagging levels, and desired level of stratification, there has been increased concern regarding the quality of CWT recovery data and inferences that have been drawn from analyses of these data. The recent Report of the Expert Panel on the Future of the CWT Recovery Program for Pacific Salmon (Hankin et al. 2005) provided an extensive discussion of the emerging issues that are only summarized here:

1) In the early 1990s, survival rates for many natural stocks declined precipitously and managers responded by reducing fishery impacts to try to maintain spawning escapement levels. As survivals plummeted and fishery impacts decreased, fewer CWTs were recovered, thereby increasing statistical uncertainty with CWT-based estimates and further reducing the reliability of inferences drawn.

2) Statistical uncertainty surrounding CWT-based estimates has been the subject of increasing scrutiny. There are various sources of uncertainty surrounding CWT-based estimates and their application in salmon management processes. Statisticians recognize two components of uncertainty in estimating population statistics: variance and bias. Variance measures the variation associated with sampling and estimation procedures; this can generally be calculated. Bias measures the difference between the expected (or average) value of estimates and the true but unknown quantity being estimated (e.g., total fishery-related mortalities). The magnitude of bias is extremely difficult or impossible to determine. For example, catch-and-release mortality rates for sublegal-sized (shaker) salmon are

commonly applied as fixed values to the number of shakers released, but the true rates likely vary with size of fish released, gear, and fishery. These inherent statistical uncertainties were exacerbated by a convergence of other factors.

a) Budget pressures within agencies that have resulted in reduced sampling in various fisheries have also decreased the reliability of CWT recovery data and also introduced unknown bias.

b) An increase in the proportion of the total catch in recreational fisheries has also increased uncertainty in CWT-based estimates, because recreational catch is estimated and these fisheries frequently have lower sampling rates for tags. In general, the larger the proportion of total catch taken in recreational fisheries, the larger the uncertainty in CWT-based estimates.

c) Managers have also in recent years relied increasingly on alternative fishery management measures such as catch-and-release or species-selective fisheries. These non-landed mortalities are unsampled and now account for a much greater proportion of total fishery mortalities in the Southern U.S. jurisdiction.

3) A key assumption underlying PSC regimes is that the selected hatchery indicator stocks are representative of their associated natural stocks. Because of the difficulty of tagging and recovering sufficient numbers of naturally produced fish, direct validation of this assumption through CWT methods can be difficult and costly.

4) The PSC and fishery managers in general have requested estimates be provided at finer scales of fishery-time/area resolution to address management concerns. However, as strata become more refined (i.e., smaller), the uncertainty surrounding estimates of these individual ERs will increase (see page 8, Hankin et al. 2005).

1.3 The Current Assignment

The PSC appointed the CWT Workgroup to identify tasks that would address the CWT-related recommendations of the Expert Panel (Hankin et al. 2005). The highest priority was to be placed on those tasks that need immediate action. Accordingly, the initial emphasis was to identify options to address current deficiencies in the CWT program (Expert Panel Recommendations #1-4). The recommendations below are quoted (in italics) from the Expert Panel report presented to the PSC (Hankin et al. 2005); the identified Workgroup tasks and the sections of this report that address the tasks are also presented.

RECOMMENDATION 1 – *Substantial improvements must be made in the CWT system to insure that the quality and reliability of collected data are consistent with the increasing demands being placed on these data by fishery managers. Areas requiring attention include quality control/quality assurance, and various sampling design issues including expansion of catch and escapement sampling in areas where little or no sampling currently takes place.*

Tasks

1) Develop a matrix outlining where quality control/quality assurance issues are occurring within the current CWT system and identify options and associated costs for corrective measures - Chapter 7 and Appendix A.
2) Identify the current tagging levels for indicator stocks utilized by PSC technical committees - Chapter 4.
3) Identify the current sampling rates occurring for marine fisheries, freshwater fisheries, spawning grounds and hatchery returns. Where the recommended or targeted sampling rates are not being achieved, identify options and costs for corrective measures - Chapter 4, 7 and Appendix A.
4) Develop recommendations for sampling design protocols for catch and escapement estimation and sampling - Chapter 0.

RECOMMENDATION 2 – *Explicit criteria should be developed for the precision of statistics to be estimated from CWT recovery data. New guidelines for CWT release group sizes and fishery and escapement sampling rates should be based on these explicit criteria.*

Tasks

1) Describe the precision currently achievable for estimated parameters derived from the current CWT data, where the status quo is defined as the precision level given that current sample design targets are being met in all areas (e.g., tagging levels, coverage and sampling rates) – Chapter 5.
2) Provide options for modifying current CWT release group sizes and sampling rates for fishery and escapement that provide increments of improved precision over status quo – Chapter 0.

RECOMMENDATION 3 – *We recommend that the utility of a decision-theoretic approach, intergrading cost, benefits, and risk into a formal evaluation structure be investigated as a means of prioritizing potential improvements (e.g., measures to improve CWT data – reporting, sample design, and protocol) to the CWT system. The approach should identify the release group sizes and recovery programs required to meet the statistical criteria for CWT recovery data. Sampling programs should include all fisheries, hatcheries, and spawning ground areas where CWT ER indicator stocks are present.*

Task

1) Work with the relevant agencies to identify cost considerations for the actions associated with the first three recommendations – Chapter 0 and 7.

RECOMMENDATION 4 – *We recommend completion of a comprehensive survey and statistical analysis of all relevant published and unpublished CWT studies that concerns the correspondence between exploitation patterns and rates for hatchery indicator stocks as compared to their natural counterparts. This review should also include new analysis of relevant agency-collected data that have not yet been previously subject to analysis. Recommendations for additional studies should be made if they are judged necessary.*

Tasks

1) Summarize the results from all the relevant management agencies' published and unpublished CWT studies that concern the correspondence between exploitation patterns and rates for hatchery indicator stocks as compared to their natural counterparts – Appendix D.
2) Review current indicator stock coverage and provide recommendations where additional analysis could be conducted for peer review that would advance understanding of the relationship between hatchery indicator stocks and their natural counterparts – Appendix D.

2 Primary Uses of CWTs by the CTC and CoTC

The PST specified that the parties maintain an ER stock program to provide the Chinook and Coho technical committees with information from each production area for the annual evaluation of fisheries and to forecast future harvest impacts. The intent was to utilize these indicator stocks to monitor and evaluate the effectiveness of the management measures agreed to by the PSC. The indicator stock programs provide information needed for cohort and ER analyses for wild and hatchery coho and Chinook salmon.

The CWT database has a variety of uses outside of those of the CTC and CoTC, including regional management as well as hatchery evaluation and monitoring. This report focuses on the use of CWTs by these PSC committees.

2.1 Indicator Stocks Used by the CTC and CoTC

The basic statistic used by PSC technical committees and managers for evaluating fisheries is the ER estimated by fishery for groups of Chinook and coho salmon. In 1985, the CTC and CoTC initiated the use indicator stock programs. Stocks were selected that were 1) coded-wire-tagged and available in sufficient years and 2) representative of particular basins, MUs, or regions of production. Exploitation Rate Indicator (ERI) stocks were to be chosen based on the following guidelines (Morishima 1986):

1) In aggregate, their ability to represent all major regions and racial types of interest to the PSC;
2) The stock must be sufficiently abundant and easily tagged so that the agency responsible can make a long-term commitment for tagging the stock;
3) The agency responsible for tagging the stock must make a commitment to sample and estimate the escapement of tagged fish and report the results to the PSMFC in a timely manner.
4) Reliable estimates of catch and escapement must be available.

The intent was to utilize indicator stocks to monitor and evaluate the effectiveness of the management measures prescribed by the PSC. Additional CWT groups are used to describe fish distribution among fisheries and estimate ERs for other stocks. The CoTC is currently using such groups to develop a management model for coho salmon (see Appendix D).

<u>Chinook.</u> The CTC relies upon a set of CWT indicator stocks to monitor the effects of PSC fishery regimes through an annual ER analysis. Statistics derived from cohort analysis on indicator stocks provide a time series of changes in fishery harvest rates, brood year ERs, maturation rates, fishing mortality rates and distributions, and pre-recruitment survival.

<u>Coho</u>. No formal, coastwide indicator stock program presently exists for coho. The analyses performed by the CoTC have been opportunistic: specifically, they have been forced to rely on the use of available CWT release and recovery data. These CWT groups were released for various purposes and sometimes employ brood stocks of uncertain origin. Further, while current PSC regimes for southern coho are based on constraining ERs on natural MUs, the ability to

monitor implementation of the PSC agreement addressing coho salmon is limited by the lack of a set of corresponding indicator stocks.

2.2 Uses of CWTs by CTC and CoTC

This section briefly describes the major uses of CWT data by the PSC technical committees.

2.2.1 Representation in Regional Planning Models

Regional planning models for Chinook and Southern Coho depend critically on CWT release and recovery data to represent the distribution and exploitation patterns of tagged fish groups representative of individual MUs.

2.2.2 Variability in Distribution and Exploitation Patterns

CWT recovery data are employed to evaluate inter-annual variability in harvest distribution patterns and exploitation of individual stocks.

2.2.3 Abundance Forecasting

Annual estimates of marine survival generated from CWT release and recovery data, along with other data such as terminal run size, provide the basis for estimates of survival trends and development of long-term datasets, both of which are used directly and indirectly for forecasting pre-fishery cohort abundance and terminal runs.

2.2.4 Estimating Stock Productivity

Cohort reconstructions are based on CWT data that are applied to natural escapement abundance to estimate production resulting from parent spawning escapements. These data and estimates of pre-recruitment survivals provide the basis for stock-recruitment analysis and the estimation of stock productivity and capacity to sustain harvest. The PSC Coho and Chinook Agreements are based on constraining fishery exploitation to levels appropriate to conserve natural stocks and produce maximum sustainable harvest.

2.2.5 Monitoring and Post-Season Review of Management Regimes

The CTC and CoTC are responsible for annually reporting estimates of fishery ERs on natural stock groups by specific groups of fisheries. For Chinook, fishery harvest rate indices and individual stock based management (ISBM) indices derived from cohort analyses are reported annually to the PSC and used in annual calibrations of the PSC Chinook Model. For coho, the ERs experienced are compared against limits established by the 2002 PSC Coho Agreement.

2.2.6 Other

Long-Term Data Set for Basic Biological Assessments. The CWT database is critical to the ability of the CTC and CoTC to increase understanding of how salmon respond to variable ocean conditions. Currently, the CWT system provides the only long-term source of data available to monitor survival, distribution, and exploitation patterns.

Stray Rates. Recoveries of tags on spawning grounds, hatchery rack(s), and extreme terminal fisheries outside of the geographic origin of the CWT release provides quantitative and/or qualitative information on stray rates.

Size at Recovery in Fisheries. Data associated with CWT recoveries (date, time, location, gear, etc.) are useful for examination of inter-annual and inter-population differences in size/growth rates. These data help identify issues or interpret observed trends in fishery impacts (e.g., long-term changes in average fish size). Size at age data help to directly model the effects of changes in minimum size limits in proposed fishing regulations. Additionally, for some stocks these data are used as indicators of condition for abundance forecasting (e.g., impacts of El Nino events) or survival.

Estimation of Regional Coho Production. The CoTC relies on CWT recovery data to produce estimates of total abundance for coho production units coastwide. This is accomplished through the use of CWT recovery data in run reconstruction and estimation of production expansion factors (PEF) in the mixed-stock model (MSM). PEFs are estimates of how many fish a single CWT represents from a given MU.

Estimation of Escapement of Natural Stocks. Estimates of the numbers of coho escaping fisheries to spawn are not available for some coho production units. The CoTC generates estimates of escapements based on estimates of fishery contributions of a coho production unit and estimates of ERs of selected hatchery indicator stocks.

3 Key Elements of the CWT program

The CWT program consists of several key components involving tagging, recovery, and data reporting. These components are coordinated and implemented coastwide to provide statistically reliable data for stock assessments and fishery evaluations (TCDS 1989; Johnson 2004) (Figure 3-1). A regional mark committee coordinated through the PSMFC and the PSC Data Sharing Committee ensure that unique codes are employed for tagging and that inter jurisdictional implications of marking programs are considered. CWTs are recovered by programs intended to sample a minimum proportion of fishery catches and escapements. Agencies use standardized formats and protocols to report release and recovery data to centralized locations where data are validated and stored for access.

The components of the CWT data systems are illustrated in Figure 3-1. Figure 3-2 illustrates the main components of the data exchange protocols between the Canadian and U.S. data systems.

3.1 Quality Assurance and Control

The parties to the PST have agreed to maintain the tagging and recovery program designed to provide statistically reliable data for stock assessments and fishery evaluations. The CWT system consists of several elements:

(1) There are separate U.S. and Canadian CWT reporting databases. The U.S. system (Regional Mark Information System, RMIS) is maintained by the Regional Mark Processing Center (RMPC) of the Pacific States Marine Fishery Commission (PSMFC). The Canadian system (Mark Recovery Program, MRP) is maintained by the Canadian Department of Fisheries and Oceans (CDFO).
(2) Both countries acquire CWT data that originates within their country and provide access to information contained in their databases in a manner that satisfies users of their country.
(3) Reporting requirements and centralized responsibilities for data exchange between Canada and the United States are standardized to ensure both databases are identical.
(4) Cooperative development of standardized formats for reporting release, recovery, and catch sample data has been employed. The release system provides information on all releases coastwide, tagged and untagged. The recovery system encompasses the sampling and recovery information for all fisheries and escapement locations coastwide.
(5) There are inter-agency processes for review, coordination, and modification of CWT data.
(6) There are rules for data validation and procedures for correction.

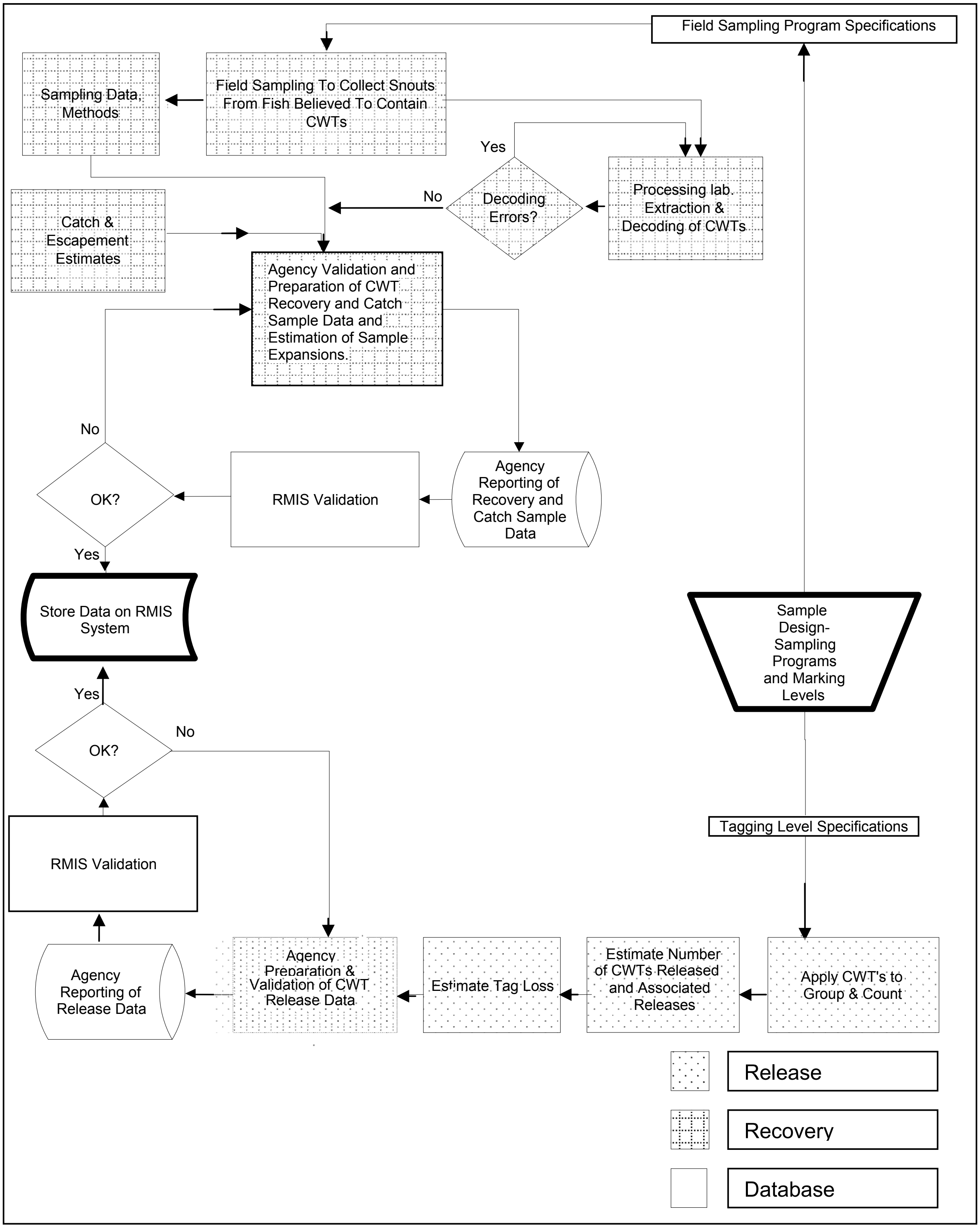


Figure 3-1. The sequence of data handling and management procedures of the CWT program, focusing on tag release, recovery, and reporting.

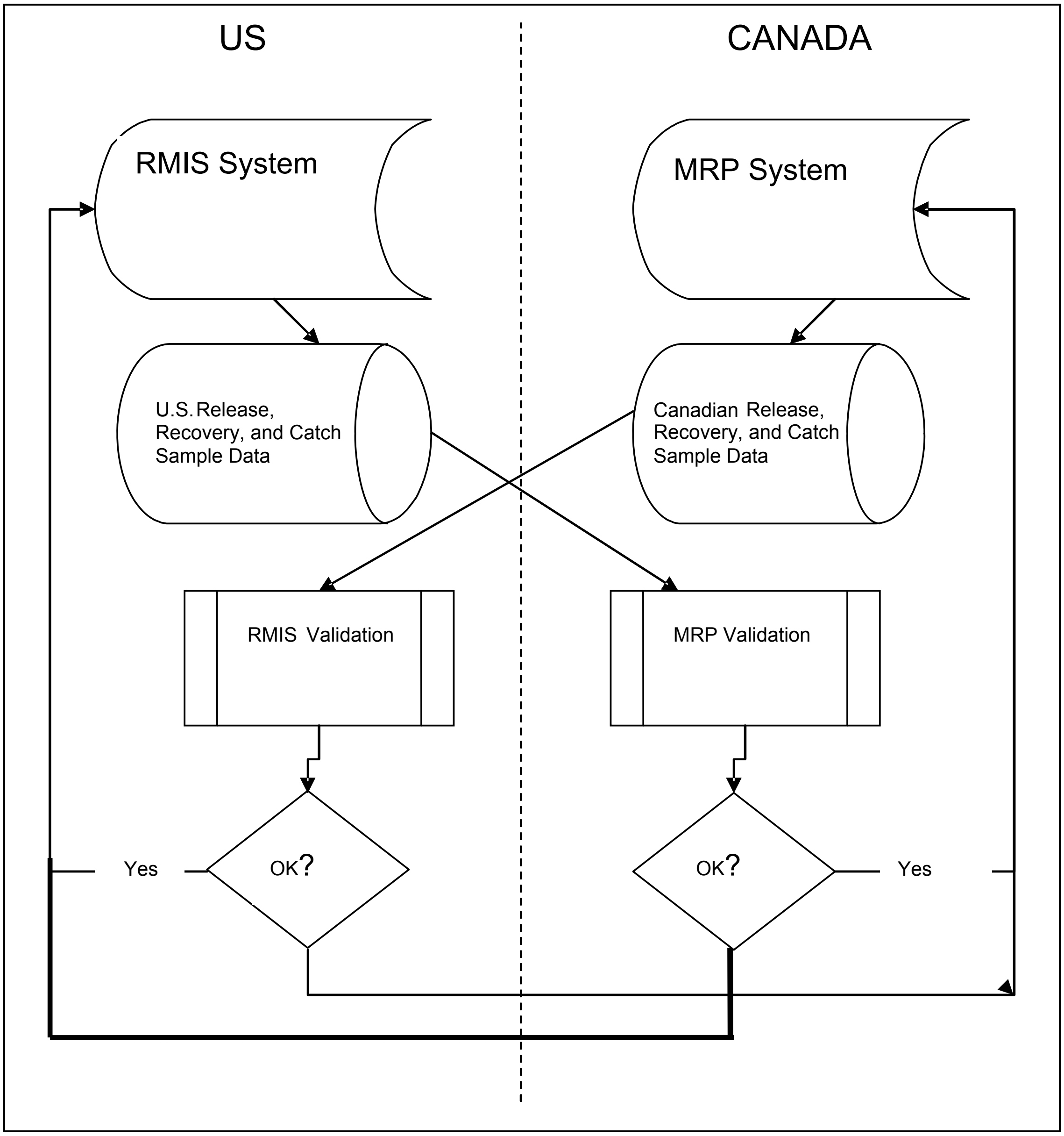


Figure 3-2. The main components of the data exchange protocols between the Canadian and U.S. CWT database systems.

3.1.1 Tagging Programs

Chinook and coho salmon tagging programs are carried out by agencies coastwide. The tag groups are specific releases of hatchery juveniles and wild or naturally-produced juveniles. For CWT analyses, tag codes must be unique for each tag group. The data reported with each CWT release group provides information on 1) the origin and release location of the fish and 2) the age of the fish in the tag group. The following conditions are necessary for survival rate and ER analyses using CWTs:

- Sufficient tags are released to allow estimation of statistics with the desired level of precision. For the purposes of using tag groups as indicator stocks (CTC) or regional representatives (CoTC), tagging level criteria are currently set at 200,000 for Chinook salmon and 45,000-75,000 for coho salmon.[2]
- Tag loss and tag mortalities are estimated within defined limits of uncertainty.
- Number of tagged fish released is known or if there is a need to estimate pre-recruitment survival then it should be known with little or no error.
- Total numbers of fish that are represented by a hatchery CWT release group is known without error, which is required if there is a need to estimate contribution of hatchery production.

An adequate time series of data must be acquired to use CWT data to monitor changes in productivity, survival, and exploitation patterns over time.

3.1.2 Sampling Program

Coast wide sampling programs that recover CWTs in commercial and recreational fisheries, in hatcheries, and on spawning grounds have been in place for three decades. Reported tag recoveries from returning adult fish are on the order of 300,000 per year. Quality control is the responsibility of the agencies conducting the tagging and sampling tasks and reporting the results.

CWT sampling is stratified to achieve management and statistical goals. For example, fisheries are sampled by area and gear and period, where period can be week, bi-weekly, month, season, or year. The definition of the spatial-gear-time strata for sampling is determined by the conduct of the fisheries and the preferences of the sampling agency. Estimation of tagged fish harvested or in escapement in a sample stratum depends on some basic assumptions, including the following:

- Sampling in each stratum is representative. Representative indicates that either sampling is random, i.e., all members of the population being sampled have equal chance of being sampled or that there is no difference between the segments of the population that are

[2] These "standards" were established in the late 1970s and early 1980s for the purpose of providing estimates of brood year ERs with acceptable levels of precision. The 200,000 CWT release group size for Chinook was established for fall Chinook fingerling releases, based on average estimated survival, fishery patterns, and brood year ERs during that period.

available for sampling and the segment that cannot be sampled. Fisheries or spawning populations cannot be randomly sampled according to the definition above, therefore sample strata should be structured to include fishery or spawning areas and periods that are similar in the stock composition of the populations present. Under this assumption estimates of the number of tagged fish harvested or in escapement in the strata are unbiased for each tag code.

- The total harvest or escapement is known or estimated without bias for the purposes of calculating a sample expansion to expand the observed tagged fish to total tagged fish harvested or in the escapement.
- All tagged fish in the sample are identified, collected, and processed.
- The sample rate is sufficient to provide an adequate number of tag recoveries to meet statistical criteria to estimate fishery and stock parameters. Currently there is a general criterion that all fisheries be sampled at 20%. Hatcheries are generally sampled at high rates, up to 100%, and spawning locations are sampled at levels ranging up to 50%, depending on the watershed and environmental conditions in each year.

3.1.3 Total Coverage of Fisheries and Escapement

An additional assumption required to estimate ERs is that all fisheries and escapement locations where a tagged stock is present will be sampled for tagged fish. This assumption of total coverage is necessary to provide unbiased estimates of cohort size and ER. It is the responsibility of each agency to sample all fisheries and escapement locations within its jurisdiction where tagged fish are present. Incomplete coverage of escapement locations results in underestimated cohort size, missing information, and estimates of ERs that are biased high.

3.1.4 Estimates of Total Catches and Escapement in Strata

In order to estimate the total number of tagged fish in harvest or escapement, the sampled tags are expanded for the fraction sampled by strata (area, gear, and period) (see Chapter 5). The sample fraction is the number sampled over the total available for sample, i.e., the total catch or escapement. In order for estimates of tagged harvest and escapement to be unbiased, the estimate of the total must be unbiased. In addition, it is necessary to provide estimates of total catch or escapement with sufficient precision to allow estimation of parameters within statistical criteria. The total catch (or escapement) and sample used for estimation of the sample fraction and tag expansion is reported to the RMIS or MRP catch-sample file.

3.1.5 Reporting and Validation

Release and sampling agencies have the responsibility of reporting release, catch-sample, and tag recovery data to the regional exchange points within the U.S. and Canada. Canada maintains its CWT database at the Pacific Biological Station and the U.S. at the PSMFC (Figure 3-2). Both databases are subjected to agreed upon validation rules for the data. The PSMFC provides programs for validating the data reported, and reports to submitting agencies when validation is not met. The validation rules are specified in the PSC Data Standards Workgroup (DSWG) database specification report (DSWG 2005) which may be found on the PSMFC web site. Validation rules indicate when columns must contain one of a set of allowed codes, such as for fishery type, gear type, species, agency code, or tag status. In addition, tag codes reported in a recovery file must match a tag code reported in a release file in the database. Information regarding species, sampling periods, and other data items in a catch/sample file must match the corresponding information in the recovery file. The location codes (for releases, recoveries and sampling sites) must follow certain rules such that the database operations can sort data by location. These are just some of the validation rules used. All reporting agencies are responsible for ensuring that complete and accurate data are reported.

4 Current Status of CWT Program

Quality assurance encompasses all activities necessary to provide confidence that a monitoring program will meet its stated objective(s). For the CWT system, this includes sample design (tagged groups and tagging levels, fishery and escapement sample strata, and sampling rates) and statistical criteria (precision and accuracy) for specific statistics estimated from CWT data. Quality control pertains to the measures necessary to ensure that the CWT data are accurately and timely reported (e.g., sampling methods, reporting, and validation). This includes methods for tagging fish, release methods of tagged groups, methods of sampling in fisheries and in hatcheries and in escapement (e.g., are visual or electronic methods used, are all fish equally likely to be sampled, and are samples processed from all fish with tags detected?).

4.1 Summary of Tagging and Sample Rates for Chinook and Coho CWT Groups

Two of the tasks set for the workgroup under Expert Panel Recommendation 1 were to identify current indicator stock tagging and sampling levels and consistency with current target levels. The current standard for fishery CWT sampling is 20% of the catch per strata, which is the goal for all agencies sampling commercial and sport fisheries. The workgroup summarized the catch-sample data available from the PSMFC RMIS indicating the proportion of reported sample strata with sample rates under 20% or not sampled at all (Table 4-1). These statistics were averaged over fishery years 2000-2004, separately for Chinook and coho and included average annual sample rates and total catch by fishery.

The PSC technical committees rely upon selected groups of CWT'd hatchery and wild Chinook and coho as surrogates to estimate impacts on natural stocks. For Chinook salmon the CTC uses a set of indicator stocks, which have been consistently tagged over long time series, and which have a standard target tagging level of approximately 200K per year. No formal system of indicator stocks has been established by the CoTC, although for Puget Sound and Washington coastal stocks tagging group standards are set at 40K and 75K, respectively. The CoTC uses any tagged coho released within a production region that meets specified criteria in procedures to generate contribution estimates for natural production from geographic regions. Table 4-2 and Table 4-3 summarize the number of tagged fish released, the average number of tagged fish returning to escapement, and sample rates at hatcheries and spawning grounds for each of the tagged stocks of Chinook and coho salmon used by the PSC technical committees.

Analyses of CWT data provide estimates of fishery ERs and other statistics employed for stock/fishery assessments and planning (see Chapter 2 for descriptions on the uses of CWT data by the CTC and CoTC). Recoveries of tagged fish in fisheries and escapement provide the basic input in these analyses. Table 4-4 and Table 4-5 show the distribution of these tagged stocks in fisheries averaged over brood years 1995-1999 (all ages combined). The fisheries included in these tables are those used by the CTC for ER analysis.

Table 4-1. Sampling statistics for fisheries that catch Chinook and coho salmon, averaged over the last 5 years (2000-2004) with comments as to the major issues for each fishery. Data are taken from RMIS catch-sample file, where a stratum is an area/period/gear and species record as reported by agencies. For both species, the table shows % of the annual fishery catch in total samples with all sample strata combined and the average annual catch; percent of all catch-sample strata reported to the PSMFC RMIS that are either sampled below 20% or not at all; and associated % of total annual catch represented by the under or un-sampled strata. NA identifies fisheries with small catches (e.g. less than a few hundred fish per year) and ND indicated no data were available. Key for comments is shown at bottom of table.

		CHINOOK						COHO							
		All Areas and Periods Combined		Strata Sampled at >0 and <20%		Strata Unsampled		All Areas and Periods Combined		Strata Sampled at >0 and <20%		Strata Unsampled		Comments, see Key at Bottom of Table	
REGION	FISHERY	% Annual Catch in Total Sample	Average Annual Catch	% of Strata	% of Catch in those Strata	% of Strata	% of Catch in those Strata	% Annual Catch in Total Sample	Average Annual Catch	% of Strata	% of Catch in those Strata	% of Strata	% of Catch in those Strata	Chinook	Coho
SEAK	Traditional Troll	34	222,837	8	3	1	<1	32	1,480,228	2	1	4	1		
	Experimental Area Troll	47	35,486	7	13	17	2	35	2,284	9	7	42	32		
	Traditional Purse Seine	16	13,332	18	81	30	7	14	382,240	46	68	23	6	1	1
	Traditional Drift Gillnet	25	6,705	23	51	23	7	25	308,697	30	37	8	1		
	Traditional Set Net	4	2,835	3	4	92	85	1	169,668	3	11	97	89		
	Sport	19	72,375	58	68	3	2	25	171,047	29	33	7	6	1	
	Terminal Purse Seine	12	12,892	20	66	51	22	4	24,035	16	54	68	43	1,3	1,3
	Terminal Area Drift Gillnet	2	6,680	3	6	93	91	3	21,039	2	18	94	75	1,3	1,3
	Terminal Troll	12	5,307	19	44	65	37	19	2,256	2	6	88	62	1,3	1,3
	MIC Drift Gillnet	30	1,898	28	28	15	<1	17	33,843	41	67	3	5		
	MIC Purse Seine	2	777	23	70	74	30	5	7,988	36	48	56	45	1	1
British Columbia	Georgia Strait Troll	15	372	15	33	67	37	NA	NA	NA	NA	NA	NA	3	3,6
	North Central Troll	NA	NA	NA	NA	NA	NA	12	12,001	19	28	56	35	3	
	North Troll	30	85,377	21	39	55	1	24	101,244	14	56	57	<1	3	1,3
	NW Vancouver Island Troll	24	44,504	15	50	75	11	NA	NA	NA	NA	NA	NA	3	3
	South Central Troll	5	333	15	45	80	54	NA	NA	NA	NA	NA	NA	3	
	SW Vancouver Island Troll	33	67,026	9	21	46	1	NA	NA	NA	NA	NA	NA	1,3	

		CHINOOK						COHO						Comments, see Key at Bottom of Table	
		All Areas and Periods Combined		Strata Sampled at >0 and <20%		Strata Unsampled		All Areas and Periods Combined		Strata Sampled at >0 and <20%		Strata Unsampled			
REGION	FISHERY	% Annual Catch in Total Sample	Average Annual Catch	% of Strata	% of Catch in those Strata	% of Strata	% of Catch in those Strata	% Annual Catch in Total Sample	Average Annual Catch	% of Strata	% of Catch in those Strata	% of Strata	% of Catch in those Strata	Chinook	Coho
	Central Net	35	4,270	23	27	23	14	15	11,296	7	4	68	77		6
	Fraser Gill Net	51	8,248	3	12	19	6	29	81	6	12	55	63		
	Johnstone Strait Net	33	383	6	20	60	27	212	193	0	0	71	71		6
	North Net	42	14,771	9	7	16	<1	30	7,286	8	67	66	5		6
	NW Vancouver Island Net	12	2,371	0	0	78	58	8	969	10	9	55	73		
	SW Vancouver Island Net	33	2,492	11	15	69	4	19	1,293	6	31	87	21		
	Fraser Indian Food Fishery	0	24,971	0	0	100	100	0	1,511	0	0	100	100	1,2	1,2
	Nuu-chah-nulth Abor. Fishery	28	5,379	33	41	0	0	NA	NA	NA	NA	NA	NA	1	7
	Alberni Canal Sport	0[5]	7,173	0	0	100	100	0[5]	5,158	0	0	100	100	1,3,5	1,5
	CBC Sport	0[5]	7,357	0	0	100	100	0[5]	1,884	0	0	100	100	1,3,5,6	1,5,6
	Freshwater Sport	0[5]	22,146	0	0	100	100	0[5]	NA	0	0	100	100	1,3,5,6	1,5,6
	GS Sport North	0[5]	21,348	0	0	100	100	0[5]	3,281	0	0	100	100	1,3,5,6	1,5,6
	GS Sport South	0[5]	6,663	0	0	100	100	0[5]	3,370	0	0	100	100	1,3,5,6	1,5,6
	Juan de Fuca Sport	0[5]	25,004	0	0	100	100	0[5]	6,017	0	0	100	100	1,3,5	1,5
	NBC Sport	0[5]	53,448	0	0	100	100	0[5]	38,268	0	0	100	100	1,3,5,6	1,5,6
	WCVI Sport	0[5]	70,002	0	0	100	100	0[5]	32,135	0	0	100	100	1,3,5,6	1,3,6
Washington	Puget Sound Net	23	6,242	8	23	53	20	21	78,646	15	43	42	7	6	6
	Coastal Net	26	6,276	10	22	43	4	34	35,548	16	21	17	2		
	Freshwater Net	31	15,193	9	8	25	6	25	106,658	12	13	23	6		
	Ocean Troll	41	56,766	15	20	32	9	24	31,110	18	31	47	12		
	Col R. sport (exc. B10)	17	13,386	26	37	59	20	5	4,288	28	59	43	41		1,3
	Puget Sound Sport	22	6,452	53	59	17	1	28	13,126	43	26	25	1	1	1

REGION	FISHERY	CHINOOK: All Areas and Periods Combined: % Annual Catch in Total Sample	CHINOOK: All Areas and Periods Combined: Average Annual Catch	CHINOOK: Strata Sampled at >0 and <20%: % of Strata	CHINOOK: Strata Sampled at >0 and <20%: % of Catch in those Strata	CHINOOK: Strata Unsampled: % of Strata	CHINOOK: Strata Unsampled: % of Catch in those Strata	COHO: All Areas and Periods Combined: % Annual Catch in Total Sample	COHO: All Areas and Periods Combined: Average Annual Catch	COHO: Strata Sampled at >0 and <20%: % of Strata	COHO: Strata Sampled at >0 and <20%: % of Catch in those Strata	COHO: Strata Unsampled: % of Strata	COHO: Strata Unsampled: % of Catch in those Strata	Comments, see Key at Bottom of Table: Chinook	Comments, see Key at Bottom of Table: Coho
	WA Ocean Sport	42	22,792	2	1	3	<1	44	49,388	2	<1	4	<1		
	Col R Buoy 10	26	6,336	8	19	3	<1	28	23,846	11	67	2	<0		
	Freshwater Sport	6	3,205	11	34	64	72	3	18,621	1	19	37	85	1,3,6	1,3,6,
Oregon	Ocean Troll	31	182,838	22	39		4		3,896	9	24		4	7	7
	Ocean Sport	40	17,133	3	4		0		25,554	2	4		0	7	7
	Columbia R Net	45	87,231	5	22		0		97,219	6	2		1	7	7
	Columbia R Sport	24	26,212	29	60		0		2,273	28	85		0	7	7
	Columbia R B10 Sp	47	3,826	0	0		0		10,634	2	<1		0	7	7
	Est fresh sport (non Col R.)	34	4,371	12	21		0		96	0	-		1	7	7
California	Ocean Troll	28	411,819	20	18	4	0								
	Ocean Sport	26	156,528	19	20	0	0								
	Klamath River Net	33	29,902	27	30	5	0								
	Klamath River Sport	32	9,894	15	7	1	0								
	Sacramento River Sport	3	75,936	60	60	40	40							1,3,4	
	Other Freshwater Sport	0	NA	0	0	100	100							1,3,4	1,3,4

Key for fishery issues:

1 Low fishery sample rates
2 Non-representative fishery sampling
3 Incomplete fishery sampling
4 Inconsistent sampling of marked and unmarked CWTs
5 Voluntary sampling programs
6 Bias in estimates of total harvest
7 Data coordination and reporting issues

Table 4-2. Chinook indicator stock CWT releases, returns to escapement at hatchery rack and spawning grounds, averaged over brood years 1994-1999, and sample rates in hatchery and natural spawning escapement averaged over run years 2000-2004. Issues are indicated and explained by notes at bottom of table.

Indicator Stock Description			Average Release over BY 1994-1999	Average Estimated CWT Recoveries in Escapement (BY 1994-1999): Hatchery	Average Estimated CWT Recoveries in Escapement (BY 1994-1999): Spawning Grounds	Proportion Escapement Sampled For CWTs return years 2000-2004: Hatchery	Proportion Escapement Sampled For CWTs return years 2000-2004: Survey of Natural Spawners: Immediate Vicinity of Hatchery	Proportion Escapement Sampled For CWTs return years 2000-2004: Survey of Natural Spawners: Within Remainder of Watershed where Hatchery is Located	Issues, see Key at Bottom of Table
Alaska	ACI	Alaska Central Inside	60,054	218	-	45%	-	13%	
	ASI	Alaska Southern Inside	157,476	812	-	28%	-	22%	
	ALP	Little Port Walter	126,806	1,405	2	51%	17%	22%	
Canada	BQR	Big Qualicum R	214,010	97	90	65%	65%	0%	
	CHI	Chilliwack R	89,488	228	2,465	100%	12%	6%	1,2,6
	COW	Cowichan R	200,206	83	268	64%	14%	0%	2
	KLM	Kitsumkalum	204,019	0	630	100%	10%	0%	2
	PPS	Puntledge R	188,751	85	48	87%	87%	0%	
	QUI	Quinsam R	237,535	216	377	95%	74%	0%	
	RBT	Robertson Cr	199,968	463	508	100%	25%	0%	
	DOM	Dome Cr	74,837	42	8	71%	0%	0%	1,2,4,8
	SNO	Atnarko-summer (Snootli)	153,580	NA	>100 observed	NA	0%	0%	6,7,8
	SHU	Lower Shuswap	94,579	<5	457	100%	40%	0%	1,7,8
	NIC	Nicola	83,844	<20	487	100%	47%	0%	1,7,8
Washington	GAD	George Adams Fall Fingerling	292,588	467	61	100%	0%	5%	2,6
	GRN	Green River Fall Fingerling	313,235	314	172	96%	56%	14%	3
	GRO	Grovers Creek Fall Fingerling	225,278	1,356	23	94%	0%	14%	
	HOK	Hoko Fall Fingerling	157,484	148	447	66%	0%	43%	
	NIS	Nisqually Fall Fingerling	273,514	639		97%	0%	1%	2
	NSF	Nooksack Spring Fingerling	218,080	687	104	100%	27%	37%	6
	NKS	Nooksack Spring Yearling	170,664	109	11	100%	27%	37%	6
	QUE	Queets Fall Fingerling	175,429	3	443	89%	0%	25%	2
	SAM	Samish Fall Fingerling	253,976	280	1	76%	0%	0%	
	SKF	Skagit Spring Fingerling	232,669	1,096	37	100%	0%	6%	2,6
	SKS	Skagit Spring Yearling	167,077	630	48	100%	0%	6%	2,6
	SSF	Skagit Summer Fingerling	162,760	9	598	100%	0%	7%	2

				Average Estimated CWT Recoveries in Escapement (BY 1994-1999)		Proportion Escapement Sampled For CWTs return years 2000-2004			
							Survey of Natural Spawners		
Indicator Stock Description			Average Release over BY 1994-1999	Hatchery	Spawning Grounds	Hatchery	Immediate Vicinity of Hatchery	Within Remainder of Watershed where Hatchery is Located	Issues, see Key at Bottom of Table
	SOO	Soos Fall Fingerling-Coastal River	214,489	241					
	SPY	South Puget Sound Fall Yearling	112,029	8					
	STL	Stillaguamish Fall Fingerling	139,575	56	295	96%	0%	20%	6
	WRF	White River Fall Fingerling	217,747	480		95%	0%	0%	6
	WHF	White River Hatchery Fingerling	243,929	242	31	95%	0%	0%	
	WHY	White River Hatchery Yearling	75,885	167		95%	0%	0%	
	WRY	White River Spring Yearling	77,840	58		95%	0%	0%	
Oregon	SRH	Salmon River	184,044	96	1,434	100%	18%	18%	7
Columbia River	LRH	Columbia Lower River Hatchery fall	211,894	300	160	86%	35%		
	SUM	Columbia Summers	753,877	857	577	86%	0%	22%	
	CWF	Cowlitz Tule	223,079	136	44	95%	0%	27%	
	HAN	Hanford fall	155,120	3	356	100%	0%	5%	
	LRW	Lewis River Wild fall	85,027	2	141	85%	0%	35%	
	LYF	Lyons Ferry Fall	332,000	780	31	99%	0%	17%	
	SPR	Spring Creek Tule	423,085	881	81	36%	0%	12%	
	URB	Upriver Bright	397,298	468	351	98%	0%	21%	
	WSH	Willamette Spring	1,088,013	4,081	230	100%	0%	12%	2,3,4,6,7
California	SRF	Sacramento River fall Chinook	2,487,781	2,849	4,062	93%	18%	19%	2
	SRW	Sacramento winter Chinook	50,276	6	50	100%	56%	56%	1
	CVS	Central Valley spring Chinook	261,875	359	827	100%	5%	12%	2,6
	KTF	Klamath River fall Chinook	715,355	3,778	2,660	100%	42%	10%	1
	CAC	California coastal Chinook	23,666	0	0	100%	0%	0%	1,2,4,5,6,7

Key for escapement issues (see section 4.1.1. and 4.1.2):

1 Low CWT tag release numbers
2 Low esc. sample rates
3 Non-representative esc. sampling
4 Incomplete esc. sampling
5 Inconsistent sampling of marked and unmarked CWTs
6 Bias in estimates of total escapement
7 Data coordination and reporting problems
8 Currently not an indicator stock, but would be if funding available
9 Indicator stock no longer operating

Table 4-3. Coho production regions and indicator stock releases, returns to escapement at hatchery rack and spawning grounds averaged over brood years 1999-2003, and sample rates in hatchery and natural spawning escapements averaged over run years 2000-2004.

Province or State	Production Regions	Indicator Stock	Average Release (Release years 1999-2003)	Average Estimated CWT Recoveries (BY 1999-2003): Hatchery Rack	Average Estimated CWT Recoveries (BY 1999-2003): Escapement and AK Cost Recovery	Proportion Sampled For CWTs for CY 2000-2004: Hatchery	Proportion Sampled For CWTs for CY 2000-2004: Survey of Natural Spawners: Immediate Vicinity of Hatchery or Wild Stock (Cost Recovery for AK)	Proportion Sampled For CWTs for CY 2000-2004: Survey of Natural Spawners: Within Remainder of Watershed where Hatchery is Located	Issues - See Key at Bottom of Table
Alaska	N ALASKA INSIDE	HATCHERY	444,237	448	837	23%	5%		
		Auke Creek (NSEI)	4,520	NA	717	NA	100%		
		Berners River (NSEI)	38,800	NA	2,972	NA	9%		
		Chilkat River (NSEI)	27,339	NA	1,773	NA	3%		2
		Slippery Creek (NSEI)	17,064	NA	1,401	NA	85%		
	N ALASKA OUTSIDE	HATCHERY	79,949	171	0	100%			
		Ford Arm Lake (NSEO)	9,453	NA	491	NA	63%		
		Nakwasina River (NSEO)	9,222	NA	624	NA	33%		
	S ALASKA INSIDE	HATCHERY	610,929	467	310	30%	8%		
		Hugh Smith Lk (SSEI)	19,105	NA	1,199	NA	96%		
	S ALASKA OUTSIDE	HATCHERY	167,596	86	34	6%	9%		3,4,6
		Chuck Creek (SSEO)	16,002	NA	449	NA	100%		
	TRANSBOUNDARY	Taku River (TBR)	36,438	NA	2,227	NA	2%		2
British Columbia	BC NORTH COAST	Toboggan	34,542	10	1,146	62%	0%	0%	2-4,7,9
		Zolzap	10,432	NA	626	NA	75%	0%	1,7,9
		Lachmach	14,609	NA	555	NA	20%	0%	1,7,9
	BC CENTRAL COAST	Martin River	6,880	NA	60	NA	10%	0%	1-5,7,9
		West Arm Cr	7,156	NA	509	NA	50%	0%	1,7
	JOHNSTONE STRAIT	Quinsam	46,332	255	530	83%	83%	0%	4,6
		Keogh	26,269	NA	406	NA	0%	0%	2-4,7
	GEORGIA STR VCI	Big Qualicum	41,346	411	189	46%	0%	0%	4,6
		Black Creek	10,521	NA	3,633	NA	39%	0%	1,7
		Goldstream	21,561	28	552	100%	42%	0%	7
	UPPER FRASER RIVER	Coldwater River	39,182	59	3,021	100%	12%	0%	2
		Louis/Lemieux/Dunn Crs	25,757	24	1,524	100%	UNK	0%	1,4,7

Province or State	Production Regions	Indicator Stock	Average Release (Release years 1999-2003)	Average Estimated CWT Recoveries (BY 1999-2003)		Proportion Sampled For CWTs for CY 2000-2004			Issues - See Key at Bottom of Table
							Survey of Natural Spawners		
				Hatchery Rack	Escapement and AK Cost Recovery	Hatchery	Immediate Vicinity of Hatchery or Wild Stock (Cost Recovery for AK)	Within Remainder of Watershed where Hatchery is Located	
	LOWER FRASER RIVER	Chilliwack	38,894	1,094	86	100%	15%	2%	2-4,6,9
		Inch	39,862	604	53	100%	97%	0%	
	SW VANCOUVER IS	Robertson	40,316	1,721	42	67%	0%	0%	2-4
Washington	SKAGIT	Marblemount Hatchery	109,625	3,400		100%			
	NOOKSACK/SAMISH	Kendall Creek Hatchery	49,537	600		77%			
		Lummi Sea Ponds	46,977	196		88%			
		Skookum Creek Hatchery	46,938	703		94%			
	STILLAG/SNOHOMISH	Bernie Gobin Hatch	30,222	71		99%			1
		Wallace River Hatchery	42,485	2,133		94%			
	HOOD CANAL	George Adams Hatchery	44,556	1,484		95%			
		Port Gamble Bay Pens	45,745		60		84%		2
		Quilcene Bay Sea Pen	47,813	842	1	34%	100%		2,4
		Quilcene NFH	45,289	956		41%			2
	S. PUGET SOUND	Soos Creek Hatchery	82,833	2,472		87%			
		South Sound Net Pens	178,601	645		99%			2,4
		Voights Creek Hatchery	40,553	1,211		83%			
	ST OF JUAN DE FUCA	Lower Elwha Hatchery	149,457	683		100%			
	MAKAH	Makah NFH	38,120	634.87		23%			1,2
	QUILLAYUTE	Solduc Hatchery	78,008	1,654		99%			
	QUEETS	Salmon River Fish Cult	118,050	99	620	91%	24%		
	QUINAULT	Quinault NFH	176,497	2,852	5	21%	82%		2
	GRAYS HARBOR	Bingham Creek Hatchery	70,442	2	1	91%	100%		
		Lk Aberdeen Hatchery	49,141	442	2	99%	99%		
		Satsop Springs Ponds	32,321	1,373	63	98%	90%		1
	WILLAPA	Forks Creek Hatchery	87,759	1,949		99%			
		Naselle Hatchery	61,258	245		73%			
Columbia River	COLUMBIA RIVER	Cedc Youngs Bay Net	169,908	763	15	99%	99%		
		Cowlitz Salmon Hatch	125,016	1,319	1	98%	100%		

Province or State	Production Regions	Indicator Stock	Average Release (Release years 1999-2003)	Average Estimated CWT Recoveries (BY 1999-2003)		Proportion Sampled For CWTs for CY 2000-2004			Issues - See Key at Bottom of Table
							Survey of Natural Spawners		
				Hatchery Rack	Escapement and AK Cost Recovery	Hatchery	Immediate Vicinity of Hatchery or Wild Stock (Cost Recovery for AK)	Within Remainder of Watershed where Hatchery is Located	
		Eagle Creek NFH	52,421	354	3	55%	100%		2
		Elochoman Hatchery	68,083	309	3	99%	100%		
		Grays River Hatchery	58,650	321		86%			
		Kalama Falls Hatchery	113,796	599	1	90%	100%		
		Klaskanine S Fk Pond	26,035	26	3	97%	100%		1
		North Toutle Hatchery	67,269	968	7	74%	100%		
		Oxbow Hatchery	169,072	1,261	13	99%	100%		
		Sandy Hatchery	111,941	1,044	3	99%	100%		
		Washougal Hatchery	300,843	3,825	8	98%	100%		
		Willard NFH	56,124	251	4	90%	99%		
Oregon and California	OREGON N AND MID CST	Cole River Hatchery	47,932	540	1	98%	100%		
		Nehalem Hatchery	50,608	753	63	99%	95%		
		Rock Creek Hatchery	48,332	144	2	94%	100%		
		Salmon River Hatchery	24,656	159	95	99%	66%		1
		Trask River Ponds	31,682	1,286	3	99%	94%		1
	OREGON S/CALIF CST	Oregon/Sth Cal Cst	28,036	1,513	4	99%	58%		1

UNK = Unknown (missing data)
1 Low CWT tag release numbers
2 Low esc. sample rates
3 Non-representative esc. sampling
4 Incomplete esc. sampling
5 Inconsistent sampling of marked and unmarked CWTs
6 Bias in estimates of total escapement
7. Data coordination and reporting problems
8 Currently not an indicator stock, but would be if funding available
9 Indicator stock no longer operating

Table 4-4. Estimated number of tagged fish harvested in fisheries as grouped by the CTC and in escapement for Chinook indicator stocks averaged over brood years 1999-2004. See Table 4.2 for full name of indicator stocks.

Region	Stock	SEAK	NCBC Troll	NCBC Sport	BC Net	WCVI Troll	WCVI Sport	GAST Sport	WAOCN	WAPS Sport	WAPS Net	COLR Net	COLR Sport	OR Sport	OR Troll	CA	TERM	Total Escap.
Alaska	ACI	258	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	257
	ALP	928	4	8	0	0	0	0	0	0	0	0	0	0	0	0	0	1,237
	ASI	1,272	18	14	2	1	0	0	0	0	0	0	0	0	0	0	0	2,036
Canada	BQR	41	5	23	1	4	3	23	1	0	5	0	0	0	0	0	9	183
	CHI	6	1	12	14	323	121	196	419	78	31	0	1	0	27	0	160	2,658
	COW	5	4	10	0	28	21	118	3	9	43	0	0	0	0	0	38	340
	KLM	149	18	85	32	0	0	1	0	0	0	0	0	0	0	0	30	622
	PPS	13	1	24	2	1	2	23	0	0	0	0	0	0	0	0	0	125
	QUI	154	4	107	5	0	0	17	0	0	0	0	0	0	0	0	0	631
	RBT	247	26	93	0	1	52	12	0	0	0	0	0	0	0	1	225	754
	SNO	61	15	74	77	2	0	0	1	0	0	0	0	0	0	0	19	0
Washington	GAD	6	2	1	1	161	64	28	63	94	74	0	0	1	9	1	140	708
	GRN	8	8	4	1	143	41	40	53	131	103	0	0	0	6	0	389	519
	GRO	6	5	0	1	236	86	51	69	147	89	0	0	1	20	0	3	1,600
	HOK	105	29	9	0	3	7	13	2	1	0	0	0	1	0	1	0	596
	NIS	1	0	1	0	108	44	25	56	238	14	0	0	0	8	0	728	874
	NKS	0	0	1	2	5	2	16	1	3	1	0	0	0	0	0	1	48
	NSF	35	3	7	1	208	63	67	13	10	5	0	0	0	0	0	3	1,031
	QUE	310	80	79	0	4	4	1	10	0	0	0	0	0	0	0	215	461
	SAM	5	5	3	1	141	62	84	42	75	597	0	0	0	2	0	8	509
	SKF	28	4	19	6	87	84	106	5	41	3	0	0	0	0	0	8	1,133
	SKS	3	2	9	0	150	58	96	3	130	10	0	0	0	0	0	7	815
	SOO	58	22	12	0	1	6	3	3	1	0	0	0	0	0	0	29	241
	SPY	0	0	0	0	1	2	1	1	44	3	0	0	0	1	0	1	6
	SSF	105	13	31	1	66	46	47	2	6	3	0	0	0	0	0	5	607
	STL	10	2	2	1	27	18	15	1	19	1	0	0	0	0	0	0	310
	WHF	1	0	0	0	3	0	1	1	9	0	0	0	0	0	0	1	97
	WHY	0	0	0	0	0	0	1	1	24	0	0	0	0	0	0	2	67
	WRF	0	0	0	0	18	6	10	4	18	0	0	1	0	4	0	0	288
	WRY	0	0	0	0	1	0	0	0	25	1	0	0	0	0	0	0	35
Oregon	SRH	568	142	68	0	9	5	0	9	0	0	0	0	56	41	0	950	1,629

Region	Stock	SEAK	NCBC Troll	NCBC Sport	BC Net	WCVI Troll	WCVI Sport	GAST Sport	WAOCN	WAPS Sport	WAPS Net	COLR Net	COLR Sport	OR Sport	OR Troll	CA	TERM	Total Escap.
Columbia River	CWF	16	3	1	0	24	15	1	70	0	0	12	8	2	38	0	7	179
	HAN	154	32	10	0	11	4	0	5	0	0	157	69	1	5	0	5	359
	LRH	1	0	0	0	90	54	2	106	1	1	45	5	9	63	1	23	428
	LRW	47	12	5	0	22	10	0	14	0	0	16	7	0	8	0	4	397
	LYF	26	18	1	0	57	4	0	113	0	0	68	18	2	31	1	16	763
	SPR	0	0	0	0	211	85	6	291	11	0	750	10	22	254	4	83	945
	SUM	1,309	397	154	3	725	132	8	366	11	0	106	190	35	325	13	5	1,433
	URB	278	45	29	0	19	13	3	28	0	0	305	110	1	7	0	19	819
	WSH	370	39	7	0	115	20	0	45	5	0	958	473	2	40	1	2,554	9,636
California	SRF	1	0	1	0	21	21	0	47	62	0	2	0	257	2,007	3,861	1,162	6,911
	SRW	0	0	0	0	1	0	0	0	0	0	1	0	1	1	5	27	56
	CVS	0	0	0	0	4	2	0	9	8	0	0	0	56	476	845	324	1,186
	KTF	0	0	0	0	0	0	1	0	2	0	2	0	53	410	671	403	6,438
	CAC	0	0	0	0	0	0	0	0	0	0	0	0	0	1	29	0	0

Table 4-5. Estimated harvest by fisheries for tagged coho salmon used as representatives for production regions averaged over brood years 1995-1999. The same fishery groups used for Chinook in Figure 4-4 are used here for coho.

Production Region		SEAK	NCBC Troll & Net	NCBC Sport	WCVI Net	WCVI Sport	GAST Sport	WAOCN	WAPS Sport	WAPS Troll & Net	COLR Net	COLR Sport	OR Sport	OR Troll	CA	TERM
Alaska	N ALASKA INSIDE H	8,283	1	0	0	0	0	0	0	0	0	0	0	0	0	15,783
	N ALASKA OUTSIDE H	1,595	0	0	0	0	0	0	0	0	0	0	0	0	0	2
	S ALASKA INSIDE H	14,453	79	64	0	0	0	0	0	0	0	0	0	0	0	5,702
	S ALASKA OUTSIDE H	1,841	0	0	0	0	0	0	0	0	0	0	0	0	0	939
	Auke Creek (NSEII)	374	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Berners River (NSEI)	2,954	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Chilkat River (NSEI)	1,152	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Chuck Creek (SSEO)	715	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Ford Arm Lake (NSEO)	728	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Hugh Smith Lk (SSEI)	1,134	37	15	0	0	0	0	0	0	0	0	0	0	0	
	Nakwasina River (NSEO)	243	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Slippery Creek (NSEI)	1,065	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Taku River (TBR)	1,005	0	0	0	0	0	0	0	0	0	0	0	0	0	
British Columbia	BC NORTH COAST	788	121	188	0	0	0	0	0	0	0	0	1	0	0	621
	BC CENTRAL COAST	27	8	22	0	0	0	0	0	0	0	0	0	0	0	0
	JOHNSTONE STRAIT	11	3	157	0	12	17	1	8	4	0	0	1	0	0	10
	GEO STR VANC ISL	4	3	106	0	75	70	13	89	39	0	1	6	1	0	31
	UPPER FRASER RIVER	0	0	0	0	12	9	21	44	13	0	1	11	0	0	0
	LOWER FRASER RIVER	2	0	0	0	42	57	25	115	59	0	0	5	0	0	304
	SW VANCOUVER ISL	2	4	22	32	830	28	7	22	14	0	0	2	0	0	17
Washington	SKAGIT	1	2	12	0	59	94	269	1,401	278	0	5	95	2	0	1,455
	NOOKSACK/SAMISH	3	1	14	0	32	77	90	311	1,825	0	2	33	3	0	154
	STILLAG//SNOHOM	0	0	7	0	30	18	145	553	1,460	0	2	56	4	0	7
	HOOD CANAL	2	1	10	0	53	27	110	1,236	756	0	1	52	5	0	217
	S PUGET SOUND	4	1	12	0	135	54	333	2,087	3,573	0	6	118	7	0	3,952
	STR OF JDF	21	1	19	0	3	6	24	50	28	1	4	4	0	0	225
	MAKAH COASTAL	2	2	0	0	15	4	52	36	14	1	3	19	1	0	61
	QUILLAYUTE	4	2	0	0	24	0	133	24	51	0	2	62	9	0	5
	QUEETS	1	1	0	0	4	0	201	21	28	0	5	83	9	0	914

Production Region		SEAK	NCBC Troll & Net	NCBC Sport	WCVI Net	WCVI Sport	GAST Sport	WAOCN	WAPS Sport	WAPS Troll & Net	COLR Net	COLR Sport	OR Sport	OR Troll	CA	TERM
	QUINAULT	6	5	18	0	54	5	626	99	57	0	21	228	19	0	3,674
	GRAYS HARBOR	2	2	0	0	20	0	373	10	13	1	9	61	16	0	345
	WILLAPA BAY	2	3	10	0	22	9	2,347	44	32	9	30	352	29	0	3
Columbia R.	COLUMBIA RIVER	0	0	7	0	90	3	3,163	154	68	8,931	2,368	2,805	208	28	18
Oregon and California	OR N AND MID CST	1	0	0	0	0	0	170	13	3	4	36	421	19	14	33
	OR S/CALIFORNIA CST	0	0	0	0	0	0	1	0	0	0	0	18	1	3	2

4.2 *Summary of Tagging and Sampling for Chinook and Coho Salmon Indicators*

The workgroup developed a tool to examine the current status of Chinook and coho tagging and sampling programs. This tool used criteria set by the PSC technical committees or the CWT workgroup, and the information summarized for tagging and sampling issues for Chinook and coho indicators in Table 4-1 to Table 4-5. The output from the tool is a summary evaluation table, which provides an overview of the performance of current tagging and sampling efforts relative to the standards and precision criteria developed by the CTC, CoTC and the CWT workgroup.

The table is a matrix of rows representing Chinook indicator stocks or coho regional groups and columns representing either tag release size or recovery sampling locations. The status for each cell is represented by an index of 1 (green cell), 2 (yellow cell) or 3 (red cell). In order to receive a status of 1 (or a green light) all criteria must be met, if one criterion is not met the cell receives a status of 2 (yellow) and if 2 or more criteria are not met, then the cell receives a status of 3 (red). However, the initial test for all cells representing fishery sampling (columns 3 and higher) is whether a minimum proportion of the total tagged fish of that stock was present in a fishery. If the percent distribution is less than 2.5% then the cell will be blank for that stock-fishery combination. An average percent distribution of 2.5% was chosen as a minimum by the CWT workgroup in order to provide an overview of the fishery areas where a stock is likely to be present.

In order to provide an overview, the tool evaluates several criteria simultaneously to identify areas with stocks and/or fisheries where further evaluation is necessary based on the following criteria:

1. Release size. For each tagged stock or production region, was the release size at or above the minimum guideline (200K for Chinook; 40K-75K for coho)?
2. Recoveries in escapements. For escapement, was the sample rate above 20%, was the escapement estimated with a percent standard error (PSE) that does not exceed 20%, and was the minimum number of observed recoveries achieved (20 for Chinook all ages combined and 10 for coho salmon – see discussion on precision in Chapter 5)?.
3. Recoveries in fisheries. For each stock, did the fishery strata account for at least 2.5% of the recoveries?
4. Fishery sampling. Was the fishery sampled?
5. Fishery sampling rate. If the fishery is sampled, then were at least 20% of the fish examined for CWTs, was the harvest estimated with a PSE that does not exceed 20%, and was the minimum number of recoveries observed (20 for Chinook all ages combined and 10 for coho salmon – see discussion on precision in Chapter 5)?

4.2.1 CWT Release Sizes

Survival, patterns of fishery exploitation, acceptable levels of uncertainty surrounding ER estimates for specific fisheries, the accuracy of catch and escapement estimates, and the design of sampling programs all influence the determination of the required size of CWT releases. A universal standard release size is not be suitable for all circumstances. Chapter 6 of this report describes a tool that can help evaluate interactions among these factors when establishing target CWT release sizes.

The simple general release criterion is currently 200K tags per indicator group for Chinook salmon (originally developed for fall Chinook hatchery releases) and 40-75K for coho salmon. Given the standard target of 20 (Chinook salmon) or 10 (coho salmon) observed tags per stratum to meet minimum precision criteria for an estimate of total tags or ER, the stock's survival will influence whether releases are adequate. For Chinook salmon a minimum of 20 tags was the criteria used, representing roughly 10 tags from each of two major age classes (e.g., age 3- and 4-ocean-age fish). However, some stocks have consistently demonstrated higher survival rates in recent years and have been tagged at a lower rate. So we developed graduated criteria to accommodate stocks with better survival rates (Figure 4-1). The criteria show the necessary survival needed with different release sizes to expect 10 or 20 recovered tags given a 2.5% ER and a 20% sampling rate.

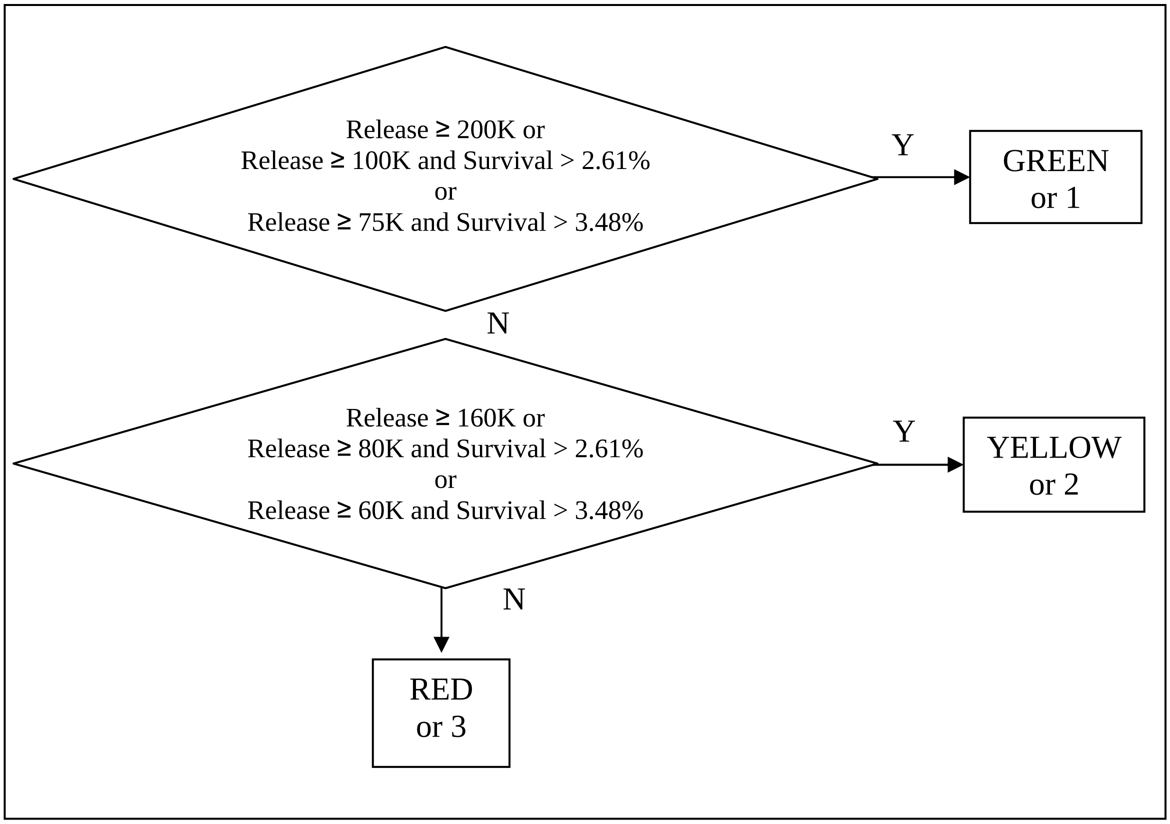


Figure 4-1. Flow chart showing how release criteria were used to identify a color for each Chinook indicator stock.

4.2.2 Sampling Programs

The criteria used to assess hatchery and spawning ground escapement and fishery sampling efforts were guided by sampling rates, PSE of estimated tags, and the number of tags observed (Table 4-6 and Table 4-7).

Table 4-6. Benchmark parameters and criteria used to evaluate CWT sampling and estimation performance.

Benchmark Parameter	Criteria
Sampling Rate	20% for fisheries
Percent Standard Error in Estimated Tags	30%
Number of Observed Tags	20 for Chinook all ages and 10 for coho salmon

Table 4-7. The PSE index (1<30%, 2 >30% and <50%) and the sampling rate identified for each fishery for Chinook salmon.

Fishery	**PSE[/1]**	**Sampling Rate**
AK Terminal Commercial	Varies by stock	Varies by stock
AK Terminal Native	Varies by stock	Varies by stock
AK Terminal Sport	Varies by stock	Varies by stock
SEAK Troll	1	36%
SEAK Sport	1	19%
SEAK Net	1	20%
NCBC Troll	1	36%
NCBC Sport	2	12%[2]
NCBC Net	2	39%
WCVI Troll	1	31%
WCVI Sport	2	7%[2]
Georgia Strait Troll	1	17%
Georgia Strait Sport	2	17%[2]
South BC Net	2	50%
WA Ocean Troll	1	41%
WA Ocean Sport	1	43%
PS Sport	1	20%
WA Net	1	39%
Col River Sport	2	18%
Col River Net	1	42%
OR Coast Troll	1	22%
OR Coastal Sport	1	43%
CA Troll	1	28%
CA Sport	2	22%

[/1] Issues of bias (e.g., due to unreported catch) are not considered by this statistic.
[/2] Estimated from voluntary sport programs.

The PSE index was developed by the workgroup, with regional members providing input as to the average precision of estimates of total fish in escapement and harvest. If at least 2.5% of the total return (escapement+fishery) occurred in a recovery location, then green (status 1) was achieved if all three criteria were met, yellow (status 2) if two out of three were met, and red (status 3) otherwise.

4.2.3 Summary Evaluation Tables

The summary evaluation tables for Chinook and coho salmon are given in Figure 4-2 and Figure 4-3 respectively. For Chinook the stocks are the tagged indicator stocks, while for coho the stocks are the tagged groups that the CoTC uses for each production region. Each row in the table represents an indicator stock (Chinook salmon) or production region (coho salmon) and for each stock there is a cell for release size, quality of data for hatchery and spawning ground sampling, terminal commercial, sport and aboriginal fisheries (in Canada) and for pre-terminal or mixed stock fisheries. The pre-terminal fisheries were those used by the CTC. The first five columns pertain to stock specific issues, i.e., sampling in escapement or terminal fisheries, while the remaining columns relate to mixed-stock fishery issues. Each cell represents a specific release or sampling location for a specific stock. Examining cells across a row shows the quality of CWT data for a stock across release and sampling locations, while examining cells down a column shows the quality of data collected from a specific location (e.g., a fishery) over all the stocks present at that location.

These tables summarize the condition of the CWT program among stocks and fisheries with respect to the precision of the CWT estimates. The workgroup members used the tables to develop regional evaluations of tagging and sampling programs. The tables do not provide information on potential bias in estimates of tagged harvest or escapement or estimates of ERs. Knowledge of the workgroup members and agency staff as to how well sample design criteria for sample strata and assumptions about strata are met were used to identify potential bias in estimates.

4.3 Summary and Recommendations

Figure 4-2 and Figure 4-3 summarize the current status of the CWT program for Chinook and coho salmon. These are matrices with the rows having a stock orientation and the columns having a fishery or escapement location orientation. Each cell is a stock-release location, stock-fishery, or stock-escapement location combination. Examination of a row provides a picture of the stock performance. A row with a large number of cells with status 2 (yellow) or 3 (red) indicates that the CWT group for that stock is not providing adequate information for the estimation of ERs. Examination of a column provides information on the sampling in an escapement or fishery location. A column with a large number of status 2 or 3 cells indicates substantial sampling issues with the fishery. Workgroup members used these matrices along with Table 4-1 to Table 4-3 in their evaluation of tagged stocks and fisheries and escapement sampling in their regions. The results of these examinations are presented below and in Chapter 7 and Appendix A.

4.3.1 Alaska

Examination of Figure 4-2 and Figure 4-3 do not indicate any substantial issues with the Chinook or coho salmon CWT programs. There are adequate number of fish released and fish sampled in escapement and fisheries indicated by a status number 1 (green cells) in all cells with the exception of SEAK sport. The status 2 for this fishery is due to a sample rate under 20%. However, for the fishery years 2000-2004 the annual sample rate has averaged 19% and the number of tags recovered in the fishery is well over 20 tags for the indicator stock(s). The SEAK net fisheries, specifically purse seine, do not meet the coastwide standard of 20% sampling for Chinook and coho salmon.

4.3.2 British Columbia

For BC Chinook and coho indicator stocks, release sizes should be reviewed due to low survival rates and escapement spawning sampling appears adequate. The primary stock issue is the absence of indicator stocks in central BC and Fraser River. In fisheries, issues with the sport fishery sampling programs, mainly low sampling rates and biased catch estimates, account for the majority of the red status cells in BC ocean fisheries. Also, these fisheries have "voluntary" sampling, i.e., anglers send in heads from fish that are clipped, which provides high potential for biases in the CWT data. These fisheries represent a high percentage of total tagged fish harvested for many BC and Washington stocks (Table 4-4 and Table 4-5), and improvements are needed to recover sufficient tags to meet the guidelines. In addition unmarked, tagged fish are not recovered in these fisheries. Terminal fisheries (both Native and non-Native) are not sampled adequately, and these programs need to be developed or improved to coastwide guidelines.

4.3.3 Washington Coast and Puget Sound

Examination of Washington Coast and Puget Sound Chinook indicator stocks indicates that the CWT release size should be reviewed due to low survival rates. In addition, for some stocks, sampling on the spawning grounds and in terminal fisheries, and estimation of catch and escapement, should also receive some attention (see Appendix A). For Puget Sound stocks, improvements are needed in sampling sport fisheries in BC and Puget Sound to recover at least 20 tags for all ages combined.

Figure 4-3 for coho indicates that improvements are needed in sampling of terminal freshwater (in contrast, terminal sport fisheries for Chinook have substantially lower impacts and often account for less than 2.5% of CWT recoveries for individual stocks) and in escapement sampling and estimation. In addition, for Puget Sound coho stocks, fishery sampling programs in the Strait of Georgia and in Puget Sound sport and Washington coastal net fisheries result in fewer than 10 observed recoveries. Methods of estimation of escapement for coho stocks in Puget Sound should be reviewed (Appendix A).

STOCK INFORMATION								REGIONAL MARINE FISHERIES																				
		Key Issues						Fishery Specific Key Issues																				
Region	Stock	Release	Escapement (Hatcher	Escapement (Sp Grou	Term Com	Term Native	Term Sport	SEAK TR	SEAK Sport	SEAK Net	NCBC Troll	NCBC Sport	NCBC Net	WCVI Troll	WCVI Sport	Geo Strait Troll	Geo Strait Sport	SBC Net	WAOcn Troll	WA Ocn Sport	PS Sport	WA Net	Col Riv Sport	Col Riv Net	OR Coast Troll	OR Coastal Sport	CA Troll	CA Sport
Alaska	Alaska Central Inside	1	1	1				1	2																			
	Little Port Walter	1	1	1				1																				
	Alaska Southern Inside	1	1	1	1			1	2																			
Canada	Big Qualicum	1	1		3	3	3	2				3					3											
	Chilliwack (Harrison Fall Stock)	2		2		3								1	3		2		1									
	Cowichan	1	1			3	3							2	3							2						
	Kitsumkalum	1				3	3	1				3	3															
	Puntledge	2	1		3	3	3	2				3					3											
	Quinsam	1	1	1	3	3	3	1				3																
	Robertson Creek	2	1	1	1	2	3	1				3			3													
	Snootli	3			3	3	3	2			2	3	2															
Washington	George Adams Fall Fingerling	1	1	3	2		3							1	3				1		1	2						
	Green River Fall Fingerling	1	1	2	1									1	3		3		2		1	1						
	Grovers Creek Fall Fingerling	1	1											1	3				1		1	1						
	Hoko Fall Fingerling	3	1	2				1			2																	
	Nisqually Fall Fingerling	1	1		1		3							1							1							
	Nooksack Spring Yearling	1	1											2			3											
	Nooksack Spring Fingerling	2	1	2				2						1	3		3											
	Queets Fall Fingerling	2		3	1			1			1	3																
	Samish Fall Fingerling	1	1				3							1	3		3		2		2	1						
	Skagit Spring Fingerling	1	1											1	3						2							
	Skagit Spring Yearling	2	1											1	3						1							
	Sooes Fall Fingerling	2	1		2			2			2	3																
	South Puget Sound Fall Yearling	1	2		2										3						2	2						
	Squaxin Pens Fall Yearling	3			2									2							1	2						
	Skagit Summer Fingerling	3						1				3		2	3		3											
	Stillaguamish Fall Fingerling	3	1	2										2	3		3				2							
	White River Hatchery Fingerling	1	1	3																	2							
	White River Hatchery Yearling	1	1																		2							
	White River Fall Fingerling	3	1											2							2							
	White River Spring Yearling	3	1																		2							
Oregon	Salmon River	2		1			2	1			1																	
Columbia River	Cowlitz Tule	1	1	3				2						2	3				2	2				2	2			
	Hanford Wild	1		2				1			2													1				
	Columbia Lower River Hatchery	1	1											1	3				1	2				1	1			
	Lewis River Wild	3						2			2			2	3				2					2	2			
	Lyons Ferry	3												2					1	1				1	2			
	Spring Creek Tule	1	1											1	3				1	1				1	1			
	Columbia Summers	1	1					1			1	3		1	3				1						1			
	Upriver Bright	1	1					1			2													1				
	Willamette Spring	1	1				2	1																1				
California	Sacramento falls	1	1	3			3																		1		1	2
	Sacramento winters	3	1	1			3																					3
	central valley spring	1	1	3			3																		1		1	2
	Klamath-Trinity falls	1	1	1		1																					1	
	California coast	3	3	3																							2	3

Figure 4-2 Results of evaluating tagging and fishery and escapement sampling levels using criteria set by workgroup for Chinook salmon. A blank cell indicates a fishery did not represent over 2.5% of the total exploitation for a stock. Green (1), yellow (2), or red (3) cells represent different situations with respect to the criteria as noted below; corresponding numbers are useful for black and white reproduction.

1 indicates that all criteria were met
2 indicates that one criteria is not met
3 indicates that two or more criteria are not met

STOCK INFORMATION								REGIONAL MARINE FISHERIES																				
		Key Issues						Fishery Specific Key Issues																				
Region	Stock	Release	Escapement (H)	Escapement (N)	Term Com	Term Native	Term Spt	SEAK TR	SEAK SPT	SEAK Net	NCBC Troll	NCBC Sport	NCBC Net	WCVI Troll	WCVI Sport	Geo Strait Troll	Geo Strait Spt	SBC Net	WAOcn Troll	WA Ocn Sport	PS Sport	WA Net	Col Riv Sport	Col Riv Net	OR Coast Troll	OR Coastal Sport	CA Troll	CA Sport
Southeast Alaska	N Alaska Inside	1	1		1			1		3																		
	N Alaska Outside	1	1					1	1	3																		
	S Alaska Inside	1	1		1			1	1	3																		
	S Alaska Outside	1	2		1			1	1	3																		
	Auke Creek (NSEII) Wild	1		1				1	1	3																		
	Berners River (NSEI) Wild	1		2				1		3																		
	Chilkat River (NSEI) Wild	1		2				1		3																		
	Chuck Creek (SSEI) Wild	1		1				1	1	3																		
	Ford Arm Lake (NSEO) Wild	1		1				1	1	3																		
	Hugh Smith Lk (SSEI) Wild	1		1				1		3																		
	Nakwasina River (NSEO) Wild	1		1				1	1																			
	Slippery Creek (NSEI) Wild	1		1				1		3																		
	Taku River (TBR) Wild	2		2				1	1	3																		
British Columbia	BC North Coast	1	1		3	3	2	1	1	3	1	3																
	BC Central Coast	3	3		2	2	3	2		3		3																
	Johnstone Strait	1	1		3	3						3					3											
	Georgia Strait - Vancouver Islan	1	1		3	3						3			3		3	2	2									
	U Fraser River	1	3		3	3	3								3	2	2	2	2				2					
	L Fraser River	1	3	2	3	3	3										3	2										
	SW Vancouver Island	1	1		3	3									3													
Washington	Skagit River	1	1		1		3											2		1		1						
	Nooksack/Samish Rivers	1	1				3											2				1						
	Stillaguamish/Snohomish Rivers	1	1				3											2		1		1						
	Hook Canal	1	1				3											2				1						
	S Puget Sound	1	1		1		3											2				1						
	Strait of Juan de Fuca	1	1		1		3											2										
	Makah Coastal	1	1		3		3											2		1								
	Quillaute River	1	1				3												1	1						1		
	Queets River	1	1		1		3													1						1		
	Quinault River	1	1		1		3													1						1		
	Grays Harbor	1	1		1															1		1						
	Willapa Bay	1	1				3													1		1				1		
Columbia River	Columbia River	1	1				3													1				1		1		
Oregon	Oregon N and Mid Coast	1	1																	1						1		
Oregon/California	Oregon S and California Coast	2	1																									

Figure 4-3 Results of evaluating tagging and fishery and escapement sampling levels using criteria set by workgroup for coho salmon. A blank cell indicates a fishery did not represent over 2.5% of the total exploitation for a stock. Green (1), yellow (2), or red (3) cells represent different situations with respect to criteria as noted below; corresponding numbers are useful for black and white reproduction.

indicates that all criteria were met
2 indicates that one criteria is not met
indicates that two or more criteria are not met

4.3.4 Oregon

Oregon coastal Chinook represented by Salmon River, are largely exploited in terminal sport and SEAK fisheries. Figure 4-3 does not indicate any issues with Oregon coho releases and recovery programs. However, Oregon has some major issues with data coordination, validation, and reporting. Table 4-1 shows that Oregon does not report sample strata with zero sampling in catch or escapement indicating that all fishery and escapement locations are sampled, which seems unlikely. There are also reported problems with sampling, updating, and validation of catch-sample and tag recovery information as the data items required to be sampled and reported to the RMIS system has changed with the introduction of MM and MSFs.

4.3.5 Columbia River

Columbia River fisheries and escapement locations are sampled by WDFW and ODFW, but all data are reported by ODFW. These data have therefore suffered the same sampling and data coordination problems reported for Oregon above. Two Columbia River Chinook stocks, Cowlitz Tules and Lewis River wild, do not seem to provide adequate information overall, in that the number of tags observed in fisheries and escapement is under the 20 tag minimum. Most of the fisheries where these stocks are exploited are sampled over 20% so this is a problem of inadequate numbers released given their survival rates.

4.3.6 California

In 2006, a program to mark 25% of the Chinook production from the California Central Valley hatcheries was implemented along with increased monitoring for CWT recoveries in spawning ground surveys, sampling in the river recreational fishery, and river escapement age structure analysis. This program has the potential to greatly improve the data available to perform cohort analyses and estimate ocean ER for Central Valley Chinook salmon, provided that these programs continue into the future. Under this program, an additional eight million smolts are CWT'd annually in the Central Valley. Ocean sampling programs for both sport and commercial fisheries are designed to sample at the targeted rate of 20%. Additional funding has been made available to process and report the increased number of heads expected to be collected in these fisheries along with those collected from the spawning ground surveys and hatcheries.

For sampling of ocean recreational fisheries, difficulties exist in the estimation of catch from sport boats that use private docks and marinas. However there is an effort underway to improve these estimates. For the ocean troll fishery, CA is unable to quantify non reported landings and is experiencing difficulty with cross porting of CWTs among the management areas. In the Klamath River recreational fishery, harvest estimates do not include the recovery of CWT's in the upper river areas during most years. This is due to a combination of funding limitations and difficulty of gaining access to private land.

Although not captured in the summary data presented here, one of the two hatcheries that produce Klamath Fall Chinook, Iron Gate Hatchery, has a very low tag rate of around

5%. The Trinity River Hatchery on the Klamath has implemented a constant fractional mark rate of 20%.

Of the three endangered species act (ESA) listed Chinook stocks in CA, the Coastal Chinook evolutionary significant unit (ESU) has the least amount of population data available. No CWT indicator stock has been established for this ESU. Winter Chinook have low recovery rates at the only hatchery producing the stock, however, this is due to the hatchery genetic management plan that limits the use of hatchery produced fish in spawning. The entire hatchery production of winter Chinook is marked with CWT's and adipose fin clips.

No CWT indicator stocks have been established for ESA-listed California coho stocks, however, ocean fisheries are believed to have minimal impact on these stocks. Retention of coho has been prohibited off California for several years and retention of coho with intact adipose fins has not been permitted off Oregon.

There is a continuing need for coordinated oversight for all CA salmon management activities from production and water management through harvest and escapement.

5 Criteria for Precision and Accuracy

In its 1995 report, the ASFEC defined *viability* of the CWT program in terms of the following three specific characteristics:

- *it must provide the ability to use CWT data for assessment and management of wild stocks of coho and Chinook salmon;*
- *it must provide the ability to estimate stock-specific ERs by fishery and age; and*
- *it must be maintained such that the uncertainty in stock and fishery assessments and their applications does not unacceptably increase management risk.*

The first characteristic reflects the emphasis of PSC management on the conservation of wild stocks of Chinook and coho salmon. The major issue regarding the use of CWTs for this purpose is the selection of CWT release groups that have exploitation patterns that represent wild stocks. Because of costs and logistical issues of tagging and recovering sufficient numbers of wild smolts, the usual practice is to apply CWTs to groups of hatchery fish from appropriate brood stocks and release strategies as surrogates for wild fish. The second characteristic explicitly refers to ERs as the principal statistics of interest.[3] Essentially, ERs, as used by the PSC, represent the proportions of a cohort caught in various fisheries. The evaluation in this report of the CWT system focuses on the uncertainty in estimates of ERs for this reason. The third characteristic of viability requires that the uncertainty associated with CWT-based estimates does not increase management risk to unacceptable levels. Risk reflects the willingness of fishery managers to accept the consequences of error. Consequently, risk is a social manifestation of the concept of statistical uncertainty (see Chapter 0).

The SFEC (SFEC 2002) defined uncertainty surrounding estimates of ERs in terms of the mean squared error (MSE), a function of precision (variance) and accuracy (bias):

$$\text{MSE} = \text{Variance} + \text{Bias}^2$$

Variance measures the precision or error in estimates due to random variability in the estimation method, e.g., from the sampling process. This error is non-directional and the average of the error is expected to be zero. Precision is measured by estimates of variance and PSE of the estimated statistic in question. Bias is a directional error in an estimate due to not meeting one or more assumptions of the CWT program sample design. There are several potential sources of bias, such as:

- assumptions about the sample design that are not met (e.g., under- or non-sampling of fishery strata; not designing sampling programs to collect systematic data that is representative; not sampling natural escapements for CWTs in areas where CWT'd fish are present),

[3] The Expert Panel report (Hankin et.al. 2005) was focused on the problem of estimating stock-fishery-age-specific ERs.

- assumptions embedded in the methods used to estimate total mortalities are incorrect (e.g., estimating non-landed mortalities by multiplying estimates of releases by assumed release mortality rates, assuming identical encounter rates for marked and unmarked fish).

This section describes the precision currently achievable for the CWT system given the status quo (i.e., the current standards for levels of tagging and sampling) and an overview of the major factors influencing precision and bias in ER estimates.

5.1 Estimation of Number of Tagged Fish Harvested or Escaping

In order to discuss the factors that affect estimates of ERs, we focus on those factors affecting estimates of the number of tagged fish present in harvest or escapement, as this is the basic component of the ER. The fundamental objective of the CWT system is the estimation of the tagged fish in harvest or escapement ($R_{s,i}$) from tags ($m_{s,i}$) observed in samples, expanded for the fraction of the total harvest or escapement that is sampled (φ_i).

$$\hat{R}_{s,i} = \frac{m_{s,i}}{\varphi_i} \qquad \text{Equation 5-1}$$

where,

$\hat{R}_{s,i}$ = estimated tagged fish of cohort s in total catch or escapement in stratum i,
$m_{s,i}$ = the number of tags from cohort s observed in sample n taken in stratum i,
φ_i = the proportion of total catch or escapement that was sampled in stratum i.

The subscript s represents a stock-specific cohort (brood year). The variance of the estimate of recoveries of tagged fish is a function of the number of tagged fish observed, the sample rate in the fishery or escapement stratum, and the variance of the estimated total catch or escapement that was sampled for tags (Bernard et al. 1998):

$$Var(\hat{R}_{s,i}) = \left[\frac{m_{s,i}}{\varphi_i^2}(1-\varphi_i) + \frac{m_{s,i}^2}{\varphi_i^4}PSE^2(N_i) + \frac{m_{s,i}}{\varphi_i^2}(1-\varphi_i)PSE^2(N_i)\right] \qquad \text{Equation 5-2}$$

where,

$PSE(N_i)$ = percent standard error of the total (N) catch or escapement of stratum i.

When the total harvest and escapement is known without error, the variance of the estimate of tagged fish reduces to:

$$Var(\hat{R}_{s,i}) = \frac{m_{s,i}}{\varphi_i^2}(1-\varphi_i) \qquad \text{Equation 5-3}$$

5.2 Estimation of ERs

Estimates of tagged fish at age in harvest and escapement provide the basic information necessary for estimation of ERs. The ER for a fishery represents the proportion of the total cohort that is killed in that fishery. The total cohort size at age *i* for a specific stock and brood year prior to natural mortality and fisheries for that age (this includes all eventual landed and non-landed fishery mortalities, other human induced mortalities, escapements and natural mortality) may be expressed as:

$$RCohort_i = \sum_{f}^{F} \sum_{a=i}^{A} (R_{f,a} + IM_{f,a}) + \sum_{a=i}^{A} (NM_a + PSM_a + R_{e,a}) \qquad \text{Equation 5-4}$$

where,

$RCohort_i$	*Recruitment cohort size at age i*
$R_{f,a}$	*Landed mortality in fishery(f) at age (a) in numbers of fish*
$IM_{f,a}$	*Non-landed, fishery induced mortality in fishery(f) at age (a) in numbers of fish*
NM_a	*Natural mortality of age (a) fish in numbers of fish*
PSM_a	*Post fishery, pre-spawning mortality of age (a) fish (e.g., dam loss) in numbers of fish*
$R_{e,a}$	*Spawning escapement of age (a) fish in numbers of fish*
F	*Set of all fisheries affecting stock in question*
A	*Highest age*

Landed mortalities and spawning escapements are estimated as the number of tagged fish in the retained catch or in escapement. Non-landed fishery-related mortalities are not observable, so are estimated either from assumed relationships between the landed catch and the total number of fish encountered or from direct sampling programs to estimate the number of salmon released. Examples of non-landed mortality include fish smaller than a minimum size limit and released or fish released under mark or species retention restrictions that die during or after release. NM_a in the equation above are numbers of fish and are calculated from age-specific natural mortality rates and assumed constant for the purpose of cohort run reconstruction.

The total mortality (landed catch plus incidental mortality) ER for the indicated age and fishery for a specific stock and brood year ($ER_{f,a}$) can then be estimated as:

$$ER_{f,a} = \frac{R_{f,a} + IM_{f,a}}{RCohort_a} \qquad \text{Equation 5-5}$$

where $RCohort_a$ is the cohort size at age prior to any fisheries.

The variance of the estimated ER is approximated for a specific stock and brood year by:

$$Var(ER_{f,a}) = (ER_{f,a})^2 \left[\frac{Var(R_{f,s} + IM_{f,s})}{(\hat{R}_{f,s} + IM_{f,a})^2} + \frac{Var(RCohort_a)}{RCohort_a^2} \right] \qquad \text{Equation 5-6}$$

The precision of an estimated ER for fishery *f* has two components (Equation 5-6), the variance of the tagged fish mortalities in fishery *f* and the variance of the cohort size estimate, which is in itself a function of the variance of tagged fish mortalities in all fisheries and escapement.

5.3 Explicit Consideration of Factors Affecting Uncertainty

The principal factors that influence the uncertainty surrounding CWT-based estimates of ERs can be separated into two groups, factors affecting precision and those causing bias. In this section we focus on the following major factors affecting precision:

- number of fished tagged,
- sample rates for fisheries and escapements, and
- uncertainty in estimates of total harvest or escapement used to calculate sample expansion;

and those affecting the bias of estimates:

- sample coverage for fisheries and escapements,
- non-representative (non-systematic) sampling, and
- bias in catch or escapement estimates.

These factors are all program planning or sample design issues and the quality of ER estimates can be changed and improved through efforts to improve tagging and sampling.

The PSE used in the discussion below to represent uncertainty is a dimensionless statistic that expresses precision as a proportion of the estimated value:

$$PSE = \frac{100 * \sqrt{Variance}}{Estimated\ Value} \qquad \text{Equation 5-7}$$

The precision of the estimates of tagged fish and ERs depends on the number of tagged fish observed in the harvest or escapement (m), the sample rate (φ), and the precision of the estimate of the total catch or escapement being sampled (*PSE(N)*), the components of the variance shown in Equation 5-2. The number of tags observed depends on the number of tags released and the sample rate, as well as survival of the tag group and ER in the fishery. The tag group size, sample rate, and *PSE(N)* are components of the sample design.

The estimate of tagged fish or ER become more precise with increasing number of tags observed. The average PSE for an estimate of ER of 10% is shown in Figure 5-1, where it is assumed that all fisheries are sampled at a rate of 20%, escapements at 100% and the total harvest is estimated either at a PSE(N) of 0 or 30%.. The trends in the figure are not linear, but the PSE(ER) decreases fastest as the number of tags increases from 0 to 10 tags, at which point an estimate of tagged fish (R) has a PSE of 30%. This level of uncertainty has been set as the maximum acceptable by at least two groups evaluating the precision of estimates of tagged fish and ERs, the Washington Joint State-Tribal Workgroup that developed the coho cohort analysis database (Marianna Alexandersdottir, pers.comm.) and the PSC CTC. Both groups set 10 observed tags per stock-specific cohort as a minimum number required in a fishery stratum to reliably estimate ERs. A fishery stratum could be fishery and period for coho salmon and fishery-period and age for Chinook salmon. As the number of observed tags increase beyond 10 the *PSE(R)* decreases asymptotically towards zero. When *PSE(N)* is greater than zero, i.e., harvest or escapement is estimated, then the PSE(R) is limited by the precision of the total, i.e., if *PSE(N)* is 30%, the *PSE(R)* cannot be smaller than 30% (Figure 5-1)

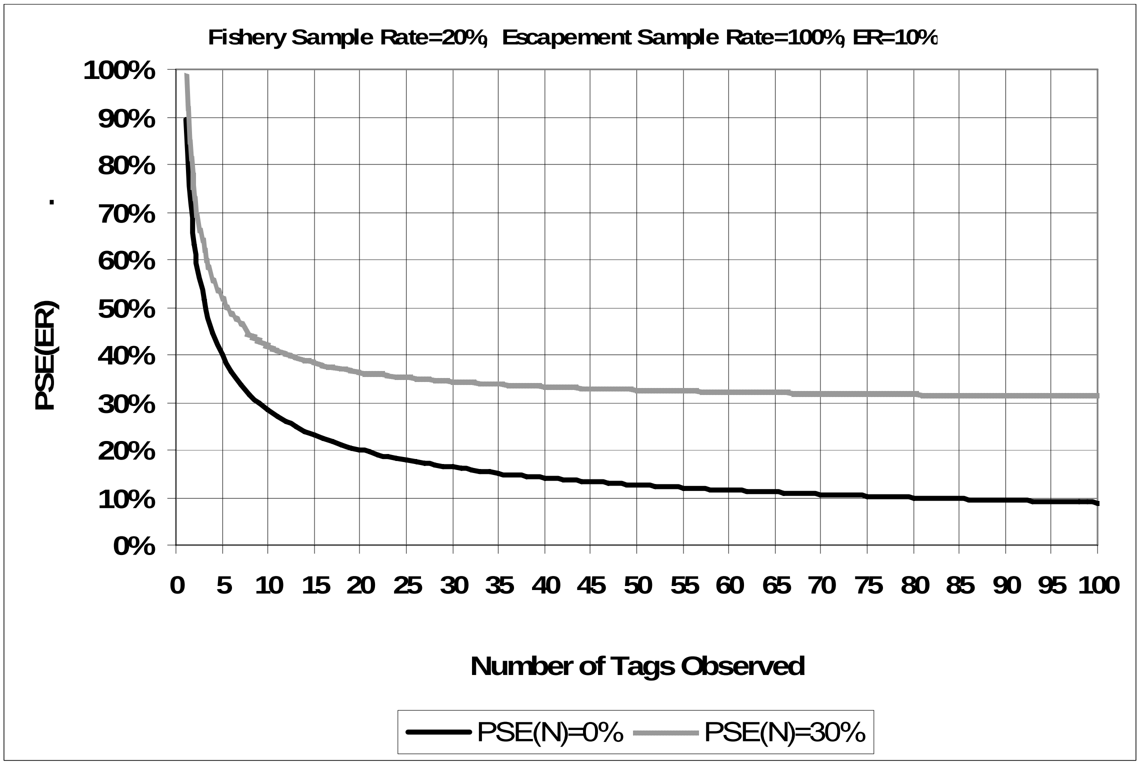


Figure 5-1. The precision (PSE) of the estimate of an ER of 10% versus the number of CWTs recovered in the fishery stratum for which the ER is being estimated, at two levels of precision for the estimate of total catch or escapement abundance (PSE(N))being sampled (0% or known without error and 30%), given a 20% sampling rate in the fishery and 100% in the escapement.

5.3.1 Tag Group Release Size

Increasing the tag group size will increase the number of tagged fish recruiting to fisheries and escapement and consequently, the number of tagged fish in samples to calculate fishery parameters. The PSE for the estimate of a 10% ER decreases asymptotically as the size of the tag group increases (Figure 5-2). However, the survival of the group to return also affects the precision, as shown in Figure 5-2, as fewer tagged fish return for stocks with lower survival rates, resulting in less precise estimates of ERs.

Survival to age 2 after release cannot be directly controlled through sample design, but as these tag groups are generally hatchery groups, hatchery practices can affect survivals.

Therefore, hatchery stocks with low survivals require larger releases; if survivals are very low, they may not be good candidates for use as indicator stocks.

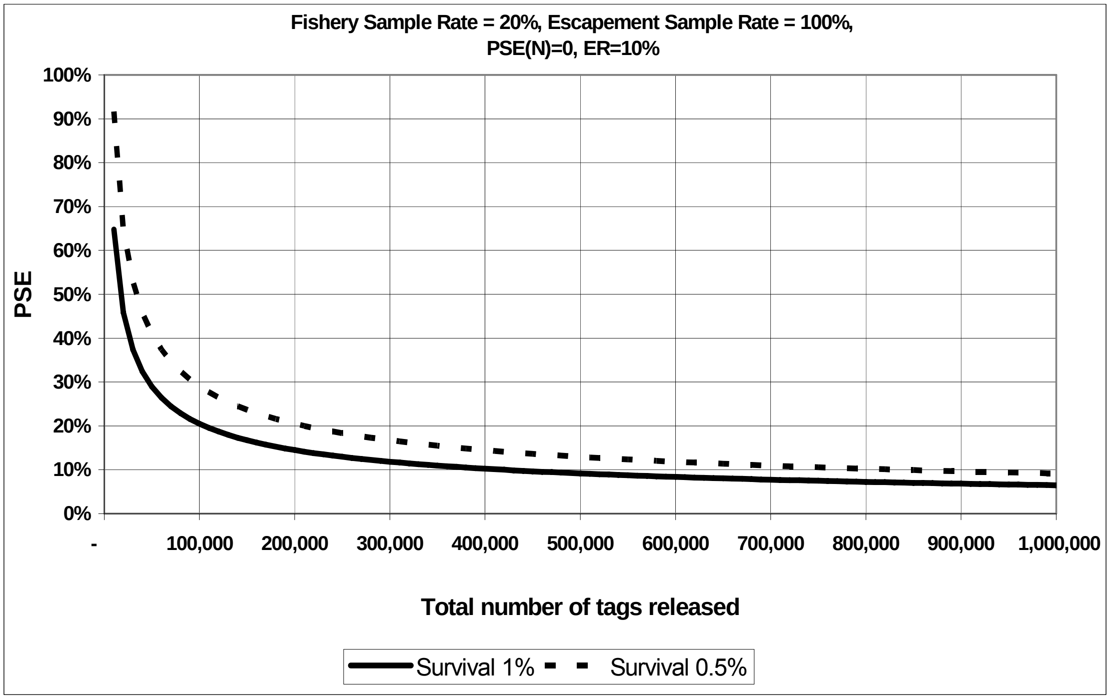


Figure 5-2. The precision (PSE) of the estimate of an ER of 10% versus the number of CWTs released at two levels of survival to age 2 (1% and 0.5%), given a 20% sampling rate in the fishery and 100% in the escapement and knowledge of the total catch abundance without error (PSE(N)=0).

5.3.2 Sample Rates in Fisheries

The sample rate in fisheries is an important sample design factor (see Equations 5-2 and 5-3). As sample rates increase, the number of tags used to estimate cohort size and ERs increases and the PSE for ERs decreases asymptotically (Figure 5-3). The examples illustrated in Figure 5-3 use a release group of 200,000 fish and average survival rates of 1%, which results in a cohort of 2,000 fish. Figure 5-3 shows the precision for ERs of 2.5% and 10%, assuming all total catches sampled were known and that all escapement returned to the hatchery and were sampled at 100%.

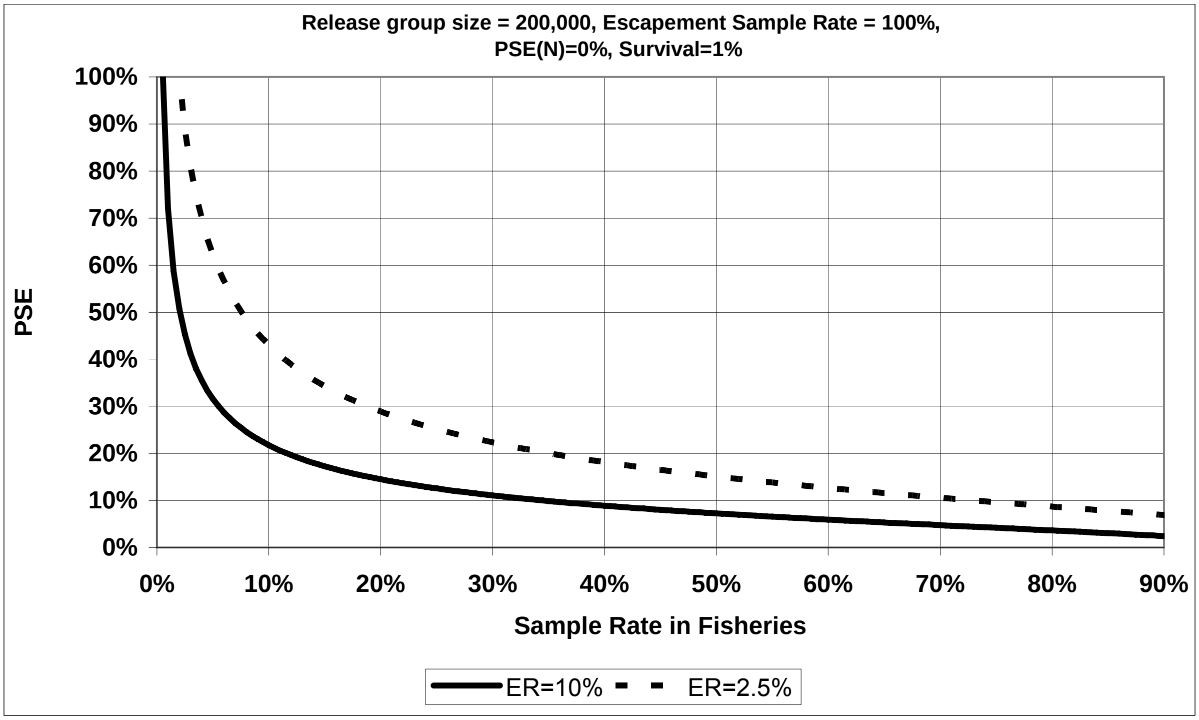


Figure 5-3. The precision (PSE) of the estimate of an ER of 10% and 2.5% for a fishery versus the sampling rate in the fishery, given a 100% sampling rate in the escapement, knowledge of the total catch abundance without error (PSE(N)=0), a CWT release group size of 200,000, and survival from release to age 2 of 1%.

5.3.3 Sampling Rates in Escapements

Over the last 20 years, there has been a general decrease in total ERs for many stocks and increasing rates of escapement. Consequently, recoveries of CWTs in escapements are increasingly important to determine the precision of ER estimates because the escapement represents a larger proportion of the total cohort ($RCohort_a$ in Equation 5-6).

A comparison for brood years from the late 70’s, to those from the late 90’s, of the total tagged return of CTC indicator stocks shows that, with the exception of the Alaskan indicator stocks, escapement represents a significantly larger proportion of the total tagged return (Figure 5-4) for the five complete brood years.

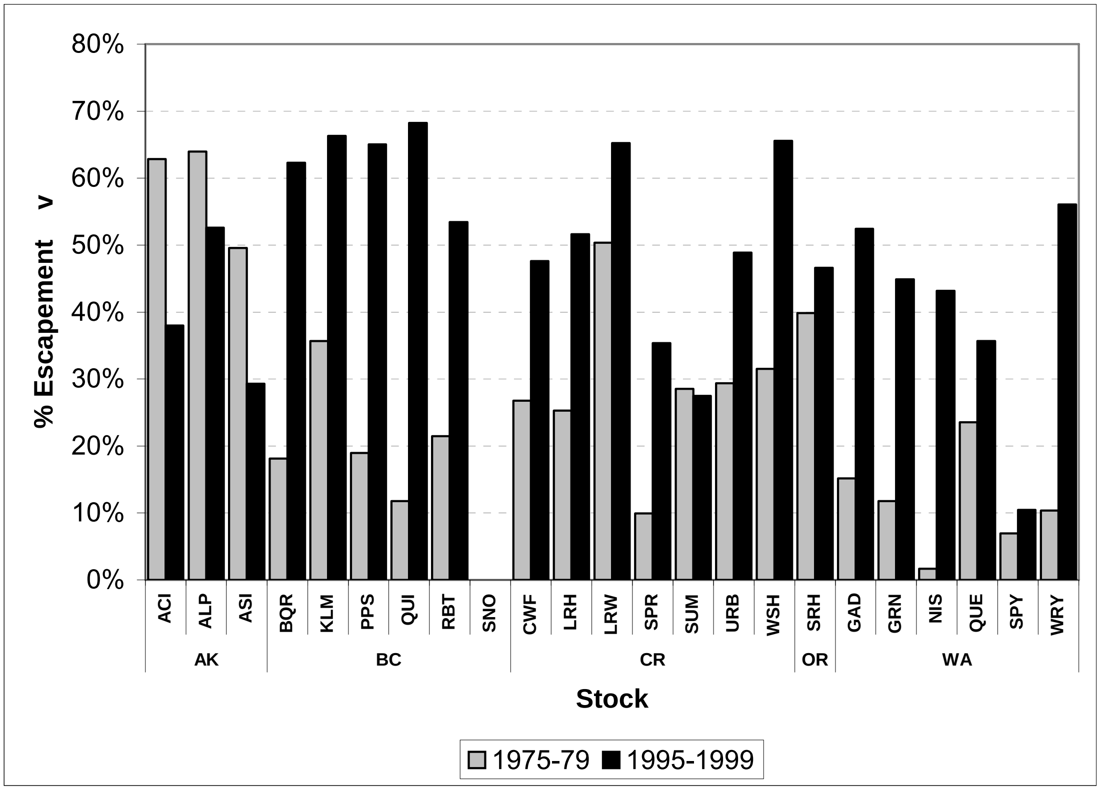


Figure 5-4. Percent of total estimated tagged fish in the escapement for early (1975-1979) and late (1995-1999) brood year periods for CTC Chinook indicator stocks. Full indicator stock names are given in Table 4.2. Data for this graph were taken from CTC Cohort Analysis System (CAS) database.

The proportion of the escapement that returns to a hatchery where it can be easily sampled and the proportion that are found on the spawning grounds are important factors affecting the precision of CWT-based estimates of ERs. The precision of the estimate of the ER depends on the proportion spawning outside the hatcheries, the sampling sample rate on natural spawning grounds where tagged fish are likely to be found, and uncertainty in estimates of total spawning escapement. If natural escapements are not sampled for CWTs, bias in estimation of ERs will be a major concern (see bias Section 5.3.5) where significant numbers of hatchery fish are on the spawning grounds.

Examination of Figure 5-5 shows the effect of spawning of tagged fish outside of the hatchery, where sampling rates are lower than in the hatchery. Given increasing total brood ER, the PSE of the total ER decreases as the ER increases, due to the increase in tags observed in the fisheries. When 100% of the escapement returns to the hatchery and is sampled at 100%, then the PSE(ER) rapidly falls to 10%. However, if all tagged fish in the escapement are in the natural spawning grounds, then the PSE(ER) does not decrease as rapidly as fewer tags are recovered in escapement (Figure 5-5).

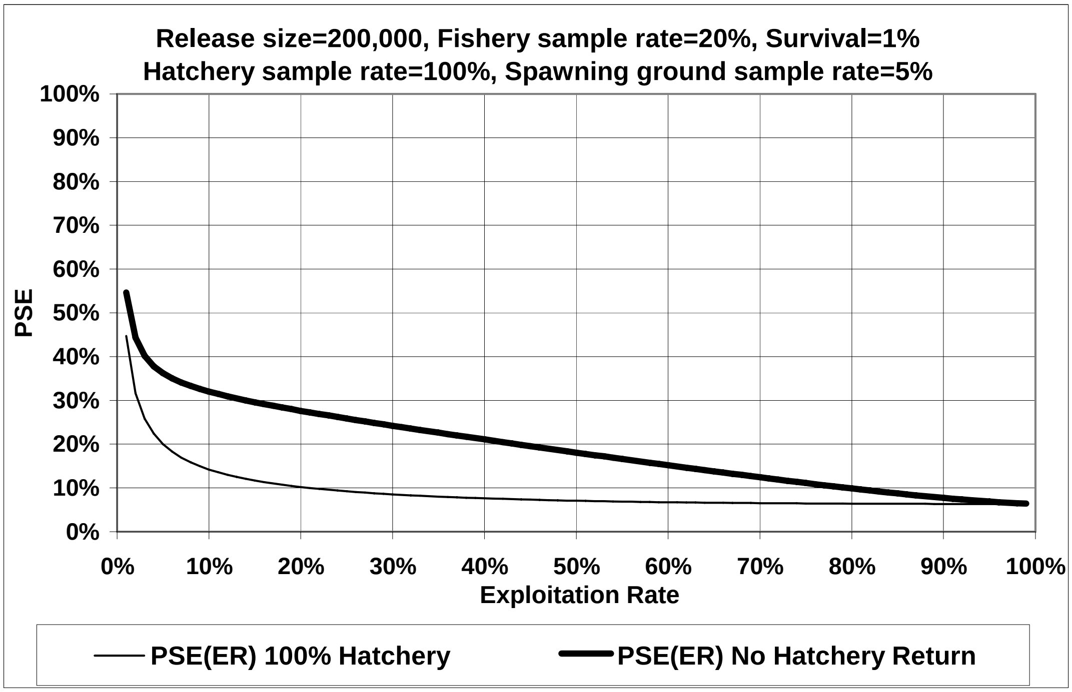


Figure 5-5. The precision (PSE) of the estimate of ER versus the magnitude of the ER estimate for the case where 100% of the escapement returns to the hatchery that has 100% sampling and the case where 100% goes to the spawning grounds that have a 5% sampling rate. A release size of 200,000 is used with survival to Age-2 of 1% and the fishery sampling rate is 20%.

5.3.4 Uncertainty of Total Catch and Escapement

Estimates of total catch or escapement, the number sampled, and the sample expansion are reported in the RMIS or MRP catch-sample database. However, variances of the total catch or escapement are not generally estimated or readily available for estimates of total catch or escapement. Infrequently, estimates of variance have been made to describe the uncertainty of estimates of total catch and escapement.

Commercial harvest. Commercial salmon harvest (seine, net and troll catches) are often assumed to be known (without error). In most commercial fisheries, catches are reported on fish tickets; sometimes the fish are counted and sometimes the total number of fish is estimated using total weight divided by the average weight per fish. In other fisheries, catchers are reported by fishers via paper logbooks or phone-in call centers. Whether fish catches are counted or estimated, species misidentification can introduce bias into the reported numbers. Data providing a basis for estimation of the variance of the total number of the commercially caught fish are generally unavailable

Sport harvest. Sport harvest is estimated using a variety of methods, including creel survey and catch record cards. Variances are available for some of these estimates as shown in Table 5-1 and Table 5-2.

Table 5-1 shows a summary of of the monthly coho and Chinook catch and PSEs in Southern B.C. These data are provided at the catch region level for the Strait of Georgia, Juan de Fuca, and WCVI. Note that the table does not represent total catch, as catches reported by lodges and areas with no catch estimation were excluded. The monthly catch estimates have PSEs ranging from 10-100%.

Table 5-2 shows the annual catch by area for 1998-2004 in Washington marine sport fisheries in Puget Sound with the estimated PSEs. Estimates of the Puget Sound sport catch PSE is largest for fisheries with small catches and decreases with increasing catches, ranging from 10% to 70% (Figure 5-6).

Escapement. Methods for estimating spawning escapement include direct counts (hatcheries and weirs), mark-recapture methods, and visual counts of redds or fish (e.g. area-under-the-curve and peak count expansion methods). The quality of the escapement estimates ranges similarly from known without error for counts to unknown variance and bias for stream survey methods. In B.C., Black Creek coho salmon estimates (Table 5-3) made using fence count and mark-recapture methods have PSEs ranging from 1-70% averaging 12%. The precision of the estimate of escapement for Black Creek coho salmon depends on the period the fence count can be maintained. Years when the fence is breached during a substantial portion of the migration have high PSEs. In Washington, Green River Chinook salmon mark-recapture estimates for 2000-2002 have PSEs averaging 10% (Table 5-4). For Nicola and Lower Shuswap Chinook salmon, mark-recapture spawner estimates have PSEs ranging from 3% to 12% when estimates were sex-specific (Table 5-5). An estimate of the variance of the redd count is available for 1993 for the Queets Chinook salmon escapement estimate, where an estimate of a total redd count of 1,809 had an estimated standard error of 172 and a PSE of 9.5%. Note however that a variance estimate for the expansion to total escapement is not available for the Queets Chinook salmon. Where stream surveys are used and counts are expanded to total escapement, there can be a significant opportunity for biased estimates of total escapement (Parken et al. 2002).

Table 5-1. Estimated catch and PSE by month for southern BC Chinook and coho marine sport fisheries, 2000-2005. An asterisk (*) indicates an unsurveyed period for which catch may have occurred but an estimate was not made using direct survey data. A dash indicates that a catch estimate was made from available survey data but not an estimate of variance. The catch estimates do not represent the total catch as lodge catches were excluded because catch variances have not been calculated.

		Georgia St. North				Georgia St. South				Juan de Fuca St.				Alberni Canal (Area 23A)				WCVI			
		Chinook		Coho		Chinook		Coho		Chinook		Coho		Chinook		Coho		Chinook		Coho	
Year	Month	Catch	PSE	Catch	PSE	Catch	PSE	Catch	PSE	Catch	PSE	Catch	PSE	Catch	PSE	Catch	PSE	Catch	PSE	Catch	PSE
2000	1	*	*	*	*	*	*	*	*	907	13	0	--	*	*	*	*	*	*	*	*
	2	*	*	*	*	*	*	*	*	640	33	0	--	*	*	*	*	*	*	*	*
	3	*	*	*	*	*	*	*	*	150	31	0	--	*	*	*	*	*	*	*	*
	4	187	49	0	--	747	33	0	--	98	41	0	--	*	*	*	*	*	*	*	*
	5	150	24	0	--	281	32	0	--	638	42	14	149	0	--	0	--	0	--	0	--
	6	2,334	21	0	--	671	23	58	75	2,213	14	0	--	0	--	0	--	8,696	11	0	--
	7	4,464	10	20	56	694	15	1,373	22	1,199	17	15	103	232	51	24	87	16,304	14	766	31
	8	9,025	11	64	70	890	14	1,262	17	1,531	18	224	41	14	79	455	24	4,166	20	2,872	20
	9	960	17	912	20	1,340	23	337	40	777	27	98	53	49	78	1,089	15	50	70	1,522	40
	10	89	33	74	43	*	*	*	*	344	28	263	40	*	*	*	*	*	*	*	*
	11	*	*	*	*	*	*	*	*	550	24	47	101	*	*	*	*	*	*	*	*
	12	*	*	*	*	*	*	*	*	1,746	24	0	--	*	*	*	*	*	*	*	*
2001	1	*	*	*	*	*	*	*	*	1,097	19	0	--	*	*	*	*	*	*	*	*
	2	*	*	*	*	*	*	*	*	1,171	35	0	--	*	*	*	*	*	*	*	*
	3	*	*	*	*	*	*	*	*	400	26	0	--	*	*	*	*	*	*	*	*
	4	125	88	0	--	363	35	0	--	639	28	0	--	*	*	*	*	*	*	*	*
	5	456	29	0	--	697	21	14	88	486	28	0	--	*	*	*	*	*	*	*	*
	6	4,340	31	0	--	3,829	12	263	91	5,013	25	0	--	1	100	9	103	5,516	19	1,572	48
	7	7,733	11	32	48	1,794	18	1,089	20	2,192	20	987	26	7	104	0	--	12,900	16	8,150	12
	8	7,337	15	6,494	17	1,104	22	796	38	4,425	12	1,092	18	0	--	555	14	8,193	9	8,905	11
	9	1,465	22	2,110	21	1,974	23	234	49	1,258	37	311	68	0	--	6,707	13	3,524	36	10,861	25
	10	25	57	675	22	0	--	0	--	97	67	243	44	*	*	*	*	*	*	*	*
	11	*	*	*	*	*	*	*	*	449	21	0	--	*	*	*	*	*	*	*	*
	12	*	*	*	*	*	*	*	*	0	--	0	--	*	*	*	*	*	*	*	*
2002	1	*	*	*	*	*	*	*	*	0	--	0	--	*	*	*	*	*	*	*	*
	2	*	*	*	*	*	*	*	*	0	--	18	97	*	*	*	*	*	*	*	*
	3	*	*	*	*	*	*	*	*	0	--	0	--	*	*	*	*	*	*	*	*

		Georgia St. North				Georgia St. South				Juan de Fuca St.				Alberni Canal (Area 23A)				WCVI			
		Chinook		Coho		Chinook		Coho		Chinook		Coho		Chinook		Coho		Chinook		Coho	
Year	Month	Catch	PSE	Catch	PSE	Catch	PSE	Catch	PSE	Catch	PSE	Catch	PSE	Catch	PSE	Catch	PSE	Catch	PSE	Catch	PSE
	4	359	26	0	--	1,346	60	0	--	638	56	0	--	*	*	*	*	*	*	*	*
	5	2,961	21	0	--	2,505	23	0	--	641	28	0	--	*	*	*	*	*	*	*	*
	6	14,205	27	18	122	1,522	24	33	69	4,556	25	0	--	71	68	0	--	4,409	13	297	25
	7	13,144	10	0	--	1,004	19	1,185	26	4,518	14	100	53	108	62	0	--	11,266	10	3,171	14
	8	11,079	16	1,343	67	1,707	18	169	45	4,509	24	1,106	24	7,918	7	692	29	14,912	12	11,808	13
	9	1,920	35	1,183	43	983	32	114	76	822	65	3,010	20	5,806	26	5,048	21	799	31	723	27
	10	59	18	522	55	43	40	15	83	119	79	527	42	*	*	*	*	*	*	*	*
	11	*	*	*	*	*	*	*	*	0	--	0	--	*	*	*	*	*	*	*	*
	12	*	*	*	*	*	*	*	*	0	--	0	--	*	*	*	*	*	*	*	*
2003	1	*	*	*	*	*	*	*	*	1,118	29	0	--	*	*	*	*	*	*	*	*
	2	*	*	*	*	*	*	*	*	138	45	0	--	*	*	*	*	*	*	*	*
	3	*	*	*	*	*	*	*	*	342	27	0	--	*	*	*	*	*	*	*	*
	4	217	30	0	--	493	26	0	--	1,323	17	0	--	*	*	*	*	*	*	*	*
	5	1,969	19	0	--	746	19	18	114	664	28	0	--	*	*	*	*	*	*	*	*
	6	4,186	12	4	109	1,095	22	387	51	4,129	13	195	47	22	--	0	--	2,439	12	477	21
	7	3,579	14	64	72	1,140	19	5,365	15	6,187	11	4,786	11	52	--	83	--	16,156	10	14,619	7
	8	3,555	11	129	19	1,342	17	1,464	25	10,046	8	2,502	14	9,918	--	1,150	--	28,319	6	19,124	7
	9	521	21	762	15	1,433	33	72	32	2,657	8	3,923	7	2,994	--	8,803	--	4,816	20	8,620	18
	10	14	59	22	105	140	60	6	168	106	67	429	57	*	*	*	*	*	*	*	*
	11	*	*	*	*	*	*	*	*	385	55	0	--	*	*	*	*	*	*	*	*
	12	*	*	*	*	*	*	*	*	496	26	0	--	*	*	*	*	*	*	*	*
2004	1	*	*	*	*	*	*	*	*	2,039	31	0	--	*	*	*	*	*	*	*	*
	2	*	*	*	*	*	*	*	*	785	21	0	--	*	*	*	*	*	*	*	*
	3	*	*	*	*	*	*	*	*	619	33	0	--	*	*	*	*	*	*	*	*
	4	*	*	*	*	54	72	0	--	275	25	0	--	*	*	*	*	*	*	*	*
	5	238	33	0	--	263	30	0	--	676	19	0	--	*	*	*	*	*	*	*	*
	6	1,388	14	0	--	143	32	0	--	4,553	17	164	51	0	--	0	--	4,519	10	494	18
	7	1,957	17	15	110	453	24	584	23	9,649	11	1,249	18	82	--	6	--	21,778	8	12,029	9
	8	4,963	12	386	39	729	33	800	24	13,201	7	3,367	13	4,443	--	512	--	42,648	6	17,690	8
	9	1,481	20	951	23	1,434	26	123	53	4,194	12	4,994	10	4,007	--	623	--	10,896	12	5,020	23
	10	53	50	83	44	693	44	135	57	2,153	25	1,265	24	*	*	*	*	*	*	*	*
	11	*	*	*	*	*	*	*	*	992	35	0	--	*	*	*	*	*	*	*	*
	12	*	*	*	*	*	*	*	*	1,532	14	0	--	*	*	*	*	*	*	*	*

		Georgia St. North				Georgia St. South				Juan de Fuca St.				Alberni Canal (Area 23A)				WCVI			
		Chinook		Coho		Chinook		Coho		Chinook		Coho		Chinook		Coho		Chinook		Coho	
Year	Month	Catch	PSE	Catch	PSE	Catch	PSE	Catch	PSE	Catch	PSE	Catch	PSE	Catch	PSE	Catch	PSE	Catch	PSE	Catch	PSE
2005	1	*	*	*	*	0	--	0	--	1,640	15	0	--	*	*	*	*	*	*	*	*
	2	*	*	*	*	2	110	0	--	499	28	3	104	*	*	*	*	*	*	*	*
	3	*	*	*	*	49	77	0	--	379	19	0	--	*	*	*	*	*	*	*	*
	4	*	*	*	*	46	70	0	--	141	28	0	--	*	*	*	*	*	*	*	*
	5	772	40	0	--	235	27	0	--	492	44	0	--	*	*	*	*	*	*	*	*
	6	1,178	21	0	--	117	59	4	44	2,475	25	453	38	6	--	0	--	5,516	10	1,646	17
	7	3,057	25	332	70	314	22	238	54	5,903	11	2,127	16	19	--	6	--	17,761	7	10,686	7
	8	3,126	23	146	71	209	29	301	31	12,039	16	946	27	7,342	--	338	--	37,309	8	18,717	12
	9	2,213	22	184	39	858	23	140	43	5,585	19	2,192	18	2,287	--	849	--	10,110	11	6,309	12
	10	*	*	47	48	76	59	19	91	75	42	1,870	10	*	*	*	*	*	*	*	*
	11	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	12	*	*	*	*	*	*	*	*	1,250	39	0	--	*	*	*	*	*	*	*	*

Table 5-2. Estimated average monthly sport harvest and total sport harvest for years 1998-2004 for Washington Puget Sound marine areas 5-13. The percent standard error (PSE) is also averaged over all the months within years. Estimates are derived using Washington catch record cards and creel surveys.

		Chinook		Coho	
Area	Year	Catch	PSE	Catch	PSE
5	1998	125	46%	4,763	12%
	1999	67	67%	1,121	22%
	2000	47	60%	2,650	12%
	2001	506	16%	19,665	6%
	2002	432	29%	12,839	5%
	2003	549	34%	11,989	5%
	2004	458	40%	9,147	15%
6	1998	121	54%	757	44%
	1999	160	60%	161	28%
	2000	212	20%	500	24%
	2001	105	30%	740	18%
	2002	51	49%	343	24%
	2003	237	33%	658	13%
	2004	104	48%	348	39%
7	1998	341	34%	622	34%
	1999	339	36%	123	57%
	2000	404	32%	881	13%
	2001	727	15%	980	23%
	2002	536	17%	1,105	8%
	2003	372	19%	486	17%
	2004	280	28%	368	37%
8-1	1998	72	62%	216	66%
	1999	76	68%	222	45%
	2000	161	45%	280	55%
	2001	122	46%	822	17%
	2002	82	28%	215	27%
	2003	61	51%	293	23%
	2004	83	31%	162	29%
8-2	1998	55	71%	786	35%
	1999	124	47%	535	27%
	2000	313	47%	2,358	14%
	2001	373	17%	3,142	32%
	2002	223	25%	1,244	20%
	2003	380	13%	1,699	17%
	2004	196	40%	768	34%
9	1998	208	48%	1,600	29%
	1999	351	44%	828	44%
	2000	334	36%	824	49%
	2001	519	23%	10,326	8%
	2002	213	25%	1,118	34%
	2003	152	24%	3,831	12%
	2004	206	36%	1,826	23%
10	1998	205	37%	780	34%
	1999	147	53%	174	62%
	2000	269	39%	710	37%
	2001	386	24%	2,597	27%
	2002	496	18%	1,012	21%

		Chinook		Coho	
Area	Year	Catch	PSE	Catch	PSE
	2003	575	15%	1,706	21%
	2004	516	25%	1,564	17%
11	1998	352	28%	311	36%
	1999	721	26%	99	58%
	2000	369	25%	336	30%
	2001	1,278	14%	1,385	22%
	2002	975	17%	306	26%
	2003	440	14%	683	29%
	2004	820	19%	975	23%
12	1998	29	63%	254	50%
	1999	129	41%	39	55%
	2000	179	36%	195	37%
	2001	74	46%	1,100	32%
	2002	169	25%	575	22%
	2003	205	34%	717	16%
	2004	324	29%	989	13%
13	1998	203	47%	95	48%
	1999	285	56%	55	63%
	2000	150	39%	221	40%
	2001	256	31%	269	19%
	2002	212	29%	96	34%
	2003	184	42%	212	32%
	2004	129	38%	177	33%

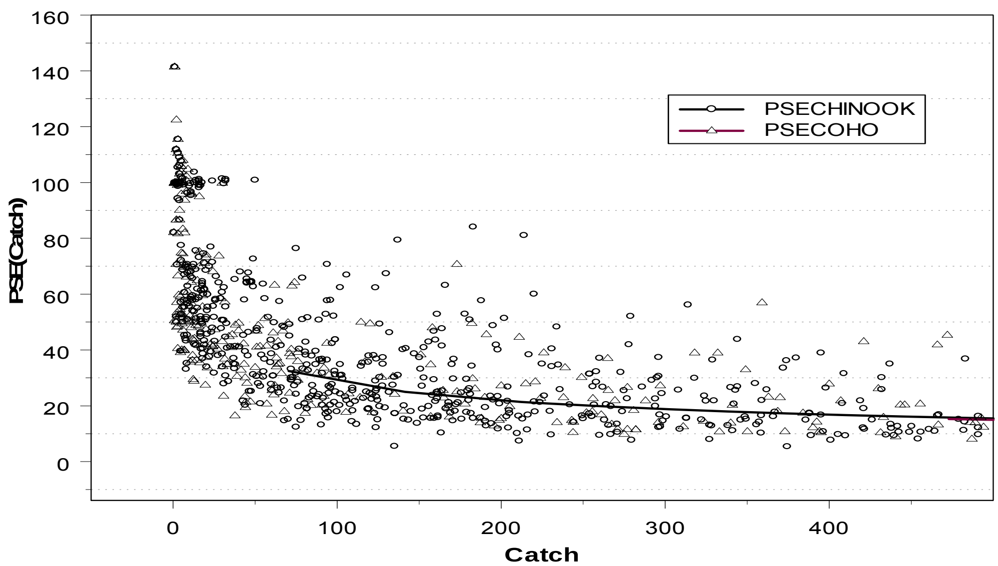


Figure 5-6. Relationship between PSE and total catch for Washington Puget Sound sport fisheries from 1998-2004.

Table 5-3. Black Creek coho salmon escapement and measurements of uncertainty (variance and PSE).

Return Year	Escapement	Variance	PSE
1984	5,990	NA	NA
1985	5,992	524,555	12%
1986	4,818	53,051	5%
1987	785	1,256	5%
1988	3,122	46,898	7%
1989	3,272	19,496	4%
1990	1,237	38,861	16%
1991	3,568	10,068	3%
1992	1,720	536	1%
1993	959	395	2%
1994	900	25,260	18%
1995	1,760	11,003	6%
1996	284	5,112	25%
1997	1,200	184,624	36%
1998	7,616	1,398,779	16%
1999	511	2,077	9%
2000	1,114	613,843	70%
2001	12,100	579,079	6%
2002	4,322	2,858	1%
2003	2,780	33,707	7%
2004	4,065	15,664	3%
2005	2,248	28,419	7%

Table 5-4. Green River Chinook salmon escapement and a measurement of uncertainty (PSE).

Year	Escapement Age 3 and older	PSE
2000	10,525	14%
2001	21,402	7%
2002	15,263	9%

Table 5-5. Nicola and Lower Shuswap River Chinook salmon escapements (age 3 and older) and measurements of uncertainty (PSE).

	Females		Males	
Year	Escapement	PSE	Escapement	PSE
Nicola River				
2000	4,768	5%	3,415	7%
2001	5,522	5%	3,462	6%
2002	12,885[1]	4%[1]	NA[1]	NA[1]
2003	8,619	4%	5,871	4%
2004	6,221	8%	3,931	9%
2005	1,732	9%	1,506	12%
2006	2,985	7%	2,102	10%
Lower Shuswap River				
2004	9,071	6%	7,892	6%
2005	8,726	4%	9,167	5%
2006	36,796	3%	22,288	3%

[1] Escapement reported for both sexes combined at Nicola River in 2002.

5.3.5 Bias

Bias is non-random error which is generally caused by violation of the assumptions of the estimation model and/or sample design. For instance, in the estimation of total ERs, the following assumptions are made:

1. all fisheries and escapement for a tagged stock are sampled for tags,
2. an unbiased estimate of all catch and escapement exist,
3. all tagged fish in a sample are located and processed, and
4. sampling in each stratum is representative, i.e., all tag codes are present in the samples in the same proportion as they are present in the total catch or escapement for the stratum.

Violation of any of these assumptions will lead to biased estimates of ERs; that is, they will be either under-estimated or over-estimated. For example, Table 5-1 shows that Canadian sport fishery catches were not estimated during all months by the creel survey program. CWTs were submitted voluntarily by anglers during months when there was no creel survey program. For those tags, head submission rates estimated during the months with creel surveys were used to expand observed tags to estimated recoveries. This approach leads to bias in the estimated tag recoveries, but these estimates are believed to be less biased than if the observed tags were not expanded (i.e. an assumed submission rate of 100%). Generally, the precision of estimates of ERs can be estimated but bias cannot be. Bias may be minimized through planning and adherence to the sample design of the CWT program and may be studied through research programs.

5.3.6 Summary

Often catch in commercial fisheries is assumed to be known without error, but the assumption is untested. In reality, errors exist with commercial catch data and depend, in part, on how the catch is estimated and reported on the fish tickets. Catch in sport fisheries is always estimated, increasing the variance and PSE of the estimate of ER. Over the period from the late 1970's to the present, the proportion of total fishery exploitation on Chinook and coho in commercial fisheries vs. sport fisheries have decreased (Figure 5-7). Since sport harvest is estimated with higher uncertainty than commercial harvest, the recent estimates of total ER are relatively more uncertain than the estimates of total ER were in the late 1970's. However, there were some exceptions. For instance, the Lower Columbia River Wild, Green River, and Nisqually River Chinook stocks (LRW, GRN and NIS in Figure 5-7) exhibit a larger proportion of the harvest in sport fisheries in the earlier period. Increasing PSE may not be simply a result of this increase in the sport proportion of the total exploitation, but also may be due to reductions in total catch.

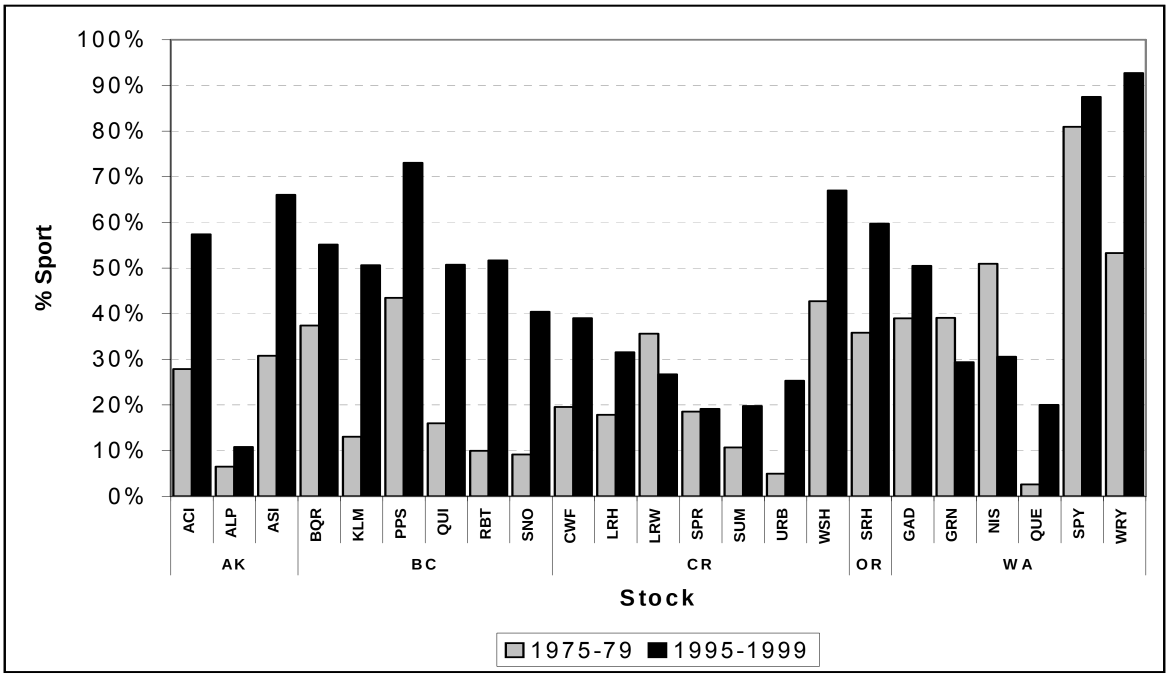


Figure 5-7. Percent of total estimated harvest taken in sport fisheries for CTC Chinook indicator stocks for early (1975-1979) and late (1995-1999) brood year periods. Full indicator stock names are given in Table 4-2. Data for this graph were taken from CTC database CAS.

5.4 *Historical Trends for CWT Indicator Stocks*

Historical trends in estimates of ERs and the factors affecting uncertainty of these estimates can be evaluated in more detail by examining selected CWT'd Chinook ER indicator stocks and coho stocks used as natural stock representatives. Green River fall Chinook (Puget Sound), Taku River wild coho (Southeast Alaska), Black Creek coho (East Coast Vancouver Island), and Queets River coho (Washington coastal) are examples selected to demonstrate CWT program performance reflecting differences in the species, region, fisheries involved, and the primary agency responsible for design, tagging and sampling.

5.4.1 Green River Fall Chinook Salmon

Green River fall Chinook salmon are released from Soos Creek Hatchery on the Green River in Puget Sound. This stock is a representative of central Puget Sound fall Chinook salmon.

5.4.1.1 Releases

With a few exceptions, approximately 200 K fingerlings per tag group have been released for this stock since 1971 (Figure 5-8). Since 1996, a double index tag (DIT) group has been released annually from Soos Creek Hatchery, with a total of approximately 200 thousand marked and 200 thousand unmarked tagged fingerlings released annually.

5.4.1.2 Total Return from Release

The percent of the total release that is estimated to return to fisheries and escapement (survival index) has decreased from 1.5% in the 1970's to approximately 0.5% for the more recent complete brood years (Figure 5-9).

For the last 5 complete brood years (1995-1999), the majority of the fishery recoveries for Green River stock are taken in the terminal net fisheries, other Puget Sound net and sport fisheries, and WCVI fisheries (Table 5-6) and about 35% of the total return was recovered in escapement, the hatchery or on the spawning grounds.

The Green River stock returns to escapement in the hatchery and to spawning grounds, but the spawning grounds have only been sampled consistently since the late 1980's. Prior to brood year 1985, escapement sampling included only hatchery returns. Since brood year 1985, on average, only 55-75% of the estimated escapement to the Green River has been to the hatchery (Figure 5-10).

Since 1985, the first brood year sampling included spawning ground returns, an decreasing percentage of the total tags recovered or estimated has been taken in troll fisheries, while a larger percentage has been taken in net fisheries and returned to escapement (Figure 5-11).

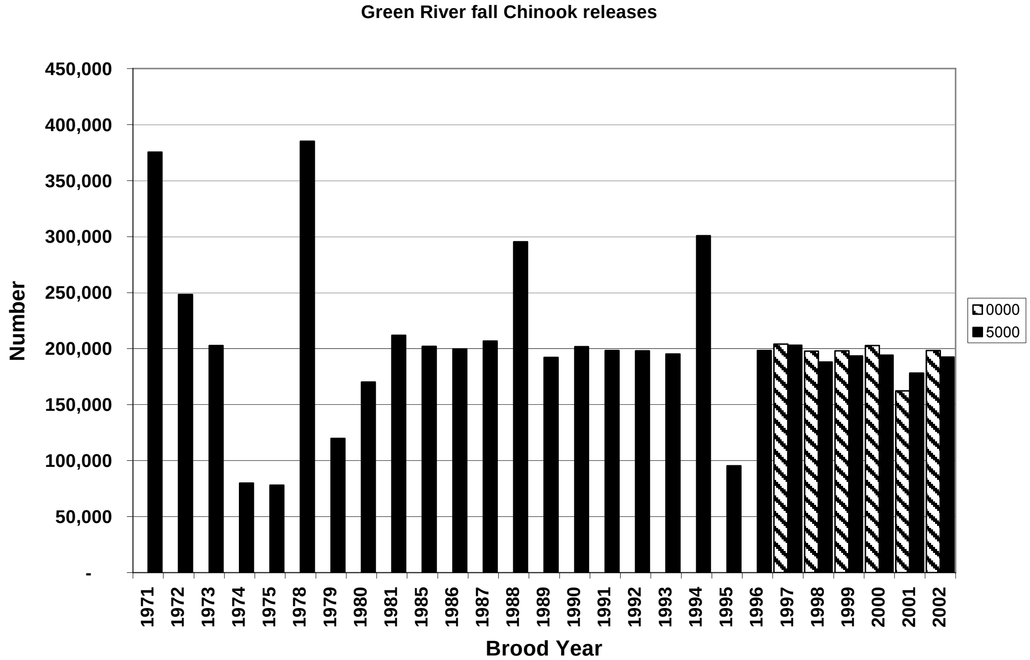


Figure 5-8. Releases of tagged Green River fall Chinook salmon from the Soos Creek Hatchery for brood years 1971-2002. (In the legend, 0000 indicates unmarked fish and 5000, adipose fin clipped).

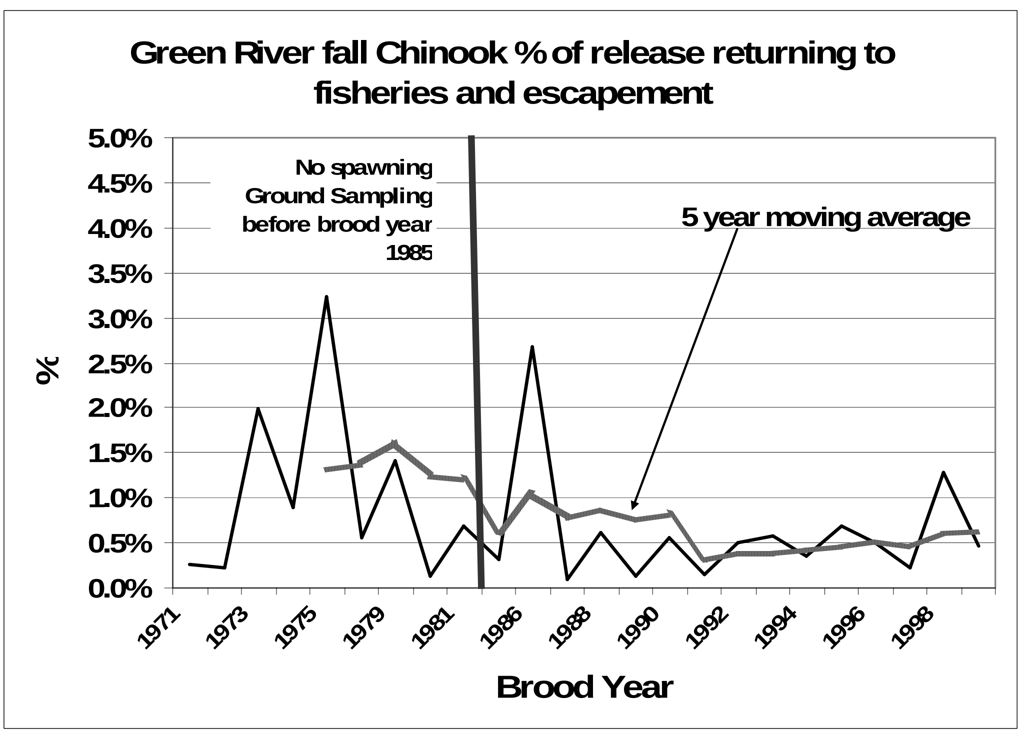


Figure 5-9. Percent of total releases returning to fisheries and escapement for Green River Chinook salmon brood 1971-1999. Note that prior to 1985 brood there was no spawning ground sampling.

Table 5-6. Number of estimated tagged Green River Chinook salmon returning to escapement and fisheries averaged over brood years 1995-1999. Fishery definitions are based on those used by CTC for the ER analysis.

	Age 2	Age 3	Age 4	Age 5	Total
Escapement	12	143	145	12	312
Terminal net	2	63	151	15	231
WCVI troll	-	12	59	4	75
Puget Sound South sport	3	28	35	3	69
Puget Sound South net	-	21	38	5	64
WCVI sport	-	15	21	-	36
Georgia Strait net	1	21	14	-	35
WA/OR troll	-	9	21	3	32
Puget Sound north sport	-	1	10	-	12
NBC troll	-	-	2	2	5
Alaska troll	-	1	6	1	8
North central BC sport	-	2	2	-	4
WA coastal sport	-	2	1	-	3
Terminal sport	1	-	-	-	1
Alaska net	0	0	-	-	0

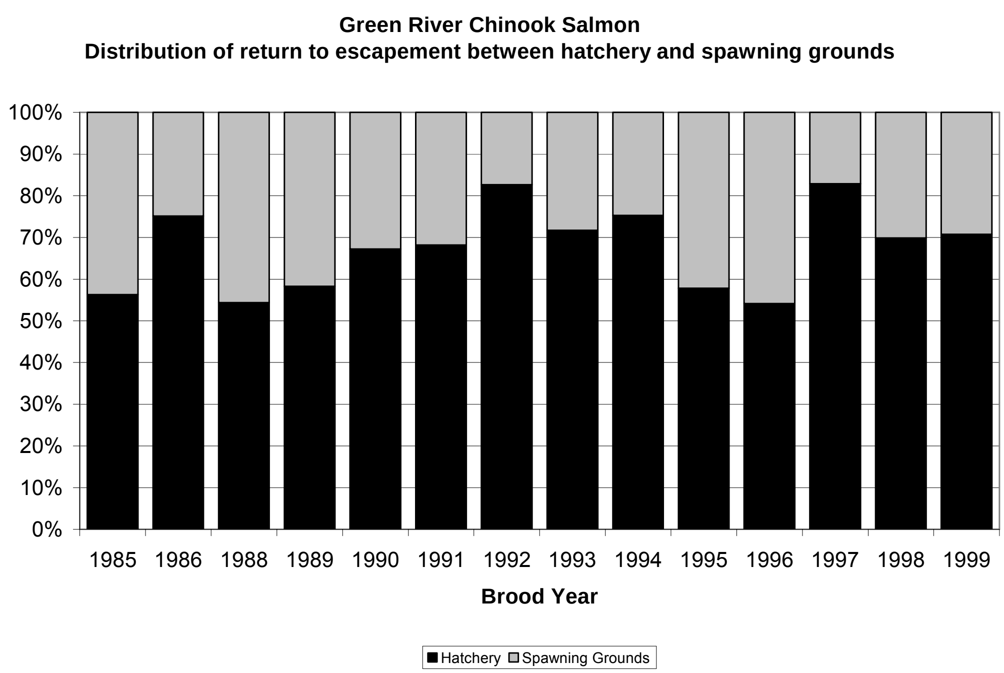


Figure 5-10. Percent of total tagged escapement returning to hatchery or spawning grounds for Green River fall Chinook brood years 1985-1999, 1987 not included.

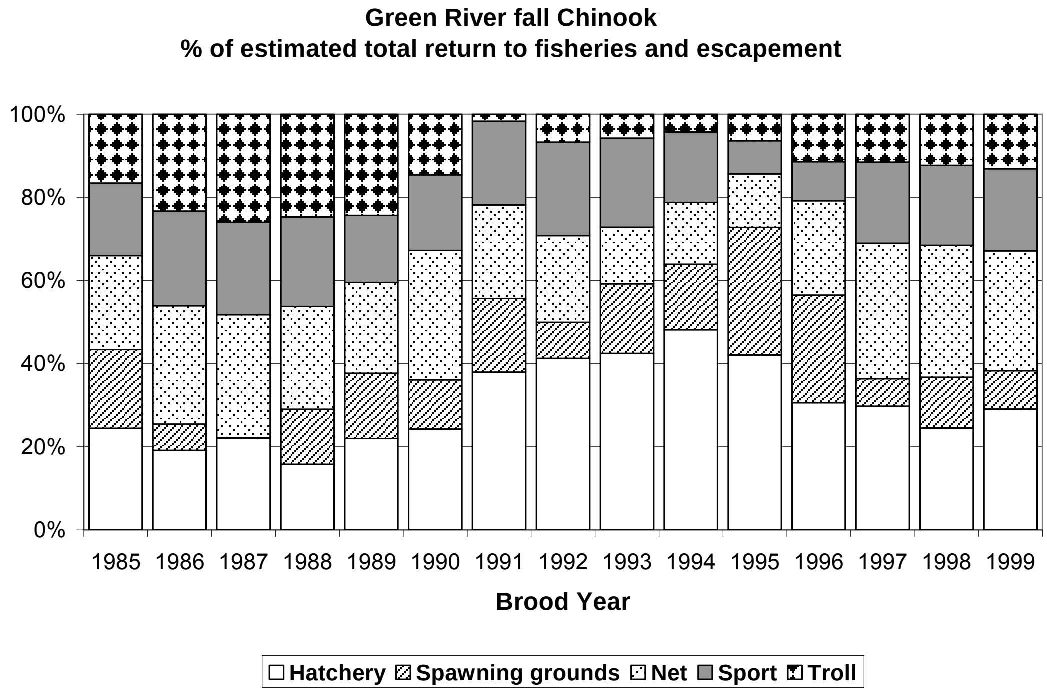


Figure 5-11. Percent of total return by location for tagged Green River Chinook brood years 1985-1999 (since commencement of spawning ground sampling).

5.4.1.3 Sampling in Fisheries and Escapement

An examination of the number of tagged fish recovered in fisheries and escapement shows that there is a general decrease in the number of tagged fish observed in samples (Figure 5-12), with the exception of hatchery recoveries and net recoveries. A comparison of the distribution of tag recoveries between pre-terminal and terminal fisheries and escapement for two periods, 1975-1979 and 1995-1999 (last 5 complete brood years) shows that there has been a change in both the pattern of tag recoveries and fisheries (Table 5-7). Tagged fish were recovered in net fisheries in both pre-terminal and terminal areas in the early period, but for the last 5 broods only terminal net fisheries are exploiting Green River tagged Chinook salmon. These terminal net fisheries do not show a decrease in the number of tagged fish exploited or recovered from the earlier to the later period (Table 5-7). For troll and sport fisheries there is a significant decrease in the number of fish estimated to have been harvested and in the number of tagged fish recovered in samples and in the precision of the estimate of the number of tagged fish harvested as measured by the percent standard error (Table 5-7).

Table 5-7 shows that since the early period of 1975-1979 pre-terminal troll and sport fisheries have decreased in size and the number of tags recovered has decreased, but the terminal net fishery has maintained in size and in the number of tags recovered.

5.4.1.4 ERs

The Green River total ERs have decreased from approximately 50% for brood years in the 1970’s and 1980’s to 30-40% in the late 1990’s, and this decline has occurred in the pre-terminal fisheries (Figure 5-13). Comparison of the two periods used above (early and last 5 complete broods) shows that as with tag recoveries in Table 5-7, the decrease in annual ERs has occurred in pre-terminal fisheries while terminal fisheries have maintained similar ERs for both periods (Table 5-8). For these comparisons total escapement was adjusted in the early period to include an estimate of strays to the spawning grounds.

5.4.1.5 Conclusion

Estimates of PSE for estimates of the number of recoveries in pre-terminal and terminal area fisheries are presented in Table 5-7, for the earlier period (1975-1979 brood years) and a more recent period (1995-1999 brood years) for the Green River Chinook stock. PSE estimates are provided for recoveries on spawning grounds, however no estimates are available for the earlier period. PSE estimates generally are higher for recoveries in fisheries in the more recent period and may be explained by lower numbers of tagged fish in pre-terminal sport and troll fisheries. Pre-terminal fishing levels were reduced in both Canada and the southern United States for conservation purposes.

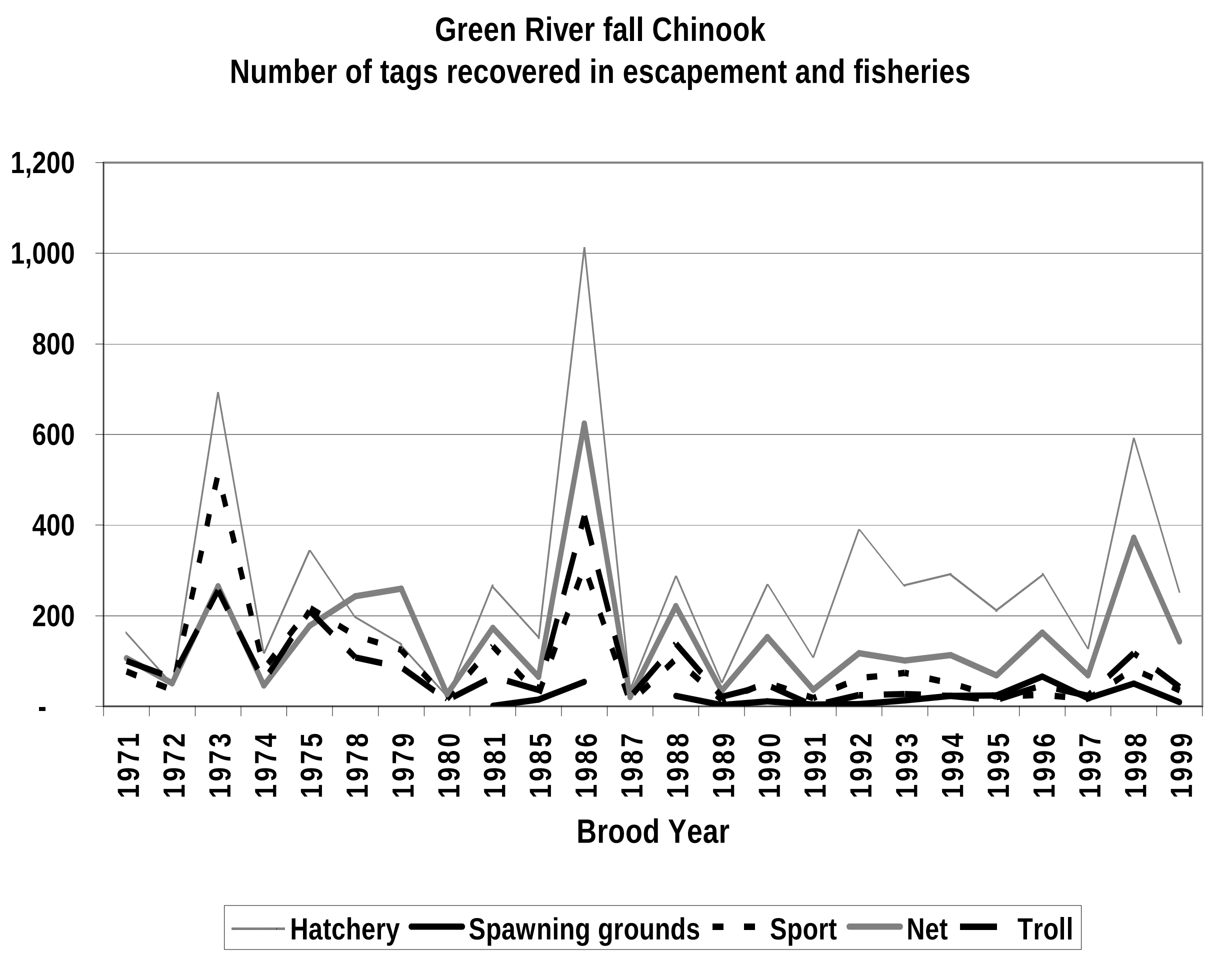


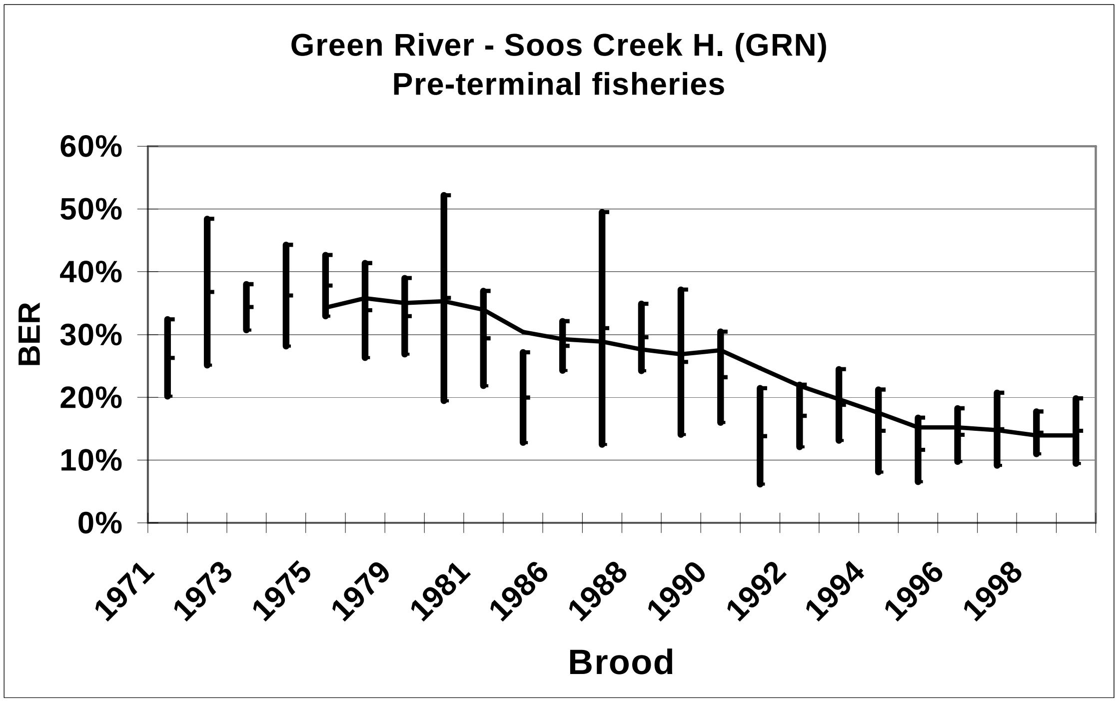
Figure 5-12. Number of observed recoveries for Green River Chinook salmon in sport, troll and net fisheries.

Table 5-7. Number of tagged Green River Chinook salmon recovered in samples, estimated number, % in samples and PSE for pre-terminal and terminal fisheries summarized for early years (1975, 1978 and 1979) available and for last five complete brood years.

		1975-1979		1995-1999	
		Pre-terminal	Terminal	Pre-terminal	Terminal
Hatchery	Observed in sample		225		295
	Estimated		249		312
	% in sample		90.5%		94.4%
	PSE		8.6%		7.9%
Spawning grounds	Observed in sample				33
	Estimated		No		172
	% in sample		Sampling		19.3%
	PSE				36.5%
Sport	Observed in sample	142	24	24	12
	Estimated	617	110	137	38
	% in sample	23.0%	21.4%	17.2%	33.0%
	PSE	12.4%	25.8%	34.0%	49.3%
Net	Observed in sample	60	167		162
	Estimated	198	315		295
	% in sample	30.5%	53.0%		55.1%
	PSE	20.1%	11.7%		11.9%
Troll	Observed in sample	135		49	
	Estimated	625		124	
	% in sample	21.6%		39.2%	
	PSE	13.4%		24.3%	

Table 5-8. Estimated annual ERs for Green River Chinook salmon for pre-terminal and terminal fisheries for two periods (early and last 5 complete brood years). Escapement has been adjusted for early years to include spawning ground returns of tagged fish (using average stray rate of broods 1985-1999).

	Pre-terminal				Terminal			
	1975,78 and 79		1995-1999		1975,78 and 79		1995-1999	
	ER	PSE	ER	PSE	ER	PSE	ER	PSE
Age 2	4.5%	27.4%	1.6%	53.3%	1.4%	28.0%	0.3%	70.0%
Age 3	24.8%	13.7%	5.1%	31.1%	5.8%	17.1%	5.6%	13.3%
Age 4	44.9%	11.2%	23.3%	19.4%	21.7%	14.9%	21.2%	12.9%



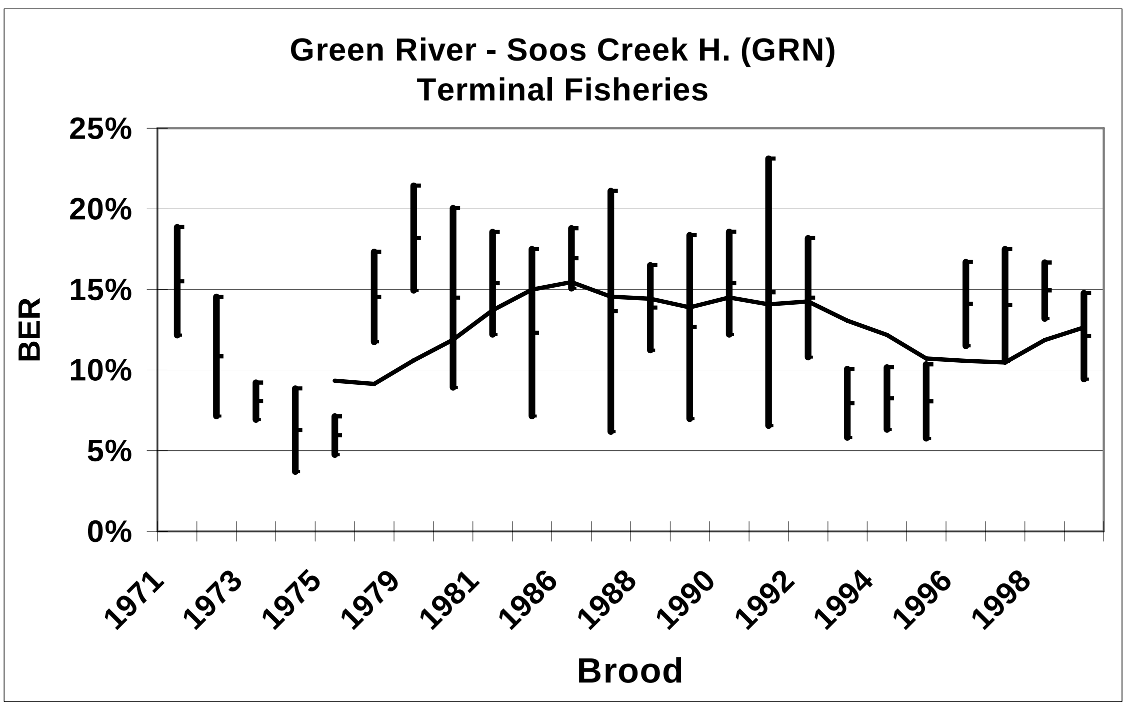


Figure 5-13. Estimates of brood ERs (ER) for Green River fall Chinook salmon for brood years 1971-1999 for pre-terminal and terminal fisheries, with 5-year average trend lines. Note that prior to the 1985 brood year spawning ground returns were not sampled but the escapement was adjusted using information from later years.

5.4.2 Taku River Wild Coho Salmon

Taku River coho salmon are trapped and tagged during the outmigration each spring by a joint (Alaska and Canada) crew in the lower river. The marked fraction with CWTs, and estimation of the number of smolts, is determined the following year by sampling done in the inriver escapement program. This stock is a large wild stock, smolts are age 2 or 3 and adults are age 3 or 4; almost all adults return after 1 year of ocean residence. The terminal run is jointly managed by Alaska and Canada under the transboundary river annex of the PST. Alaska Department of Fish and Game (ADFG) and Canadian Department of Fisheries and Oceans (CDFO) use stock assessment for inseason management of escapement, with run strength judged by inriver abundance and marine-fishery CWT recoveries expanded to total estimated harvest, for run reconstruction. Population statistics are estimated postseason and reported in ADFG technical reports and are available since 1992 (e.g., Jones et al. 2006; Table 5-9). Marine harvests are estimated using methods in Bernard and Clark (1996). In this section we are reporting on statistics from wild smolt tagging in 1991-2002 and adult returns in 1992-2003.

5.4.2.1 Releases

As experience and trapping methods have improved, both the number of coho smolt and the marked fraction with CWTs has increased (Figure 5-14). The average number of smolt tagged from 1991-1998 was 11,151 and was more than tripled (37,411) from 1999-2002. The marked percent has doubled from about 1% to 2%, on average, over the two time frames.

5.4.2.2 Total Return from Release

Marine survival has averaged 11.3% from 1992-2003, with averages of 12.7% from 1992-1999 and 8.8% from 2000-2003. This compares to the long-term average of about 10% for Southeast Alaska (SEAK) coho stocks since 1980.

For the last 4 complete return years (2000-2003) for which data are compiled, 31% of the return was harvested in landed catch and 68% returned to the escapement (Table 5-9). One-half (16%) of the landed catch was taken in the SEAK troll fishery, 9% in the SEAK drift gillnet fishery, 4% in the sport fishery, 2% in the inriver Canadian gillnet fishery and 1% in the SEAK seine fishery (Table 5-10). No straying of Taku wild coho salmon have been documented to any nearby natural spawning escapements nor hatcheries.

From 1992-1999, harvest rates were higher, with 55% of the return harvested in landed catch and 45% accruing to escapement. Of the landed catch, 25% was taken in the SEAK troll fishery, 19% in the SEAK drift gillnet fishery, 4% in the sport fishery, 5% in the inriver Canadian gillnet fishery and 2% in the SEAK seine fishery (Figure 5-15).

Table 5-9. Summary of population parameters for the Taku River coho salmon run, 1987–2003 (Jones et al. 2006, Appendix F-1).

Coho salmon above Canyon Island									
Calendar year	Escape-ment	Canadian harvest	Inriver run	Est'd U.S. marine harvest	Estimated total run	Total ER (%)	U.S. marine ER (%)	Smolt in year (t-1)	Marine survival (%)
1987	55,457	6,519	61,976						
1988	39,450	3,643	43,093						
1989	56,808	4,033	60,841						
1990	72,196	3,685	75,881						
1991	127,484	5,439	132,923						
1992	84,853	5,541	90,394	96,283	186,677	54.5	51.6	743,000	
1993	109,457	4,634	114,091	97,758	211,849	48.3	46.1	1,510,000	14.0
1994	96,343	14,693	111,036	228,607	339,643	71.6	67.3	1,476,000	23.0
1995	55,710	13,738	69,448	111,571	181,019	69.2	61.6	1,525,000	11.9
1996	44,635	5,052	49,687	44,529	94,216	52.6	47.3	986,489	9.6
1997	32,345	2,690	35,035	15,825	50,860	36.4	31.1	759,763	6.7
1998	61,382	5,090	66,472	53,368	119,840	48.8	44.5	853,662	14.0
1999	60,768	5,575	66,343	50,789	117,132	48.1	43.4	1,184,195	9.9
2000	64,700	5,447	70,147	38,971	109,118	40.7	35.7	1,728,240	6.3
2001	104,394	3,099	107,493	55,264	162,756	35.9	34.0	1,846,629	8.8
2002	219,360	3,802	223,162	80,046	303,208	27.7	26.4	2,718,816	11.2
2003	183,038	3,717	186,755	78,277	265,032	30.9	29.5	2,988,349	8.9
Standard errors									
1992	19,033		19,033	24,005	30,635		8.20	247,000	
1993	17,503		17,503	19,256	26,022		6.20	418,051	4.2
1994	6,529		6,529	36,734	37,310		3.80	368,411	6.3
1995	3,242		3,242	12,186	12,610		2.80	339,822	2.8
1996	3,650		3,650	6,494	7,449		4.10	214,152	2.2
1997	4,120		4,120	2,691	4,921		4.40	154,051	1.5
1998	5,394		5,394	7,435	9,186		4.00	147,260	2.6
1999	7,049		7,049	6,097	9,320		3.90	207,576	1.9
2000	5,667		5,667	3,326	6,571		2.59	255,147	1.0
2001	9,495		9,495	4,828	10,652		2.75	276,385	1.4
2002	28,648		28,648	6,389	29,352		2.92	363,071	1.8
2003	17,724		17,724	10,271	20,485		3.32	1,008,886	3.1

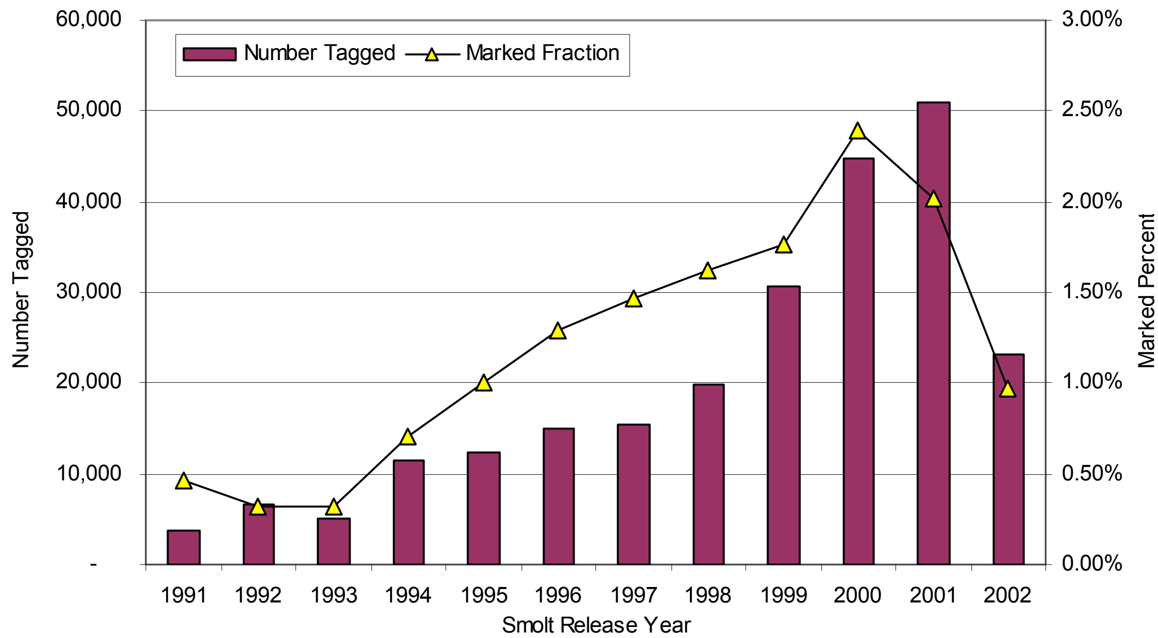


Figure 5-14. Releases of tagged smolt and the estimated marked percent of coho salmon from the Taku River 1991-2002.

Table 5-10. Number of estimated tagged Taku River coho salmon returning to escapement and fisheries for calendar years 2000-2003.

	2000	2001	2002	2003	Average
Escapement	372	768	788	322	563
Inriver Canadian Gillnet	28	50	70	32	45
Alaska Drift Gillnet	168	79	143	56	112
Alaska Sport	175	274	494	245	297
Alaska Purse Seine	96	74	77	36	71
Alaska Troll	1,139	2,495	4,431	1,775	2,460
Total	1,978	3,740	6,003	2,467	3,547

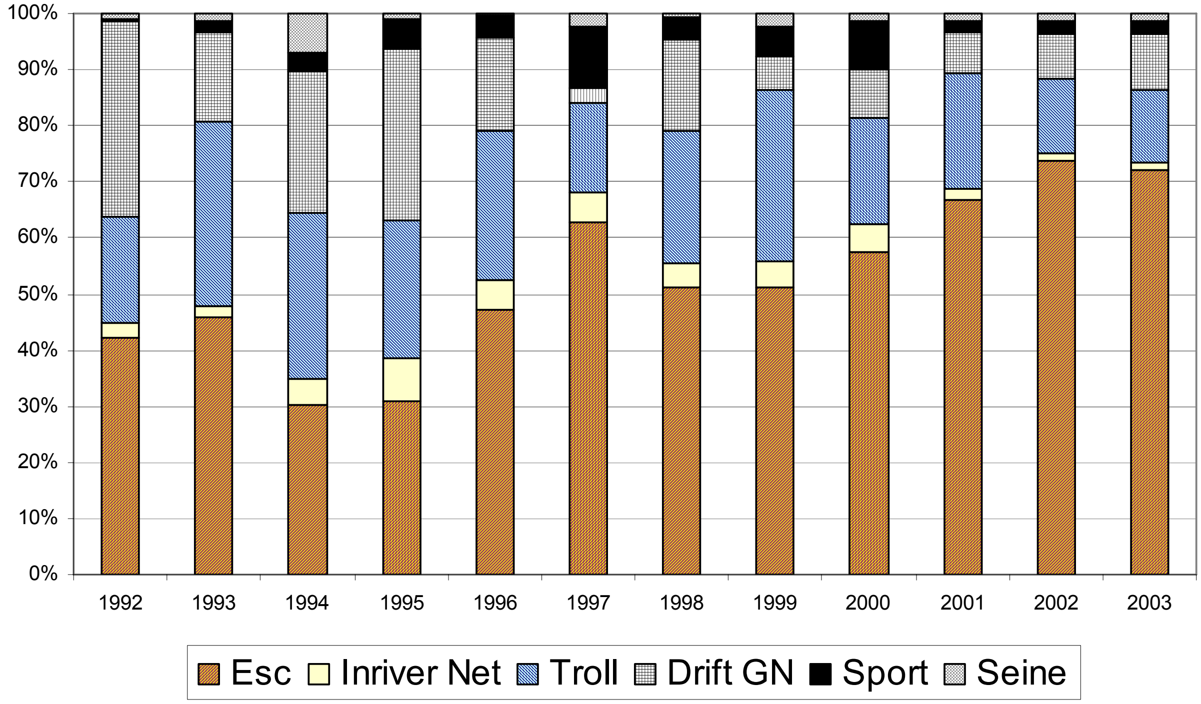


Figure 5-15. Percent of total return by gear sector and escapement for tagged Taku River coho salmon for calendar years 1992-2003.

5.4.2.3 Sampling in Fisheries and Escapement.

An examination of the number of tagged fish recovered in fisheries and escapement shows that there has been an increase in the number of tagged fish observed in samples (Figure 5-16). This is a direct result of increased numbers of tagged fish. From 1992-1999 an average of 160 observed randomly sampled CWTs were recovered from marine fisheries and a total of 180 in all fisheries and escapement, compared to 289 recovered in fisheries and 338 total from 2000-2003. Sampling rates in marine fisheries has averaged 28% from 1992-2003, with no discernable change in these rates, for fishery strata in which Taku River coho salmon are recovered. Sampling rates in the escapement have averaged 3.2% from 1992-2003, which is not a high rate, but constitutes an average of 2,500 adults examined during the marking event in the escapement assessment program. This level of sampling has produced population statistics with acceptable levels of precision for management (see following section).

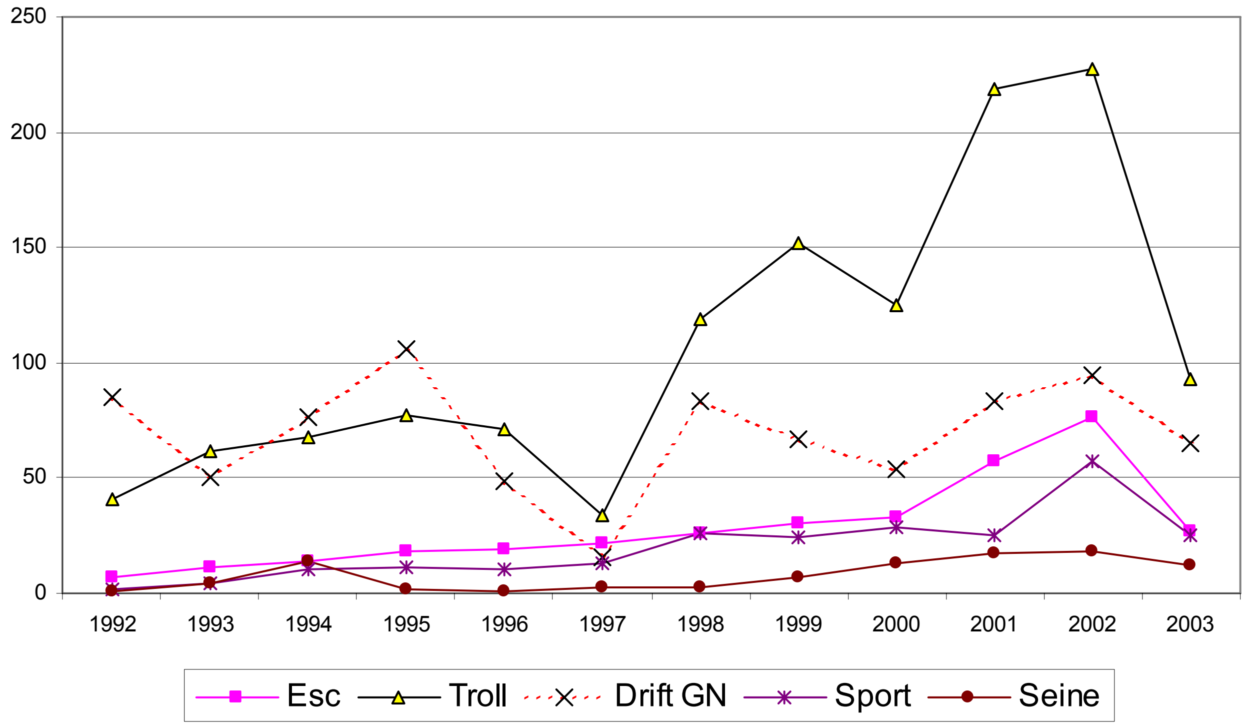


Figure 5-16. Number of observed CWT recoveries of Taku River coho salmon in sport, troll and net fisheries.

5.4.2.4 ERs and Population Statistics Precision

The Taku River annual ERs have decreased from approximately 49% for 1992-1999 to about 31% for 2000-2003 (Table 5-11). The precision of the ERs, as judged by the PSE, has remained about the same over the time series, averaging about 10%. As the ERs have decreased over time, the precision of the marine harvest and total run estimates have improved, which is the primary reason that the precision of the ERs has not changed.

Table 5-11. Estimated annual marine ERs for Taku River coho salmon and percent standard errors (PSE = SE/estimate x 100) for various population statistics.

Adult Return Year	PSE Estimated Smolt	PSE Estimated Marked Fraction	PSE Estimated Marine Harvest	PSE Estimated Esc	PSE Estimated Inriver Run	PSE Estimated Total Run	PSE Estimated Marine Survival	PSE Estimated Marine ER	Estimated Marine ER
1992	33%	38%	25%	22%	21%	16%		16%	**52%**
1993	28%	30%	20%	16%	15%	12%	30%	13%	**46%**
1994	25%	27%	16%	7%	6%	11%	27%	6%	**67%**
1995	22%	23%	11%	6%	5%	7%	24%	5%	**62%**
1996	22%	23%	15%	8%	7%	8%	23%	9%	**47%**
1997	20%	21%	17%	13%	12%	10%	22%	14%	**31%**
1998	17%	19%	14%	9%	8%	8%	19%	9%	**45%**
1999	18%	18%	12%	12%	11%	8%	19%	9%	**43%**
2000	15%	17%	9%	9%	8%	6%	16%	7%	**36%**
2001	15%	13%	9%	9%	9%	7%	16%	8%	**34%**
2002	13%	11%	8%	13%	13%	10%	16%	11%	**26%**
2003	34%	19%	13%	10%	9%	8%	35%	11%	**30%**
Averages									
1992-2003	21.8%	21.7%	14.0%	11.1%	10.3%	9.2%	22.4%	9.8%	**43.2%**
1992-1999	23.1%	25.0%	16.1%	11.5%	10.6%	10.0%	23.4%	10.0%	**49.1%**
2000-2003	19.2%	15.2%	9.6%	10.1%	9.8%	7.5%	20.7%	9.4%	**31.4%**

5.4.3 Black Creek Coho Salmon

Tagging of wild coho salmon smolts began at Black Creek in 1976. The stock represents the freshwater survival, marine survival, and fishery impacts of wild coho salmon in the Georgia Strait, east coast Vancouver Island region. The tagged fraction of the freshwater production is estimated the following year by sampling mark rates in the adult spawning escapement.

5.4.3.1 Releases

Strategies for smolt tagging targets have varied among years; however, often all captured wild smolts were tagged and adipose fin clipped, except in recent years when adipose fins were not clipped. On average, more than 45,000 wild smolts were tagged annually, ranging from about 8,000 to 150,000 smolts (Figure 5-17). Tagged fish represent an average of 62% of the surviving freshwater production, ranging from 5% to 90%. Freshwater production likely originates from Black Creek and other nearby systems.

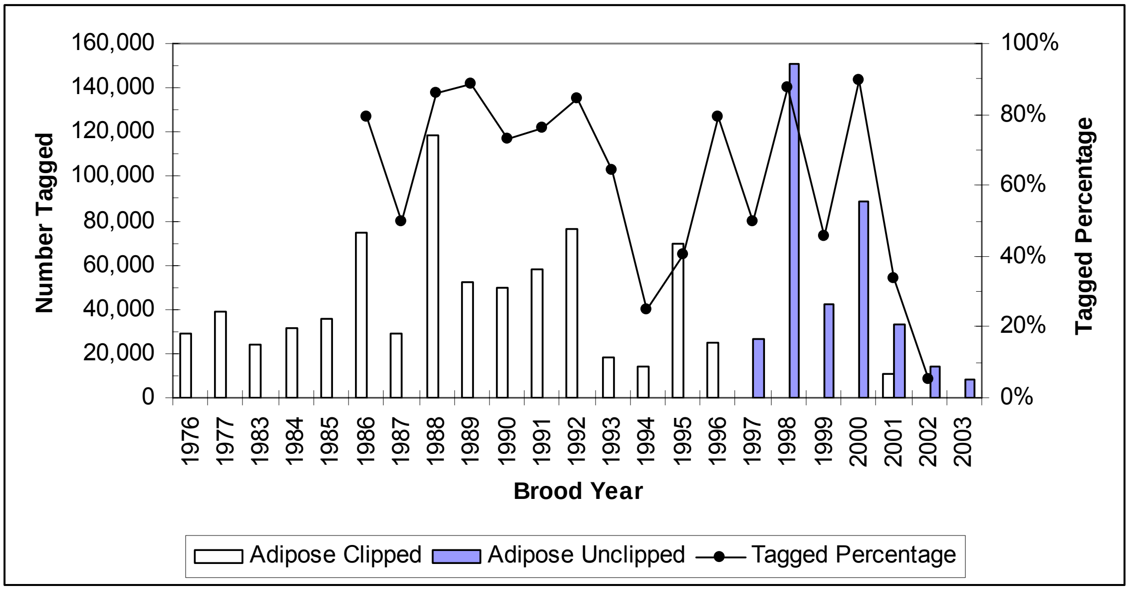


Figure 5-17. Numbers of tagged wild coho salmon smolts at Black Creek for brood years 1976-2003, and the estimated percentage tagged among age-3 adults on the spawning grounds.

5.4.3.2 Returns from Releases

The percentage of tagged releases returning to fisheries and escapement has been fairly high with an average survival index (excluding incidental mortalities) of 10%, ranging from 2% to 19% between brood years 1983 and 2002 (Figure 5-18). After brood year 1996, adipose fins were not clipped from tagged fish, except for 2001, and very few recoveries were made from mark selective or visually sampled fisheries. Overall, the percentage of tagged fish returning to fisheries and escapement has been declining steadily since the mid 1980’s.

For brood years 1990-1994, average annual estimated CWT recoveries were highest in the WCVI troll, Strait of Georgia sport, and Southern BC net fisheries and about 64% of recoveries were at the spawning grounds (Table 5-12). After brood year 1994, nearly all the CWT recoveries occurred on the spawning grounds largely due to reduced fishing impacts, reduced adipose fin clipping of tagged smolts, and implementation of hatchery-mark selective fishing methods (Figure 5-19).

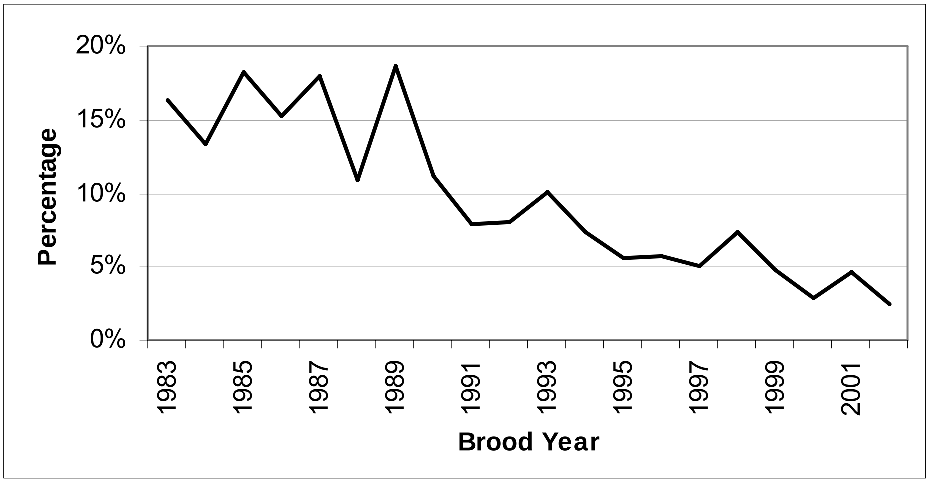


Figure 5-18. Percentage of total CWT releases estimated to return to fisheries and escapement for Black Creek coho salmon for brood years 1983-2002. Note that after brood year 1996, adipose fin clipping of CWT fish was limited.

Table 5-12. Number of estimated tagged Black Creek coho salmon returning to escapement and fisheries averaged over brood years 1990-1994. Note that after brood year 1994, fisheries were shaped to reduce impacts on coho stocks of concern and after 1996, adipose fin clipping of CWT fish was limited.

	Age 3 Estimated CWTs
Escapement	833
WCVI Troll	597
Georgia Strait Sport	479
Southern B.C. Net	168
NCBC Troll	126
SEAK Troll	63
NCBC Sport	58
WCVI Sport	48
WA Net	26
SEAK Net	24
NCBC Net	22
Puget Sound Sport	13
Terminal Sport	9
Washington Ocean Sport	5
WCVI Net	3
Washington Ocean Troll	2
Oregon Sport	2

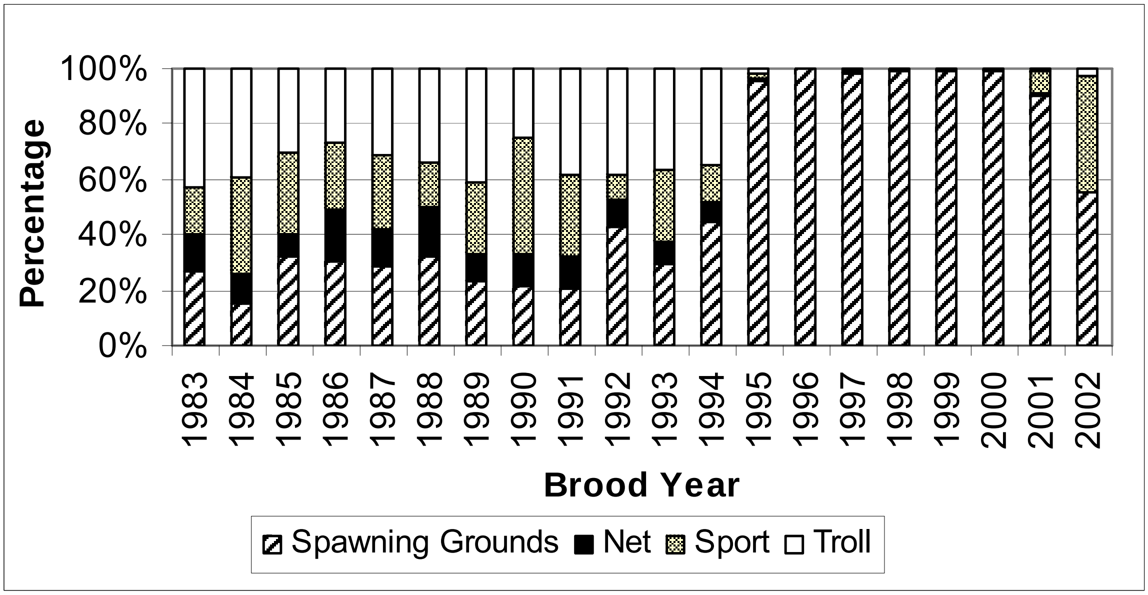


Figure 5-19. Percentage of estimated tag recoveries occurring in net, sport, and troll fisheries and on the spawning grounds for brood years 1983-2002. Note that after brood year 1994, Canadian fisheries were shaped to reduce impacts on coho stocks of concern and after 1996, adipose fin clipping of CWT fish was limited.

5.4.3.3 Sampling in Fisheries and Escapement

Observed tags peaked in fisheries and escapement in the late 1980's and declined to low levels by brood year 1993 (Figure 5-20). Fishery recoveries were rare for brood years that were not adipose fin-clipped. At the spawning grounds, CWT sampling occurred until brood year 1998 returned, and since then no CWTs have been sampled (no heads collected for CWT dissection). Beginning with brood year 1996, electronic detection equipment (detector wands) was used to identify fish presumed to contain a CWT. For brood years 1998-2002, on average 57% of the estimated spawning escapement was examined for the presence of a CWT using electronic detection equipment.

Recently (brood years1998-2002), fisheries have reported a much smaller number of recovered tags than for brood years 1976 and 1977, for both pre-terminal and terminal fisheries (Table 5-13). For troll and net fisheries, average sample rates appear similar between these time periods; however, the average sample rates have decreased recently for the sport fisheries. In both time periods, pre-terminal fisheries accounted for more estimated age-3 recoveries than terminal fisheries, which were defined as freshwater sport recoveries and all fishery recoveries occurring between October and December.

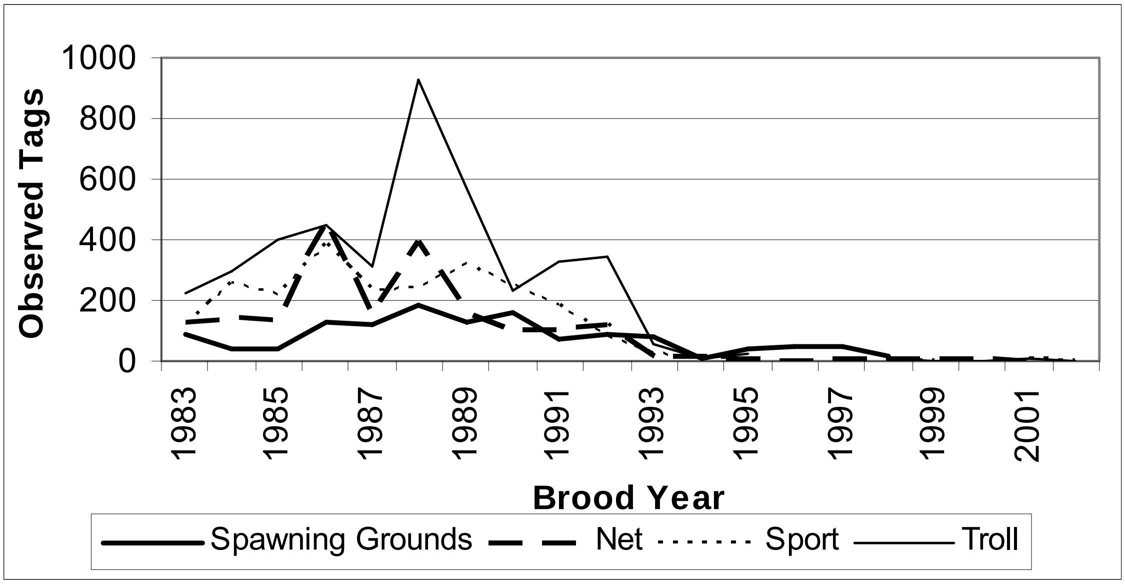


Figure 5-20. Number of observed CWT recoveries for Black Creek coho salmon at spawning grounds and in sport, troll and net fisheries.

Table 5-13. Number of age-3 tagged Black Creek coho salmon recovered in samples, estimated number, percentage (%) in samples (observed/estimated), and PSE for pre-terminal and terminal fisheries summarized for early brood years (1976 and 1977) and available for last five completed brood years (1998-2002).

		1976 and 1977		1998-2002	
		Pre-Terminal	Terminal	Pre-Terminal	Terminal
Spawning Grounds[1]	Sum of observed				1,087[1]
	Sum of estimated		No Sampling		3,314
	% in samples				57%
	PSE				7%
Net	Sum of observed	446	17	3	3
	Sum of estimated	1,196	44	7	5
	% in samples	32%	38%	44%	71%
	PSE	5%	35%	47%	31%
Sport	Sum of observed	536	15	3	<1
	Sum of estimated	2,445	69	48	1
	% in samples	22%	22%	11%	15%
	PSE	4%	26%	67%	102%
Troll	Sum of observed	562	3	4	0
	Sum of estimated	2,062	9	16	0
	% in samples	27%	40%	31%	NA
	PSE	5%	46%	60%	NA

[1]No heads were collected to decode CWTs. All fish with positive electronic detections were assumed to carry a Black Creek CWT (an observed tag) and be 3-year olds.

5.4.3.4 ERs and Precision

ERs generally ranged from 75% to 85% between brood years 1983 and 1993 and then declined rapidly to low levels when fisheries were shaped to reduce impacts on stocks of concern (Figure 5-21). Pre-terminal fisheries experienced the largest reductions, although the terminal fishery ERs have been declining since the mid 1980s (Figure 5-22). The precision of the ERs, as judged by the PSEs, increased after 1992. Further, standard errors were likely under-estimated when electronic detection equipment identified fish presumed to contain a CWT, as detections were not adjusted for false positive or negative errors.

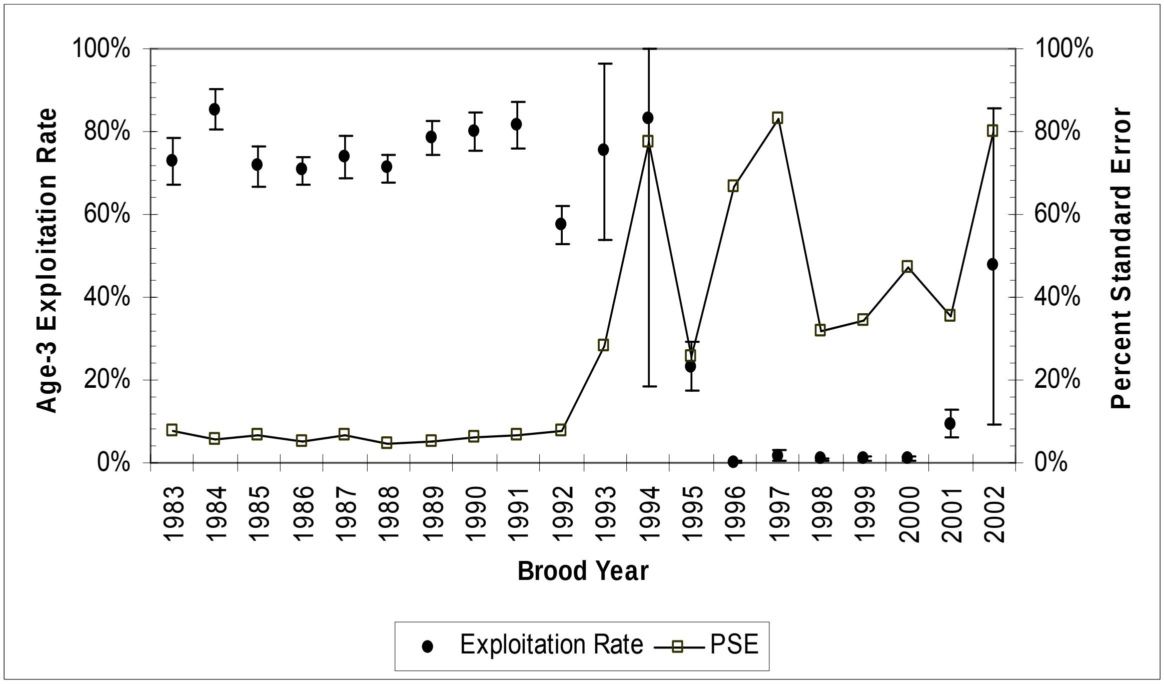


Figure 5-21. Age-3 ERs (excluding incidental mortalities) and percent standard errors (PSE) for Black Creek coho salmon brood years 1983-2002. Error bars represent one standard error.

5.4.3.5 Conclusion

- In the recent period, essentially all the fisheries have average PSE's that exceed the 30% benchmark identified in Chapter 5.
- Exploitation rate estimates became less precise, as indicated by increasing PSEs, when non-selective fisheries were closed and when fishing impacts were mainly from mark selective fisheries. However, the absolute precision was excellent given the extremely small ER measured from tag recoveries during most of the period when fisheries were mark selective.

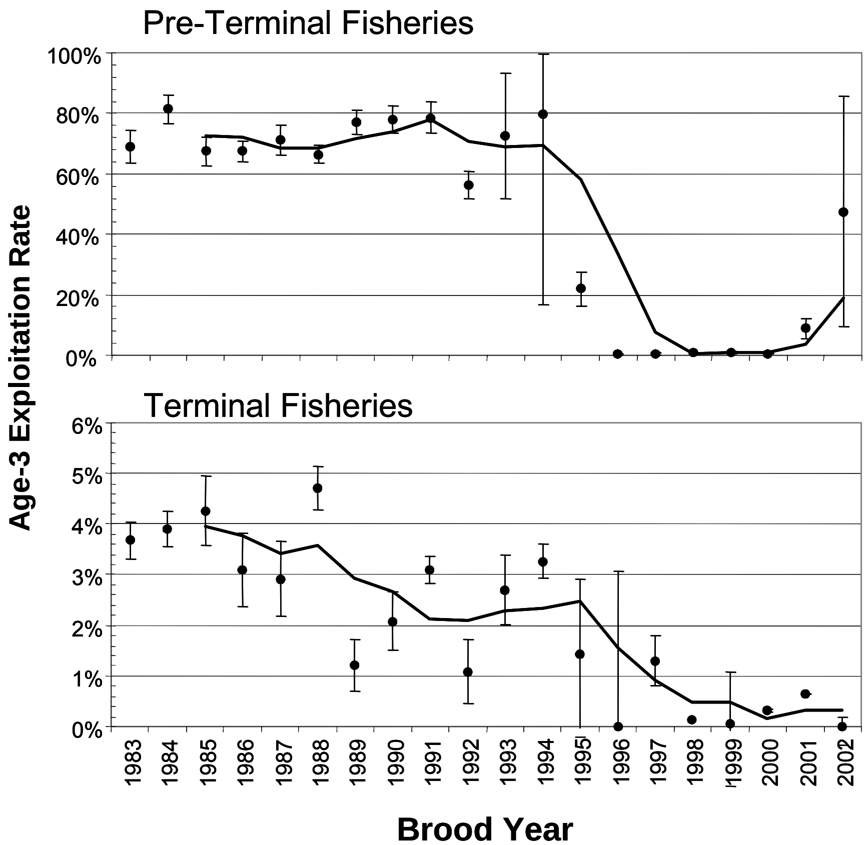


Figure 5-22. Age-3 ERs for pre-terminal and terminal fisheries for Black Creek coho salmon brood years 1983-2002. Error bars represent one standard error and solid lines represent a running three-year average.

5.4.4 Queets River Coho Salmon

Queets River fall coho salmon are released from Salmon River Hatchery on a tributary to the Queets on the Washington coast.

5.4.4.1 Releases

With a few exceptions, approximately 75,000 fingerlings per tag group have been released for this stock since 1983 (Figure 5-23). Since 1995, a DIT has been released from Salmon River Hatchery, with 75,000 marked and 75,000 unmarked tagged fish released.

5.4.4.2 Total Return from Releases

The percent of the total release estimated to have returned to fisheries and escapement has averaged 2.3% for brood years 1985-2002, ranging from 0.4% to 7.9% (Figure 5-24).

Until 1992 all escapement sampling occurred in the hatchery, since then samples are taken in the hatchery and on the spawning ground (Figure 5-25). For brood years 1983-1993 the troll and net fisheries were taking equal numbers of tagged fish, but since 1993 the net fishery has taken the majority of the tagged fish, while the sport fishery has taken 10-20% of the total tagged return (Figure 5-25).

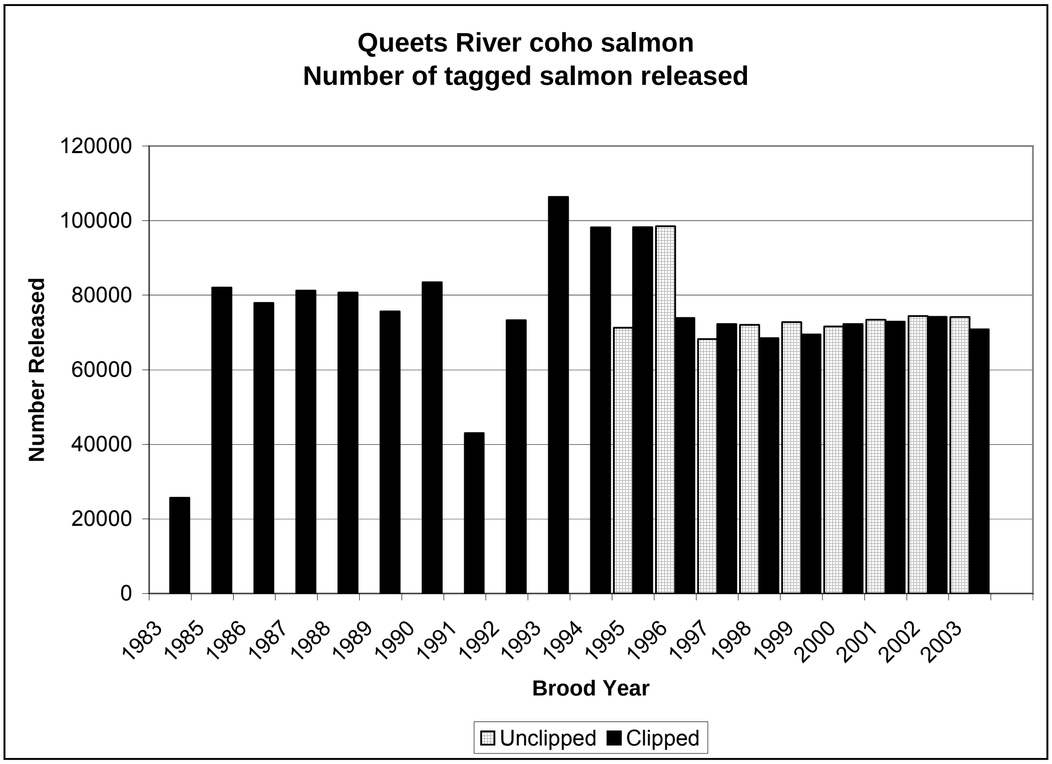


Figure 5-23. Releases of tagged coho salmon for Queets coho salmon 1983-2003.

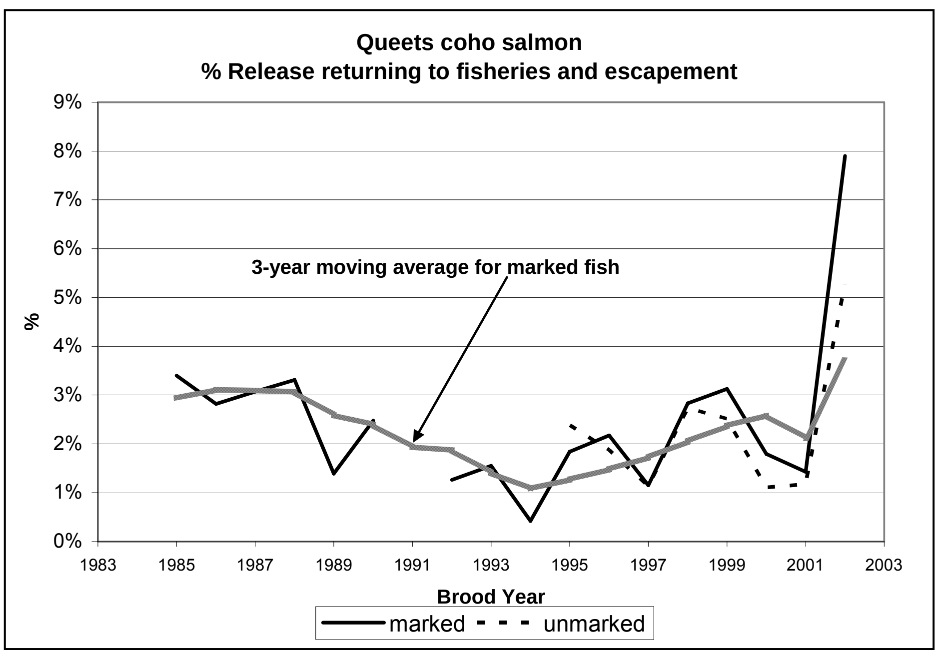


Figure 5-24. Percent of total releases returning to fisheries and escapement for Queets River coho salmon brood years 1983-2002.

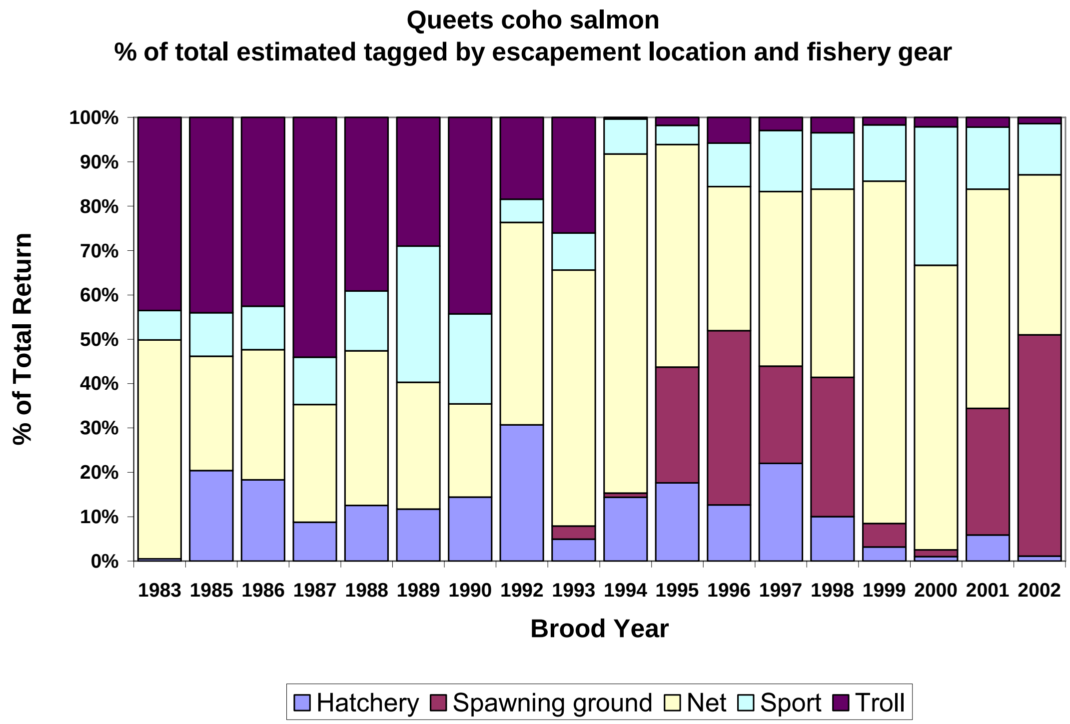


Figure 5-25. Percent of total estimated tags by escapement recovery location or fishery gear type for Queets coho salmon brood years 1983-2002. The spawning grounds were not sampled for CWTs prior to 1993.

5.4.4.3 Sampling in Fisheries and Escapement

An examination of the number of tagged fish recovered in fisheries and escapement shows that there is a general decrease in the total number of tagged fish observed in fishery and escapement samples (Figure 5-26), largely due to a decrease in the size of the troll fishery and to a decrease in recoveries in escapement. Before 1994, troll fisheries were the dominant fisheries (Figure 5-25) while net fisheries take a larger proportion after 1994. Sample rates have remained at levels well above 20% in the fisheries and tag recoveries have not decreased in the sport and net fisheries. However, spawning ground escapement represents a large proportion of the total return after 1994, and the sample rate is substantially lower on the spawning ground and far fewer tags are taken in escapement for the last five brood years as a result (Figure 5-26 and Table 5-14).

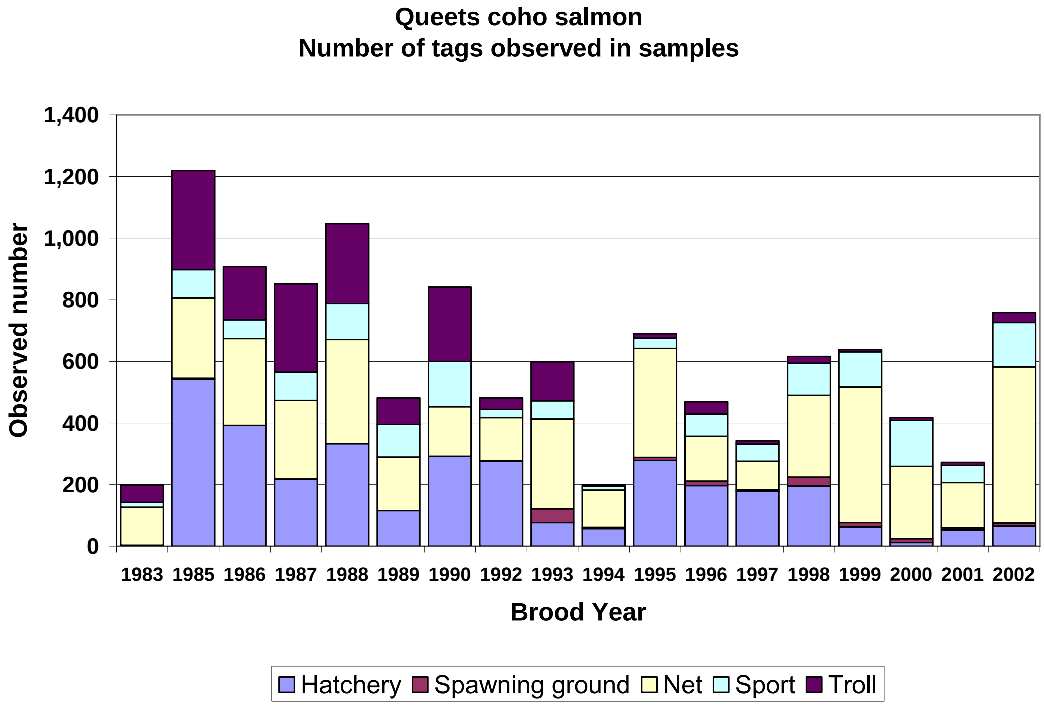


Figure 5-26. Number of observed CWT recoveries for Queets River coho salmon in sport, troll and net fisheries and in escapement. The spawning grounds were not sampled for CWTs prior to 1993.

5.4.4.4 Summary

The Queets River coho salmon total ERs average 74% and 68% for the brood years 1983-1994 and 1995-2002 (Table 5-15). Sport and net fisheries have increased average ER in the latter period, while the troll ER has decreased. This is largely due to the decreased exploitation in the B.C. WCVI troll fishery. A comparison of the PSE of ERs between the two periods shows a decrease in precision for the latter period. This is generally due to the decrease in the number of recoveries from escapement and decrease in ER in the troll fishery.

Table 5-14. Average number of tagged Queets River coho salmon recovered annually in samples, estimated number, % in samples and PSE for pre-terminal and terminal fisheries summarized for brood years from 1983-1994 and 1994-2002.

			1983-1994	1995-2002
Pre-Terminal	Sport	Observed	71	80
		Estimated	205	232
		% in Sample	37%	39%
		PSE	19%	17%
	Troll	Observed	159	31
		Estimated	665	106
		% in Sample	51%	64%
		PSE	19%	38%
Terminal	Hatchery	Observed	231	133
		Estimated	238	143
		% in Sample	97%	93%
		PSE	13%	12%
	Spawning ground	Observed		13
		Estimated		662
		% in Sample		11%
		PSE		37%
	Net	Observed	208	252
		Estimated	544	863
		% in Sample	40%	31%
		PSE	8%	7%

Table 5-15. Estimated annual ERs with PSE for Queets River coho salmon averaged over brood years1983-94 and 1995-2002.

Fishery		Statistic	1983-1994	1995-2002
Pre-Terminal	Sport	ER	10%	14%
		PSE	19%	19%
	Troll	ER	29%	3%
		PSE	20%	36%
Terminal	Net	ER	34%	49%
		PSE	9%	13%
Total		ER	74%	68%
		PSE	8%	12%

Recommendations and Summary

The PSC relies on CWT-based estimates, including ERs, to conserve and manage stocks of Chinook and coho salmon. The uncertainty (precision and accuracy) of CWT-based statistics depends on the number of observed CWT recoveries; generally, as the number of observed recoveries increases, uncertainty decreases. Statistical consideration of uncertainty is addressed in detail in Sections 5.1 to 5.3.

The four case studies in Section 5.4 above provide examples of how interactions among tagging levels, survival rates, fishery distributions, and estimates of total catch/escapement affect uncertainty surrounding estimates of ERs for individual stocks. The impacts of these factors vary among stocks. For the Green River Chinook stock (Section 5.4.1), the uncertainty of brood year ERs in pre-terminal fisheries has increased and in terminal fisheries it has decreased, while overall ERs have dropped from 48% to 24% and survival has dropped by 60%. For Taku River wild coho (Section 5.4.2), the relative precision of ERs has remained stable (PSE=10%), even though total ERs have dropped from 55% to 32% while distribution amongst fisheries has remained similar. Maintenance of this precision level can be attributed to increased tagging levels coupled with increased precision in estimates of harvest and total run. For Black River wild coho (Section 5.4.3), ERs and the number of CWTs recovered have both decreased since 1995 due to large reductions in fisheries where this stock is caught and a shift to unclipped releases, resulting in increases in the uncertainty in fishery impacts and statistics. For Queets River coho (Section 5.4.4), ER and their relative precision have remained relatively stable from 1983-2002, but have been commensurate with a shift away from pre-terminal harvests to terminal harvests and escapement.

All the case studies illustrate that changes in survival, ER, harvest allocation, and sampling programs have affected the uncertainty surrounding stock-specific CWT statistics over time. Major factors that can increase or decrease the number of observed CWTs in a given strata, and hence affect uncertainty, are summarized below.

Factors that increase uncertainty	**Factors that decrease uncertainty**
• Lower survival rates • Smaller CWT release sizes • Lower sampling rates • Unsampled strata (fisheries or escapements) • Lower ER or finer resolution requirements for fishery strata • Sampling methods that are inconsistent or result in bias • Lower reliability of the magnitude of total catches or escapements being sampled	• Higher survival rates • Larger CWT release sizes • Higher sampling rates • Complete sampling of fisheries and escapements • Higher ER or aggregated sampling strata • Consistent, unbiased sampling programs • Increased confidence in reliability of the magnitude of total catches or escapements being sampled

Examination of Figure 4-2 and Figure 4-3, combined with other general and specific considerations listed above, provides a cursory framework of evaluation for decision makers involved with the CWT programs coastwide. Substantial changes in fisheries, survival, and ERs have occurred since the mid-1980s which have tended to increase uncertainty surrounding CWT-based statistics.

The reliability of CWT statistics can be improved by undertaking general types of remedial actions for individual stocks or in fisheries harvesting complex stock mixtures. For example, if the overall ER in a particular fishery is so low that the reliability of CWT statistics is unacceptable, increase the tagged release to reduce uncertainty for an individual stock, or increase the sample rate to reduce uncertainty for all affected stocks. If less uncertainty is required to satisfy tolerance requirements for a particular stock, increase the size of CWT release groups, or improve sampling and estimation programs for terminal fishery catches and escapements.

The case studies presented in this chapter demonstrate that remedial actions to reduce uncertainty in CWT statistics are likely to vary by stocks and fisheries. The Workgroup recommends that each agency evaluate its CWT programs in order to determine where the reliability of CWT statistics does not satisfy management needs and identify the strategies that will most efficiently and effectively improve the performance of their CWT programs. Stock-specific and multi-stock issues and solutions should be examined in a comprehensive framework to evaluate trade-offs between investments in tagging levels, fishery/escapement sampling, and estimation. Single-stock tools and multi-stock tools in a decision-theoretic setting which can provide information regarding trade-offs between the costs and impacts of alternative measures are discussed in Chapter 6. The workgroup recommends that a high priority be placed on further development of such tools.

6 Decision Theoretic Model

The principal utility of a decision-theoretic model is derived from the imposition of a disciplined structure for identifying and evaluating alternatives. Although it would be developed to address specific issues relating to tagging levels and sampling rates for CWT studies, such a model will need to go beyond matters of experimental design in a statistical sense. Because its purpose is to inform decision making, the model will need to include social values relating to the nebulous socially-defined terms of “costs and benefits”. The model would integrate statistical tools and information regarding alternative marking and tagging strategies in the form of an *expert system* that would be designed to provide advice to entities conducting CWT studies or fishery/escapement sampling programs. The presentation of information provided for alternatives should center on describing the consequences and outcomes of decisions in metrics that are relevant and important to the decision-makers responsible for determining budget constraints and operating tagging/sampling programs.

The model could be designed and constructed in a variety of ways to integrate statistical and social considerations involved in the design of CWT studies, but the most straight-forward approach would be to focus on the consequences of error and statistical uncertainty around estimates of ERs. This would provide direct visibility of the trade-offs between investments made in tagging and/or sampling programs and the uncertainty surrounding the estimate of a fishery ER. The model would then translate that uncertainty into metrics that are relevant to decision-makers.

For example, in Figure 6-1, the two curves represent expected distributions of estimates of the ER resulting from different CWT programs. The figure on the left side shows the distributions for an estimate of ER (60%). Although both estimates of ER are the same, the shapes of the curves reflect different levels of uncertainty. The narrower distribution indicates a lower level of uncertainty than the second, wider distribution, indicating that there is less of a chance of estimating an ER that deviates substantially from the mean value.

The significance of the difference between the two distributions depends upon the consequences of uncertainty. For example, if a determination that the ER is above a fixed constraint results in penalty, then the degree of uncertainty becomes relevant in two ways: (1) avoidance of a penalty due to uncertainty of the estimate of ER; and (2) the ability to maximize the harvest for a given level of risk. As the uncertainty in the estimate of ER becomes smaller, there is smaller chance that random error would trigger a penalty when the true ER is within the allowable constraint. Also the smaller the uncertainty, the closer the manager can set the target ER to the allowable constraint. For instance, the degree of uncertainty might be determined by the tagging level and/or sampling rate; the manager’s decision is: “are the benefits of reducing uncertainty worth the cost of increasing the tagging level or sampling rate?”

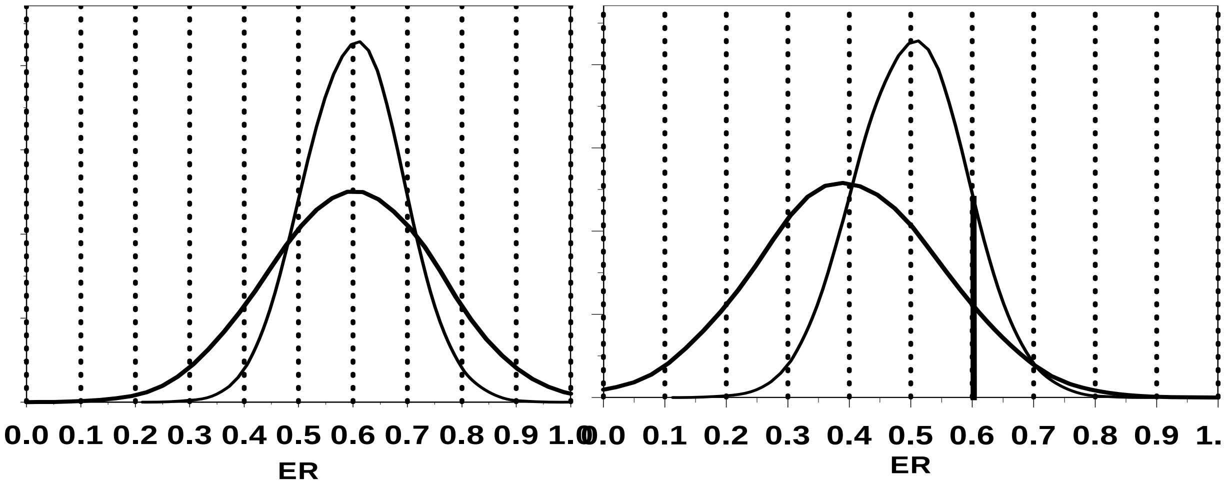


Figure 6-1. Illustration of effects of uncertainty on management decisions. The two curves represent distributions of estimates of the ER resulting from different CWT programs (see text for further explanation).

The example illustrated in the figure on the right side of Figure 6-1 shows the impact of setting an ER management objective. In this example the objective is set at 60% (0.6 in the figure) with the management criteria that the chance of exceeding this constraint should be no larger than 10%. Consequently, the target ER must be lower than the constraint so that the area under the curve to the right of the constraining ER of 60% is no larger than 10%. For the two curves illustrated in the right graph of Figure 6-1 the one with the smaller uncertainty meets this criteria at an ER target of 50%, but the one with the larger uncertainty (wider distribution) must be moved to a target ER of 40% to ensure that there is less than a 10% chance of exceeding the ER constraint of 60%.

The preceding discussion should remind those versed in statistics of Type I and II errors commonly considered in experimental design. Basically, Type I error is the probability that the null hypothesis will be rejected when the hypothesis is in fact true. A Type II error is the analog, the probability that the statistic of interest will lead to the acceptance of the null hypothesis when the hypothesis is in fact false.

How does decision theory utilize the concepts of Type I and II errors and alternative hypotheses? Basically, in decision-theory, probabilities are assigned to reflect the likelihood that a particular hypothesis (or state of nature) is true, and evaluates outcomes in terms of the consequences of alternative decisions. In essence, decision theory assigns pay-offs to correct outcomes and penalties for incorrect ones under uncertainty as to the true level management criteria. These pay-offs and penalties can be uni-dimensional (e.g., money), or multi-dimensional (e.g., dollar outlays and allowable ERs). When pay-offs and penalties are expressed in common terms, optimization strategies can be employed to maximize the expected pay-off or minimize the potential penalties resulting from making erroneous conclusions. The purpose of the model is to inform decision-makers of the consequences using these two type types of error.

In some situations, the options for reducing uncertainty are limited. For example, once CWTs are released, it is obviously not possible to increase the tagging level. Therefore, the only option to reduce uncertainty is to increase sampling rates to some degree to improve the precision of the estimated ER or to compensate for reduced survivals. If the desire is to reduce the uncertainty surrounding the ER of a particular stock in a given fishery without changing the sampling rate, then the only option would be to increase the tagging level. In both these circumstances the model would provide a means of estimating how much uncertainty could be reduced at what cost (Figure 6-2).

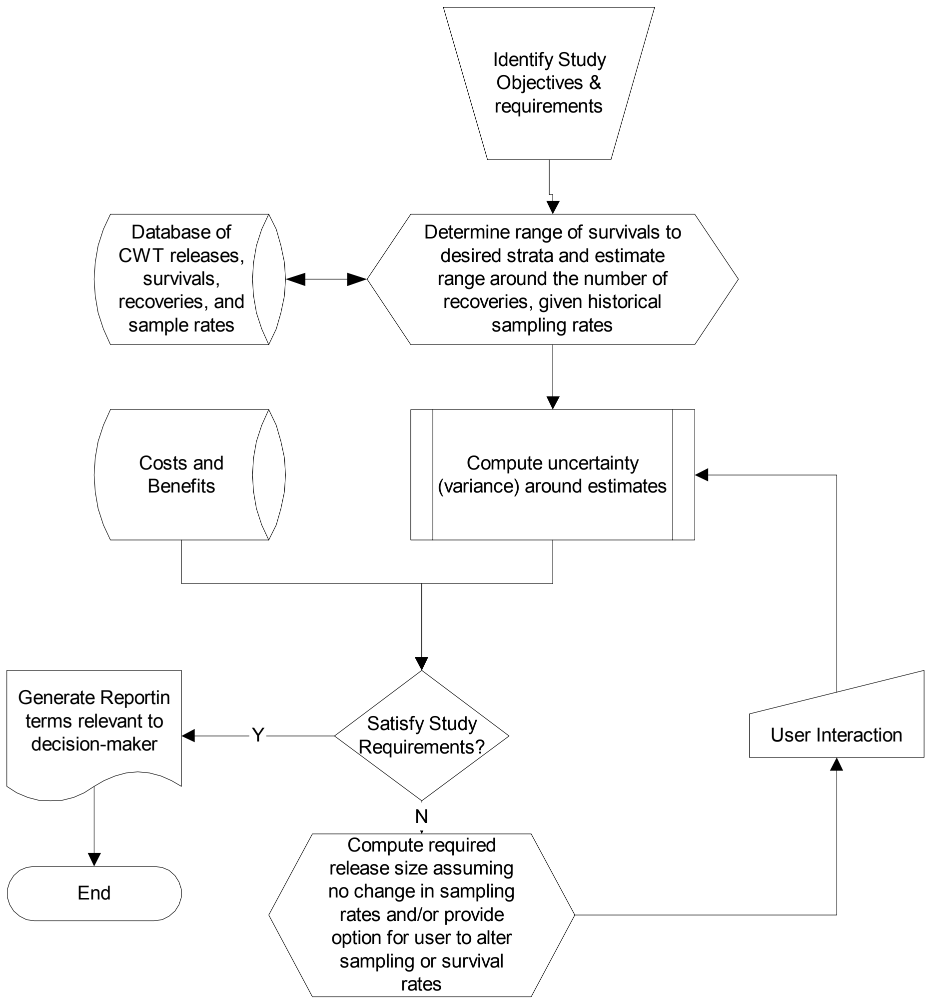


Figure 6-2. General schematic of a decision-theoretic model.

It is also important for the model to recognize that individual experiments are not conducted in isolation. The model will need to integrate and coordinate tagging and recovery strategies across agencies and among fisheries. Tagging agencies rarely have control of all the fishery sampling programs where many of the recoveries occur. It is not a simple matter for tagging agencies to dictate fishery sampling rates because those agencies doing the sampling are operating within their own budget constraints, priorities, and management needs. Within an agency, the effects of uncertainty in one fishery can affect the management of other fisheries. For example, if the management objective is to constrain the total fishery ER to a specified level, the degree of uncertainty in estimates of impacts on one fishery could affect the level of uncertainty allowed in the management of other fisheries. The model will need to take such interactions into account.

At this point the workgroup has not constructed a full model such as that outlined in Figure 6-2. However a proposal for such a model has been constructed by Dr. Gary Morishima and is included in Appendix B.

6.1 A Tool to Evaluate Tagging and Sample Rates - Sampling Guidelines Model.

The simpler planning tool described in this section was developed to provide advice to agencies conducting CWT studies and to fishery and escapement sampling programs, as well as to provide feedback to the PSC. The approach focused on the consequences to error around estimates of ERs to provide direct visibility of the trade-offs between investments made in tagging and/or sampling programs. The coast-wide CWT system is composed of tags released and tags recovered in both fisheries and escapements with the purpose of measuring fishery ERs. Tag recoveries also depend on the numbers of fish sampled and the number of fish in the harvest or escapement of interest. Relative uncertainty in the assessment of a fishery's ER decreases as more tags are recovered in that fishery. Because multiple processes affect the likely number of tags recovered, e.g., tagging levels, survival, maturity, fishery harvest magnitude, and fishery sampling rates, they are the key inputs to determining the level of uncertainty in an ER.

According to our statistical analyses, maintaining a PSE of 30% or less in the ER estimate in one fishery requires that tagging and sampling programs are large enough to recover 10 observed tags from each fishery stratum for the stock or stock-age cohort of interest. The standard of 10 recovered tags has been used to develop guidelines on tagging and sampling rates given long-term average expected survival and fishery ERs. However, those standards are based on calculations that would deliver on average over the long term, 10 tags, meaning in half of the years one would expect less than 10 tags and in the other half more. An alternative is to include an additional factor that would, say, assure at least 10 tags 80% of the time rather than only 50% of the time. Including this factor increases the necessary tagging and or sampling rates.

6.1.1 Practical Application of the Tool

The algorithms developed for this tool are shown in Appendix C. At its simplest, the tool can inform decisions on tagging and sampling levels where only one or two tag groups or sampling strata are involved. General trends can be evaluated for either tagging or sample levels given various levels of ER or survival (Figure 6-3 and Figure 6-4). To use this model, the first order of business is to identify the objectives for the CWT study, i.e., the specific statistical questions to be addressed. Some questions central to the design of tagging and sampling programs are clear. What statistic is appropriate for the question to be addressed? What level of accuracy/precision is needed? These questions cannot be dealt with in the abstract; the answers will influence experimental design, data collection, and methods of analysis. For example, examination of Figure 6-3 and Figure 6-4 indicate that given an ER of 5%, tagging 200,000 fish and sampling at 20% is adequate to provide for 10 observed recoveries if survival is 1% or higher. At lower survival levels, tagging and/or sampling levels would need to be higher to achieve 10 observed tags in a fishery with an ER of 5%.

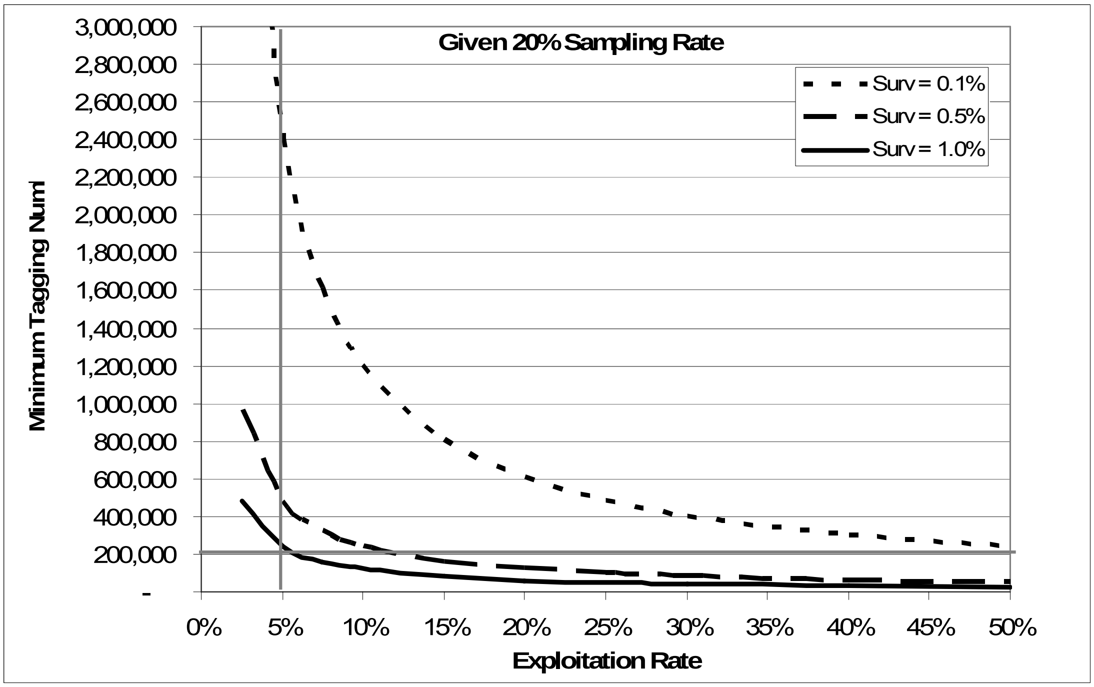


Figure 6-3. Tagging levels required for a single stock versus ER (% of age 2 cohort taken) in a fishery stratum, at three different levels of survival (Surv), necessary to meet a minimum recovery of 10 tags at least 80% of the time given a fishery sampling rate of 20%.

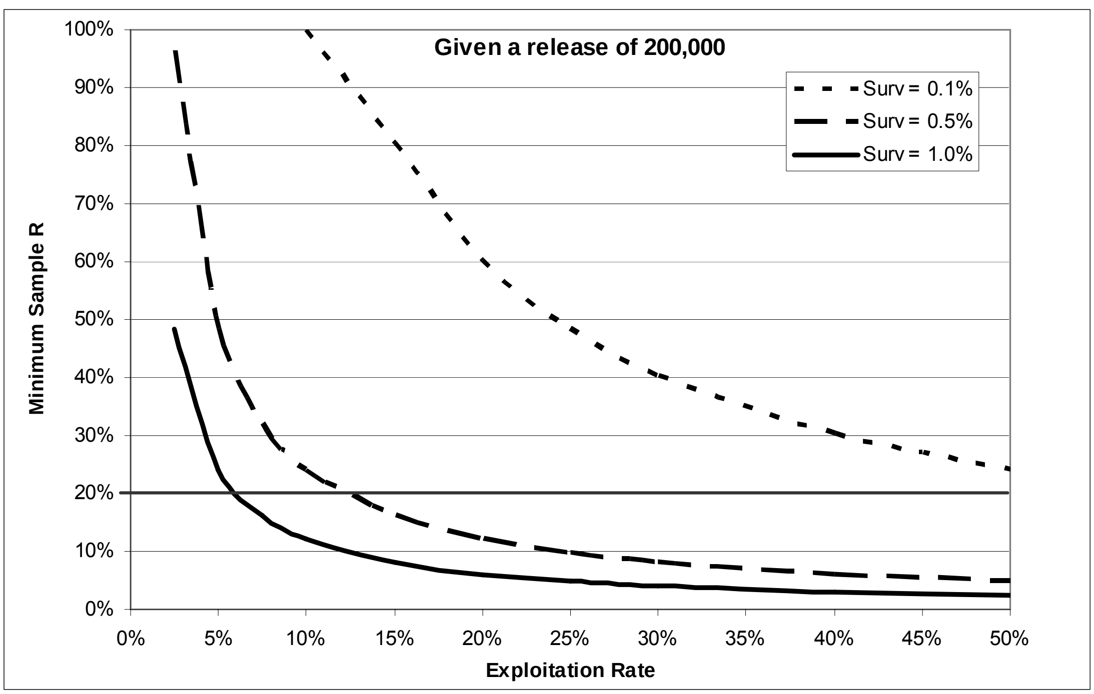


Figure 6-4. Sampling rates required for a fishery versus ER (% of age 2 cohort taken), at three levels of marine survival, necessary to meet a minimum recovery of 10 tags at least 80% of the time, given a release of 200,000 tags for a stock.

The planning tool would be initiated by an inquiry. For instance, say the sponsor wanted to estimate the ER of Stock X at age A in fishery F with confidence level Z. The database would be consulted to evaluate historical patterns of the survival and distribution of recoveries for Stock X, along with information on sampling rates and trends in fishery harvest rates. The user would then perform an analysis, and provide alternatives for consideration (e.g., release R marked fish, or increase sampling rates to S level) in an attempt to help the sponsor minimize cost. The answer for each question will depend on the objectives and the characteristics of the stocks involved. For species or stocks with multiple ages, a tagging target for an older age group will correspond with a survival that has been adjusted for fishing-related mortalities at younger ages in the cohort, fish that matured and left the ocean for the spawning grounds, and natural mortality (see example in Section 6.3).

6.2 Chinook Indicator Stocks

Data from 1971-1999 (brood years) for Chinook indicator tag groups were used to demonstrate historical performance of the tagging and sampling programs relevant to those stocks. Figure 6-3 and Figure 6-4 show that adequate tagging and sampling levels depend highly on survival rates. The average and frequency of historical survival estimates are given in Figure 6-5 and Figure 6-6 for Chinook indicator stocks. Most of these stocks have averages survivals between 0.5 and 1% (Figure 6-5), ranging from 0.2 to 6.0% for brood years with tag data available (Figure 6-6).

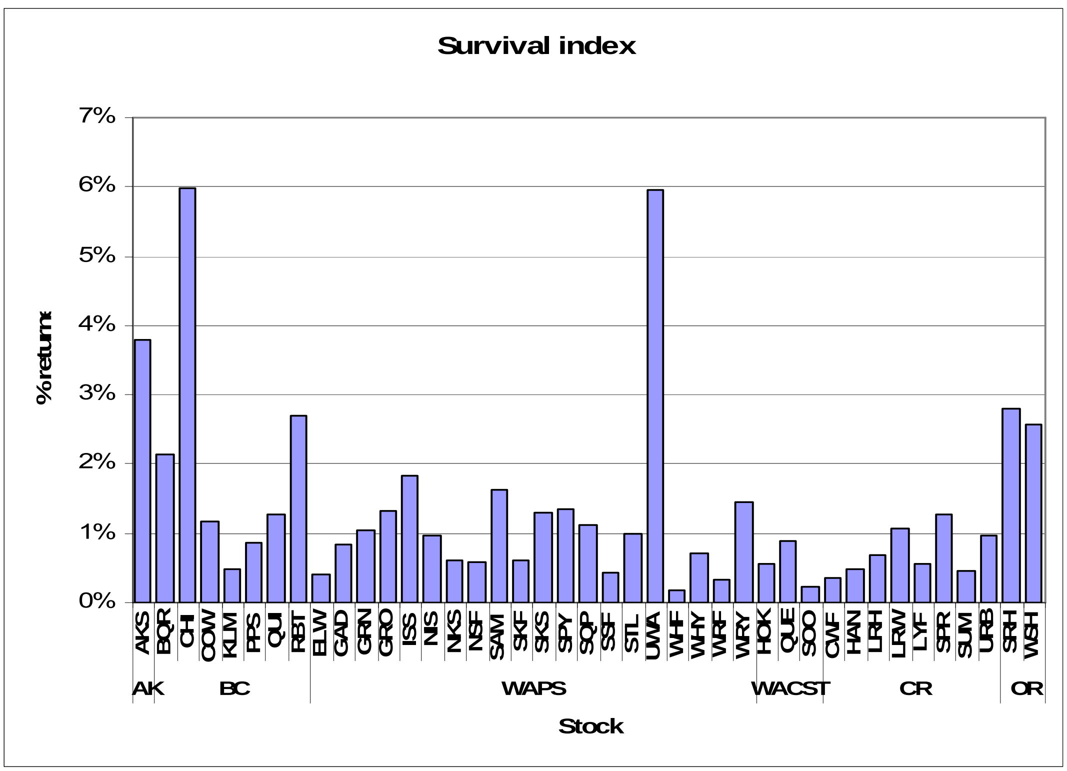


Figure 6-5. Estimated survival (catch+escapement over release) for Chinook salmon indicator stocks averaged over brood years 1971-1999 by stock in each region.

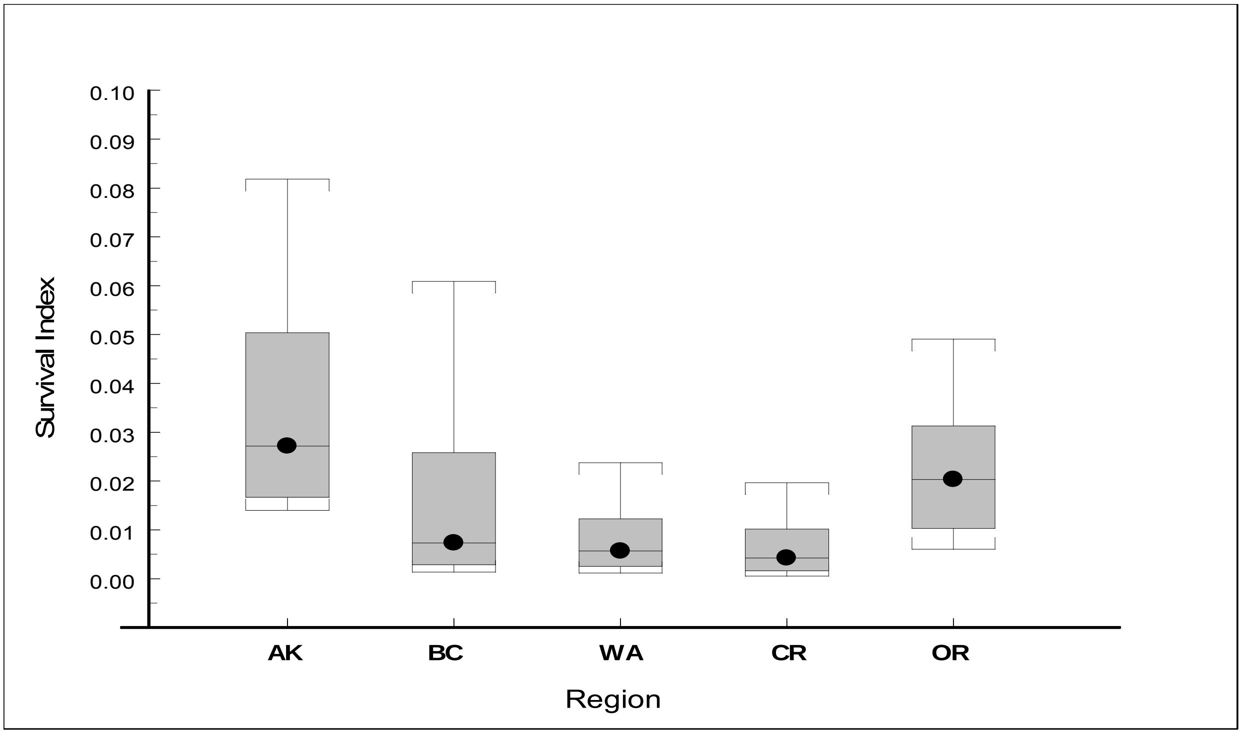


Figure 6-6. Frequency distribution of survival estimates for Chinook indicator tag groups by region of release for brood years 1971-1999. The median and 25th to 75th quartiles lie within the box with the 10th and 90th percentiles indicated by the whiskers.

The number of tagged fish released on average for stocks within each of the regions is shown in Figure 6-7 for brood years 1990-2003 and the range of sample rates by fishery area in Figure 6-8. The median release size is at or above 200,000 for all regions. Sample rates shown are for fisheries with direct sampling programs and the median sample rates are over 20% for all regions except the Columbia River (Figure 6-8).

A comparison of the ratio of historical release sizes to the number required to recover at least 10 tags is shown in Figure 6-9. For this comparison tagging levels that would have been required to achieve success at least 80% of the time were calculated given the observed survival, assuming a sampling rate of 20% and an ER of 5%. Actual tagging levels were divided by the required levels. Values greater than 1.0 indicate the tagging level was sufficient to meet the 80% criteria for an ER of 5%.

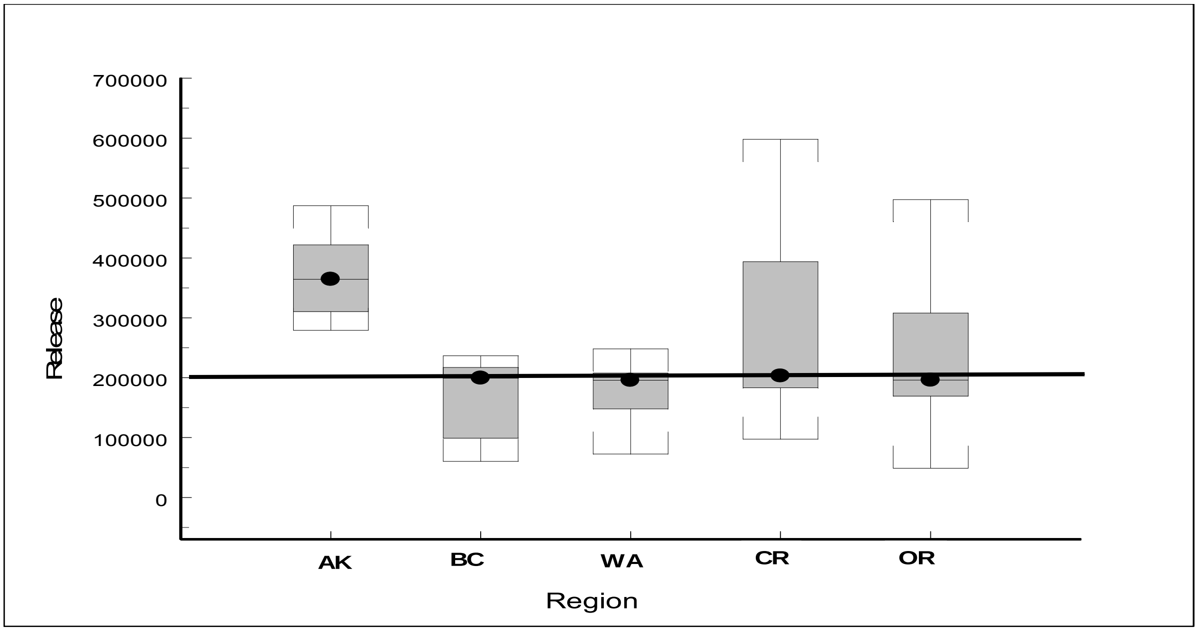


Figure 6-7. Frequency distribution of release size for Chinook indicator tag groups by region of release for brood years 1990-2003. The median and 25th to 75th quartiles lie within the box with the 10th and 90th percentiles indicated by the whiskers. The bold horizontal line indicates the current target of 200,000 CWT release group size.

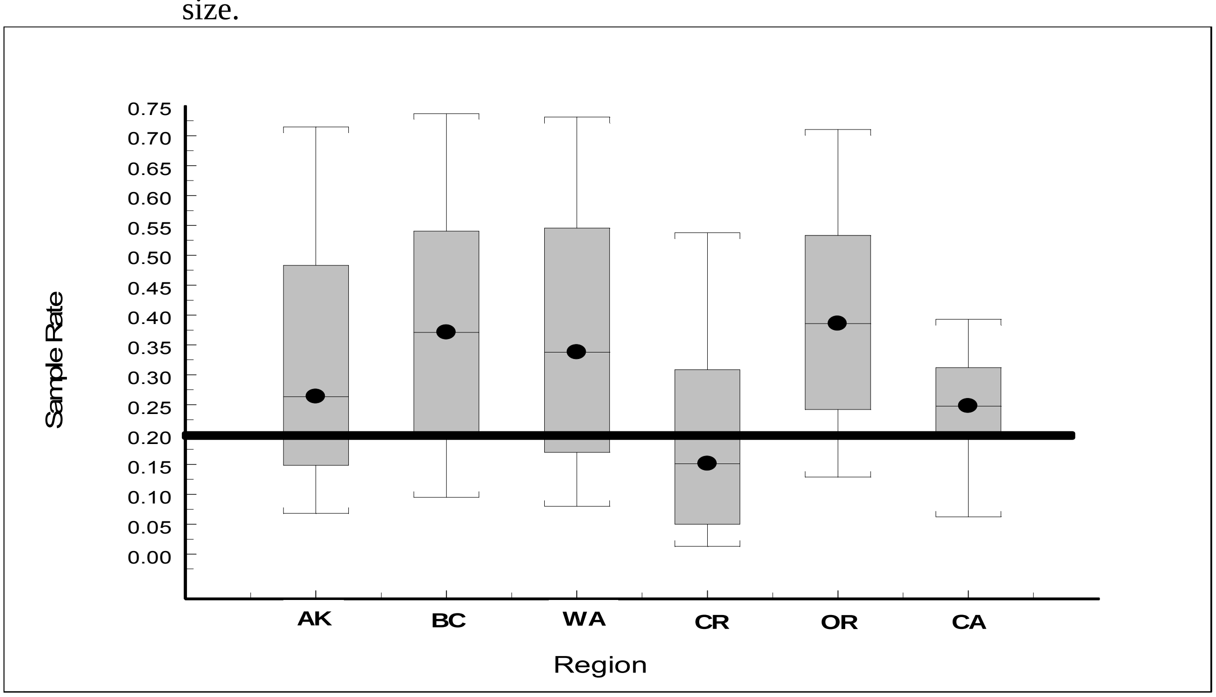


Figure 6-8. Frequency distribution of sample rates for Chinook indicator tag groups by fishery region for catch years 1995-2005. The median and 25th to 75th quartile lie within the box with the 10th and 90th percentile indicated by the whiskers. The horizontal bold line indicates the current target sample rate of 20%.

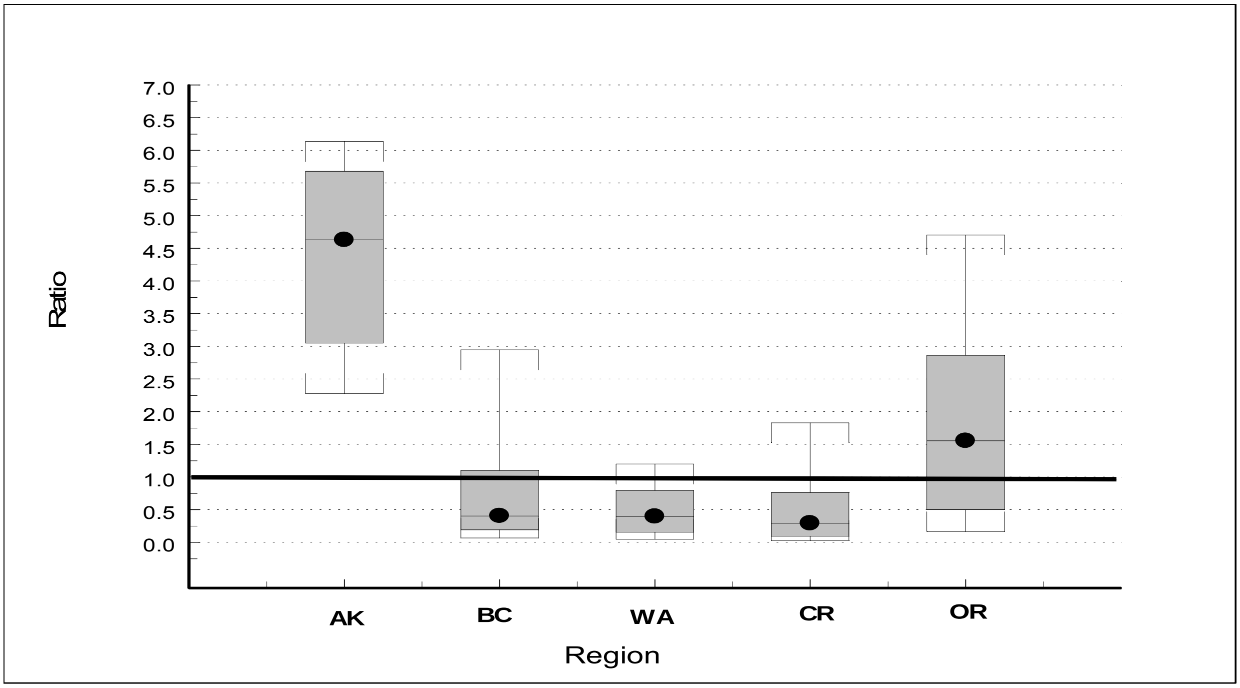


Figure 6-9. Frequency distribution of ratio of observed to required tag releases to achieve goal of 10 observed tagged fish in a fishery with ER of 5% assuming sample rates of 20%. Values greater than 1.0 indicate the tagging level was sufficient to meet the 80% criteria. The median and 25th to 75th quartiles lie within the box with the 10th and 90th percentiles indicated by the whiskers.

This evaluation (Figure 6-9) shows that inadequate numbers of tags have been released historically for stocks within all regions except Alaska and Oregon to achieve the sampling goal of 10 observed tags given sample rates of 20%. In order to achieve the goal, either sample rates must be increased or tagging levels must be increased. The tool introduced in section 6.1 can be used to evaluate what levels of sampling and tagging would be the best use of resources for any indicator stock or fishery. An example is provided in the following section.

6.3 Application to the Robertson Creek Chinook Salmon Indicator Stock

For some Chinook indicator stocks with multiple ages contributing to fisheries, it will be desirable to establish a tagging target using survival to an older age (that is not age 2) for several reasons. For example, the agency releasing the tagged fish may not be responsible for fishery sampling rates and therefore increasing tagging numbers may be the most effective option to improve CWT data quality from fisheries. Furthermore, with Chinook salmon most fishery recoveries occur at one or two ages and a tagging target based on the older age will achieve the target for the younger age. This occurs because a larger tagged cohort is needed for the older age in order to account for natural mortality, fishery exploitation, and maturity factors which reduce the numbers of fish reaching the older age.

The methods to estimate the minimum tagging numbers for a Chinook stock maturing at different ages are demonstrated using the Robertson Creek stock, which matures at ages 2 to 5 with most CWT fishery recoveries being ages 3 and 4. Since brood year 1973, age 2 survival rates have ranged from 0.01% to 21.6% (Figure 6-10), and over the last 20 completed brood years, it equaled or exceeded 0.4% in 16 years (80%) and 2.2% in 14 years (70%). Survivals to age 2 of 0.4% and 2.2% correspond to respective minimum tagging targets of 627,000 and 117,000 fish for the conditions demonstrated in Figure 6-10; an 80% chance of recovering 10 observed tags in a fishery with an ER of 2.5% and a sampling rate of 20%.

To estimate the minimum tagging number for these conditions at age 3, the age 2 survival rate must be adjusted to an age 3 survival rate to account for natural mortality (MORT), ER, and maturation rates (MAT) between ages 2 and 3. The age 2 survival rate is multiplied by the proportion of age 2 fish surviving fishing ($1\text{-}ER_{age=2}$), the proportion of fish remaining at sea after maturation ($1\text{-}MAT_{age=2}$) and the proportion of fish surviving the natural mortality between age 2 and -3 ($MORT_{age=2}$). For a tagging target at age 4, this age 3 survival rate would be further adjusted to account for natural mortality, fishery exploitation, and maturation between ages 3 and 4.

For planning purposes, one can apply average ER for recent brood years, average maturation rates, and the CTC natural mortality rates to estimate the survivals for older fish. To estimate a tagging target for age 3 fish at Robertson Creek, the average age 2 ER (2.3%) for brood years 1995-1999, average age 2 maturation rates for brood years 1980-1999 (excluding 1992: 2.4%), and natural mortality rate between age 2 and -3 (40%) were applied to the expected age 2 cohort survival. To estimate a tagging target for age 4 fish, the average age 3 ER (5.8%) for brood years 1995-1999, average age 3 maturation rates for brood years 1980-1999 (excluding 1992: 15.1%), and natural mortality rate between age 3 and age 4 (30%) were applied to the expected age 3 survival calculated above. After calculating the age specific survival rates, the minimum tagging numbers can be estimated using the tool or Figure 6-3. The minimum tagging numbers needed to achieve a 70% or 80% chance of recovering 10 observed tags in a fishery with an ER of 2.5% and a sampling rate of 20% increase with the age used for planning (Table 6-1).

At Robertson Creek, the tagging target has been 200,000 fish for many years and it was developed when average survival rates and ERs were much higher than they have been recently. From the information provided by the tool, the 200,000 target appears close to achieving the planning conditions for age 3 fish in 7 out of every 10 years over the last 20. Since age 4 fish contribute much of the tag data collected from fisheries and escapements, a tagging target based on age 4 fish would be valuable in terms of improving the CWT data quality for a significant stock used for coastwide abundance forecasting and fishery planning. A tagging target for age 4 fish would require an approximate doubling of the tagging target depending upon how often one aims to achieve the planning conditions. Overall, this tool represents a substantial resource for planning indicator stock programs and improving CWT data quality.

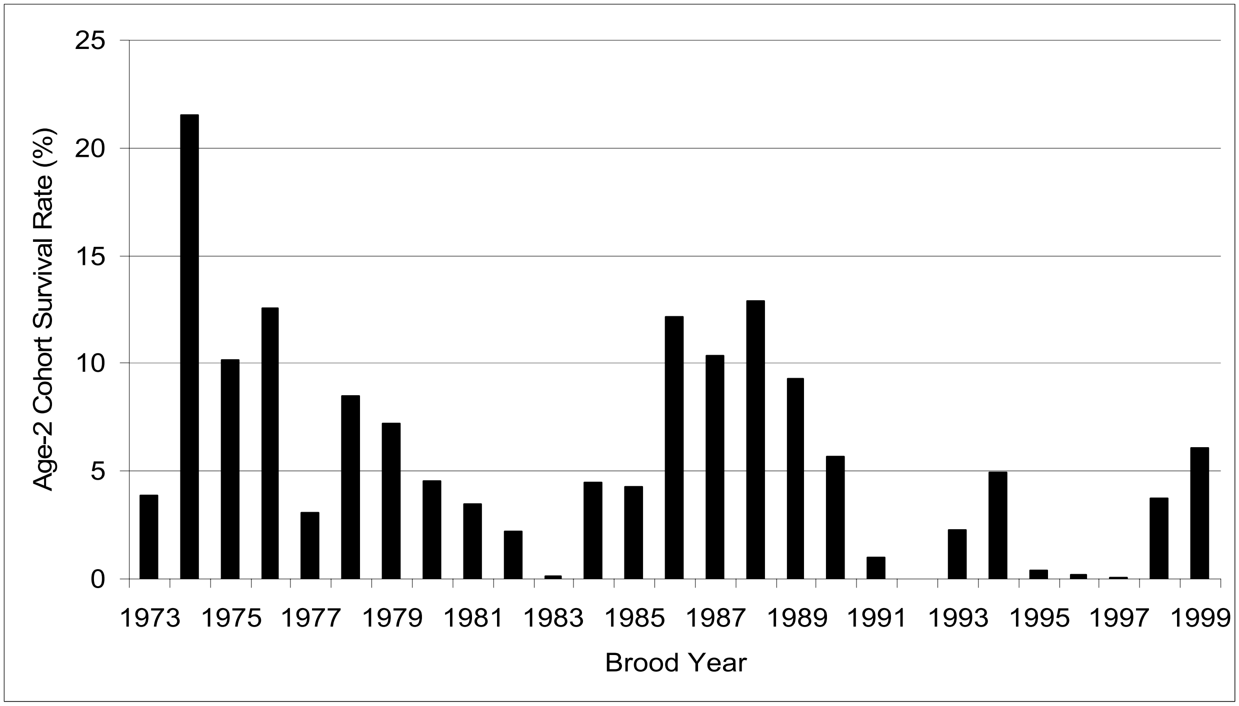


Figure 6-10. Age 2 cohort survival rates for the Robertson Creek Chinook indicator stock for brood years 1973 to 1999.

Table 6-1. Survival rates and corresponding minimum tagging numbers to achieve the conditions depicted in Figure 6-5, while accounting for age-specific fishery exploitation, maturation, and natural mortality for the Robertson Creek Chinook example.

	Survival[1]		**Minimum Tagging Numbers**	
Age	**8 of 10 years**	**7 of 10 years**	**8 of 10 years**	**7 of 10 years**
2	0.42%	2.21%	627,000	118,000
3	0.24%	1.27%	1,096,000	206,000
4	0.13%	0.71%	1,960,000	368,000
5	0.03%	0.16%	8,670,000	1,630,000

1. Proportion of the cohort in the ocean at the beginning of fishing exploitation on that age.

7 Evaluation of CWT Program; Conclusions and Recommendations

As illustrated in Chapter 5, uncertainty associated with estimates of ER can be minimized by increasing precision and/or accuracy. Precision can be improved either by improving estimates of total catch or escapement or by increasing the number of tagged fish recovered in samples of catch and escapement (i.e., increased tagging levels and/or sampling rates). Accuracy is best controlled through adherence to a rigorous sample design and through quality assurance and control. The workgroup has reviewed the tagging and sampling programs, the data collection, validation and reporting of agencies releasing and sampling tagged Chinook and coho salmon coastwide. This was accomplished through review of fishery sampling and indicator or regional tagging programs (Table 4-1 through Table 4-5). The basic standard for any estimation program is that estimated statistics should be unbiased and meet precision criteria. In our review, the precision guideline for estimates of tagged fish in harvest or escapement and estimates of ERs should have a PSE of 30% or less.

Workgroup members followed a general process to review the programs for Chinook and coho stocks and the fisheries which catch them, within each region as follows:

1. Quality Control
    a. Sample methods
    b. Data validation
    c. Data coordination and reporting
2. Quality assurance
    a. Stratification of fisheries and escapement areas
    b. Coverage of fisheries and escapement
    c. Sample expansion - estimation of total catch and escapement
    d. Sample rates
    e. Indicator stock coverage
    f. Number of tags released

The workgroup first used the information summarized for current tagging and sampling programs (Chapter 4), the criteria for precision and accuracy (Chapter 5), and expertise from workgroup members to develop a list of issues, with general consequences and solutions, affecting the quality of CWT data in the coastwide CWT system. A categorized list of problems and issues with tagging and sampling programs and with the estimates of the total harvest and escapement being sampled is in Section 7.1. Problems with data reporting and coordination that also impact the quality of the CWT data are listed in section 7.2. These lists cover most issues facing agencies and groups analyzing CWT data, for programs releasing and sampling CWTs, as well as estimating or forecasting population parameters such as harvest, escapement, total return, survival and ERs.

The issues discussed in Sections 7.1 and 7.2 have consequences generally resulting in greater imprecision in estimates or biased estimates of tagged harvest and escapement and of ERs. The problems can be remedied by changes in tagging, sampling, reporting, or release strategies. To this end, workgroup members from each region reviewed their programs and identified both the issues and solutions that can be used to address specific problems, which appear in Sections 7.3 and 7.4. A compilation of issues, remedies, and costs are detailed in Appendix A by geographic region.

7.1 CWT Tagging and Sampling Issues

The workgroup identified issues affecting the quality and reliability of CWT-based information and placed them into three general categories: (1) Tagging and Sampling specific to stock; (2) General sampling; and (3) Data reporting and coordination. The first two categories involve issues that affect statistical uncertainty surrounding CWT-based statistics, reflected by its two major components, precision and bias, and appear in this section. The third category involves the accuracy and completeness of CWT data reported for exchange and processes that are relied upon for timeliness, coordination, consistency, and accessibility; and is covered in Section 7.2. For each issue, problems and consequences are described and potential solutions are presented for consideration and discussion.

7.1.1 Tagging Issues

ISSUE 1: Inconsistent and Incomplete Representation of Production Regions by CWT Indicator Stocks

Problem	Consequences	Solution
Important production regions are not represented by indicator stocks. Either the production is not represented, or inference is made from another (nearby) indicator stock without a means of validating the assumption of representativeness.	Lack of management information or potential bias in management statistics, impeding the ability to perform stock and fishery assessments to evaluate changes in migratory behavior or responses to particular environmental conditions (e.g., the 1983 El Nino). Also an inability to monitor climate and production responses over time and areas.	For coho salmon, establishing a consistent, long-term indicator tagging program occurring simultaneously coast-wide would provide an extremely useful data source to detect and evaluate long-term trends. See Appendix D for a summary of coho salmon CWT groups currently used for regional representation. For Chinook, adding indicator stocks for significant production groups that are not represented would provide for more complete representation of that production.

ISSUE 2: Determination of Tagging Levels

Problem	Consequences	Solution
Currently, CWT release levels are generally determined through the use of ad-hoc rules of thumb developed through limited analysis. There is no common method of determining tagged levels.	If release numbers are too low, too few CWTs will be recovered to achieve desired fishery resolution and precision in estimates of ERs. If release numbers are too high, tagging and recovery costs are excessive.	Develop a standardized tool to assist managers in determining the tagging levels required to achieve a desired level of recovery stratification and precision. Use Bernard et al. (1998) as a guide.

ISSUE 3: Representation of Hatchery Production

Problem	Consequences	Solution
Hatchery production released without CWT group, which is becoming increasingly obvious with mass marking.	Stock composition of hatchery harvest cannot be estimated using current associated tagged releases. This does not allow estimation of hatchery programs' contribution to fisheries. Reduces the ability to estimate hatchery and wild abundances and fishery impacts.	All hatchery releases should have a representative tagged and clipped group.

7.1.2 Terminal Fishery and Escapement Sampling Issues

ISSUE 4: Low Sample Rates in Terminal Fisheries

Problem	Consequences	Solution
Low sample rates in terminal fisheries, resulting in few tags recovered.	Imprecise estimates of fishery impacts and cohort size, affecting uncertainty surrounding estimates of fishery ERs, survival, and may add uncertainty in preseason abundance forecasts used in fishery models.	Develop a standardized tool to assist managers in determining fishery sampling rates required to achieve a desired level of recovery stratification and precision where significant terminal fisheries occur and where outside stocks have been recovered in the past.

ISSUE 5: Low Sample Rates in Escapements

Problem	Consequences	Solution
Sample rates on spawning grounds are generally low or there is no sampling at all.	Low sampling rates reduce precision in estimates of tagged escapements and cohort size. No sampling underestimates cohort size causing survival to be biased low and ERs to be biased high, increasing uncertainty or adding bias to estimates of fishery ERs. Creates uncertainty in preseason abundance forecasts used in fishery models.	CWT sampling of escapements should be of sufficient quality to achieve a desired level of recovery stratification and precision. Agencies should identify where tagged indicator stocks are expected to be present and develop adequate spawning grounds sampling programs in these areas. Develop a standardized tool to assist management agencies in determining fishery escapement sampling rates appropriate for the indicator stock objectives.

ISSUE 6: Uncertainty in Estimates of Escapement or Terminal Fishery Catch

Problem	Consequences	Solution
Where the total catch or escapement being sampled is unknown, the sample expansion is also unknown. Tags are recovered without the ability to expand to total tags in catch or escapement.	Bias in estimates of total harvest or escapement leads to biased sample expansions and the estimate of tagged fish will be biased, introducing bias in estimates of cohort size and ERs.	Implement programs to develop unbiased and more precise estimates of total escapement and terminal fishery catch, where tagged fish are exploited or escape.
Where the total catch or escapement being sampled is estimated with low precision, the sample expansions are highly uncertain, so tags are expanded but the total numbers recovered are of low quality.	Reduced precision of the estimate of tagged fish in the harvest and escapement and of the estimates of cohort size and ERs. Creates uncertainty in preseason abundance forecasts used in fishery models.	

7.1.3 Sampling Issues for Highly Mixed Stock Fisheries

ISSUE 7: Low Sample Rates in Highly Mixed Stock Fisheries

Problem	Consequences	Solution
Uncertainty in pre-terminal fishery impacts results when sample rates are low and few CWTs are recovered.	Fewer CWTs will be recovered; rare stocks may be missed resulting in imprecise or zero estimates of harvest and ER. This results in an inability to achieve adequate fishery resolution (lack of or insufficient tag recoveries) and imprecise estimates of ERs (low number of tag recoveries).	Develop a standardized tool to assist managers in determining fishery sampling rates required to achieve a desired level of recovery stratification and precision. Implement sampling programs as required to achieve desired levels of precision and accuracy. Bernard et al. (1998) is a helpful guide for this issue.

ISSUE 8. Uncertainty in Estimates of Catch in Highly Mixed Stock Fisheries

Problem	Consequences	Solution
Where the pre-terminal harvest being sampled is not known with certainty, the sample expansion is also uncertain, i.e., estimated. For example, in commercial fisheries, catches are sometimes estimated using average weights; in sport fisheries, catches are estimated through creel census programs or punch card systems.	Reduced precision of the estimate of tagged fish in the harvest and of estimates of cohort size and ERs. Bias in estimates of total harvest leads to biased sample expansions. Consequently, the estimate of tagged fish will be biased, introducing bias in estimates of cohort size and ERs.	Implement programs to obtain an unbiased estimate of total harvest with adequate precision in all pre-terminal fisheries.

7.1.4 General Sampling Issues

ISSUE 9: Non-representative Sampling

Problem	Consequences	Solution
Non-representative sampling can occur from a variety of practices. These include: -combination of catches from time/area or gears, where stock composition is not homogenous and sample rates have not been equal over all time/area/gears within the combined strata -disproportionate sampling of particular sizes or grades of salmon.	Estimates of the number of fish by tag code and ERs will be biased and, where this occurs, will affect most of the uses of CWT's in fishery management.	Design and implement representative sampling programs where not already in place. Communicate the rationale for representative sampling to stakeholders to increase options to collect representative samples.

ISSUE 10: Incomplete Coverage of Fisheries or Escapement Areas

Problem	Consequences	Solution
All fishery or escapement locations where tagged fish are present are not sampled.	Estimates of tagged fish are missing for unsampled fishery or escapement strata. Therefore, estimates of cohort size and ERs are biased, generally overestimated or zero. This could result in over fishing or in unnecessary fishery closures.	All locations where tagged fish for indicator or regional stock groups are present should be reviewed for importance to estimation of total cohort size. If presence of tagged fish is substantial these locations should be sampled.

ISSUE 11: Voluntary Sport Fishery Sampling Programs

Problem	Consequences	Solution
Under voluntary programs, the total number of CWTs caught in the sport fishery is estimated through the use of "awareness factors", or the proportion of adipose fin clipped fish returned voluntarily by anglers. Voluntarily returned CWTs are expanded by the awareness factor. Several sport fisheries are not sampled for CWTs to estimate the awareness factor. Total recoveries are estimated assuming an awareness factor from another fishery or time period.	Various factors can cause bias in estimates derived from voluntary tag returns. Anglers who return tags (volunteers) may not represent the fishing patterns of all anglers, resulting in some tag groups being overestimated and others underestimated. There is no recovery of unmarked tags (i.e. from DIT groups or tagged supplementation programs). Where awareness factors are not estimated directly from creel programs they must be assumed or estimated from other fisheries. This can introduce additional uncertainty and potential bias, especially when the origin of anglers varies between temporal and geographic strata. This contributes unquantifiable	Evaluate options to produce representative, unbiased CWT recoveries from sport fisheries which rely upon voluntary returns of CWTs. Implement direct sampling programs where significant recoveries of CWTs occur in order to collect, independent, random, and representative samples, e.g., creel census survey programs producing sampling rates of 20% or more. Another option is to implement voluntary and direct recovery of CWTs to determine present, as potentially past, differences in CWT results from both methods.

	imprecision and bias to estimated exploitation and survival rates for indicator stocks which are significantly impacted by fisheries that rely upon voluntary returns to recover CWTs..	

ISSUE 12: Sampling Methods to Facilitate Mark Selective Fishery Evaluations and Processing of CWTs

Problem	Consequences	Solution
Tagged fish are currently sampled visually (looking for an adipose fin clip) or electronically (using a wand or tube detector). Unmarked and tagged fish are not detected in visual sampling. For some fisheries, CWTs from unmarked fish are collected but not processed. Electronic sampling reduces the utility of using half tags to tag small wild fish trapped near spawning grounds	When visual sampling is employed or unmarked CWTd fish are not processed, CWTs of unmarked DIT fish will not be recovered. For Chinook salmon with multiple age return, this diminishes the ability of DIT to provide estimates of mark-selective fishery impacts on unmarked fish and potentially results in unproductive expenditures of tagging unmarked fish. .	Implement electronic tag detection and processing of all fish with CWTs in all mark-selective fisheries. These stocks should be identified in mark-selective fishery proposals submitted to the PSC SFEC. Agencies considering mark selective fisheries can review the CWT Expert Panel Report (2005) and PSC SFEC reports (e.g., 2002) to better understand strengths, weaknesses, and opportunities to use DIT methods to evaluate mark selective fisheries.

7.2 Data Coordination and Reporting Issues

The United States and Canada have established central data exchange points for each country. The U.S. exchange point is the Pacific States Marine Fisheries Commission's Regional Mark Processing Center (RMPC), which maintains the Regional Mark Information System (RMIS) a CWT database for all fish releases, all tag recoveries, and catch-sample information that originate in the U.S. The Canadian exchange point is the Pacific Biological Station, which maintains the Mark Recovery Program (MRP) CWT database for the Canadian Department of Fisheries and Oceans. Both RMIS and MRP maintain copies of the complete PSC CWT data set and have their own query and reporting systems.

The workgroup identified issues pertaining to timeliness and completeness of reporting, inter/intra agency data coordination, and data validation. The workgroup also identified issues relating to the need to clarify responsibilities and authorities for the RMPC.

ISSUE 13: Timeliness of Reporting

Problem	Consequences	Solution
CWT data are not reported by all agencies by the dates in the established schedule for the PSC technical committees. Some agencies report their CWT recovery data two years after the fishery, even though CWTs have been processed,	Work of PSC technical committees cannot proceed on time to meet deadlines associated with cohort analyses of ERs of indicator stocks for fisheries conducted in the previous year. Often the committees must repeat analyses as new data are	Estimated recoveries from the previous year must be reported in time to plan fisheries for the current year, consistent with the August 13, 1985 Memorandum of Understanding between U.S.A. and Canada, Data Sharing section.

because multi-agency agreement is needed to arrive at a post-season catch number.	added. Pre-fishery cohort abundance data are not available in time to forecast stock abundance for the upcoming year, so in the absence of timely CWT data, more uncertain assumption-based methods are relied on to forecast abundance of stocks. This affects the efficiency of the committees' work, results in confusion and misinterpretation of preliminary analyses, and impacts fisheries management decisions.	PSMFC should provide an annual report to the Commission regarding the performance of agencies in providing the data on the established schedule. Require all reporting agencies to provide complete data in a timely manner for use in fisheries planning and management.

ISSUE 14. Incomplete/No exchange of CWT Data

Problem	Consequences	Solution
Not all data necessary to evaluate the integrity of the CWT data system are exchanged bi-laterally. The catch/sample file does not include information on all fisheries and escapement locations where tagged fish are expected to be encountered. The information does not always include all data necessary to create sample expansion where sampling has occurred at the reporting level. Total catch or escapement information is not always reported where no sampling has occurred. Reporting of total estimates of escapement and spawning ground recoveries is not consistent within and between agencies. Some agencies do not report recoveries from spawning ground surveys; some agencies report tag recoveries from escapement surveys or hatchery returns with no estimates of escapement and no sample expansion and this varies by species (i.e., coho vs. Chinook) and area. Some data has not been reported at all, leaving data gaps for some stocks.	The catch-sample files are incomplete and PSC technical committee members are left to make personal contact with agency staff to acquire it.	The PSC Data Sharing committee and its subcommittee for Data Standards should assess and report on the options, implications, and impediments of managing these data, including the estimation of variance for estimated CWT recoveries and reporting of variances in the recovery file. This effort needs to be coordinated with the co-chairs of the CTC and CoTC.

ISSUE 15: Inter/Intra-agency Coordination

Problem	Consequences	Solution
Data collection and reporting processes involve several programs within or between agencies. A	When processes are not adequately coordinated, the resulting data can be incomplete, or missing, or	Promote better coordination of data collection needs within and among agencies to better meet regional

failure to understand and appreciate the uses of CWT data may result in inadequate sampling methods or reporting of data. Some agencies may have internal protocols that only require sampling and reporting of clipped and tagged fish without realizing the importance of unclipped and tagged DIT fish for evaluation of impacts of mark-selective fisheries.	unusable. This results in loss of tag information and biased estimates of statistics derived from CWT data.	needs. Non-technical communication materials can be used to educate others on the importance of the CWT programs.

ISSUE 16: Unclear Authority to Establish and Enforce Standards

Problem	Consequences	Solution
Within the PSMFC, the responsibilities and authorities for establishing and implementing standards, evaluating proposals that involve significant changes to RMIS, and prioritizing issues relating to reporting of CWT data are unclear. There is no funding to support coordination and implementation of standards and facilitation of coordinated data collection. Lack of decision body to review and establish priorities with respect to formats and workloads for the RMPC staff on the CWT database. The RMPC's operations are overseen by the Mark Committee on Anadromous Fin Marking and Tagging. While PSC participants represent the major subset of the CWT user community served by the RMPC, the RMPC is, in effect, reporting to two organizational groups, the Mark Committee and the PSC.	The lack of a consistent and disciplined structure for coding systems impedes access and complicates analysis and accurate reporting of CWT data.	Convene two forums. The first would be between the analysts and data reporting staff within the agencies to engage in discussions of needs and possibilities for providing data needed. The second forum would be between analysts and the Data Standards to establish the standards for coding, validation of data, and develop specifications for report generation capabilities.

ISSUE 17: Updating CWT Data is Difficult and the Updates Cannot be Tracked

Problem	Consequences	Solution
Agencies update their data to make corrections and additions over time and the users of CWT data are often unaware that some of the data housed in RMIS have been updated and changed. Correcting data is difficult and sometimes impossible.	Lack of a unique and stable ID for each recovery increases the difficulty of identifying sources of differences between sets of "identical" data retrieved at different times from RMIS. Experienced users learn to download data frequently to be sure they have the most recent datasets. Known errors in historical data can	RMPC staff have made changes to the validation process and worked on data integrity issues independent of a formal system or committee to make recommendations for these changes. This may be adequate, but does not provide for input from all interested parties and may not catch all anomalies in the data. Methods to easily correct individual

	only be changed by uploading the entire data set from a reporting agency. This results in not correcting errors, especially for older data.	data need to be developed and tracked through time.

ISSUE 18: Validation is Inadequate for Current Uses of CWT Data

Problem	Consequences	Solution
There is no formal system for establishing validation requirements and for acceptance of CWT data into regional databases. Examples: a) Some fields are not checked for implausible values (e.g., lengths or catch sample expansion factors that are impossibly small or large). b) Some fields are not cross checked (e.g., CWT code and species may not match release records; recovery records may not be tied to the correct catch sample records; double index tag groups may not be linked). c) Some recoveries may be duplicated.	The responsibility for developing validation criteria falls on the RMPC. Errors that are not detected by the validation screening process are discovered by happenstance. The RMPC contacts agency coordinators requesting that corrective action be taken when errors are discovered. New validation rules are implemented when specific errors consistently re-occur. Errors can unknowingly result when using CWT data. This can lead to: (a) decision-making based on erroneous information; (b) delays in the availability of time-sensitive data; (c) discrepancies in analysis of CWT data and confusion or controversy in interpretation; and (d) multiple re-analysis of data and explanation of discrepancies from previous results. PSC technical committees and other users of CWT data must often develop their own validation or screening methods to minimize the potential for inappropriate data to be incorporated into their analyses. Validation does not include many fields that are important to analysis of CWT data, in particular new fields due to mass marking and double index tagging.	Establish a mechanism to establish, revise, and enforce validation rules for CWT data. This could be solved by designating a group to review validation criteria and to add and develop new validation rules as needed. Members would need the expertise and experience required to implement such an approach.
With the introduction of MM and MSF it became necessary to add additional fields to the RMIS databases (catch-sample, release and recovery). These fields are not consistently reported to the database and there is no validation in place for any of these fields.	Analysis of CWT data with MM and MSF requires that analysts use these new fields, but as they are not consistently reported, analyses can be difficult or impossible to accomplish.	Recommendations should be developed to add validation algorithms for some of these fields as recommended by the workgroup described above.

ISSUE 19: Lack of Formal Designation of RMPC as the Official U.S. Public Database and Lack of Adequate Funding Support

Problem	Consequences	Solution
Lack of stable funding to support PSC data exchange functions and responsibilities of the PSMFC Mark Center.	Lack of funding will result in the inability of the RMPC to provide timely quality data for the region.	Provide stable bilateral funding to establish the RMPC as the U.S. coast-wide repository of hatchery release, CWT, and catch-effort data

The availability of funding to support implementation of standards and facilitation of coordinated data collection is uncertain.	No assurance of continuity. Potential duplication of effort and unproductive expenditures.	accessible to fishery scientists and the public. Conduct a feasibility study on changing the systems functionality including an audit of current expenditures and cost forecasts of different systems such as distributed rather than centralized data processing and warehousing.

7.3 Regional Priorities for Improving the Quality of CWT Data

Workgroup members from each region identified priorities for improving CWT data for the stocks and fisheries within their respective jurisdictions using the results from Chapters 4, 5, and sections 7.1 and 7.2. Workgroup recommendations for measures which offer the greatest promise for improving the quality of CWT data for each issue and jurisdiction are presented in this section with priorities set by the regional members of the workgroup. Priorities are presented in three categories (high, medium, and low). Agency rationales for priority assignments for each issue are summarized in the following tables. Detailed information describing and supporting the priorities, and, where available, estimated costs of implementation, is provided in Appendix A.

ISSUE 1: Inconsistent and Incomplete Representation of Production Regions

	Chinook		**Coho**	
Region	**Priority**	**Solution**	**Priority**	**Solution**
Alaska	High	Chinook - Establish the Taku, Unuk and Chilkat stocks as formal ER Chinook indicator stocks. Second, include these as Model Stocks for the PSC Chinook Model at such time this is agreed and feasible.	High	A coho CWT tagging and adult escapement program should continue to be funded on the Chickamin River, which represents another life history and exploitation pattern present in the southern inside area of SEAK. A coho escapement program should be funded for 3-5 years on the Stikine River.
British Columbia	High	Some indicator programs can be functional almost immediately if funding was available for escapement programs (Lower Shuswap, Nicola, Atnarko). Additional funding is needed to develop indicators for Upper Fraser River springs and summers, and Strait of Georgia Mainland.	High	Funding is required to develop indicator programs to represent each production region. Indicator programs will be reviewed under implementation of the Wild Salmon Policy. Indicator programs are necessary for both the Southern and Northern Boundary coho PST agreements.
Washington (excluding Columbia River)	High	Establish indicator stocks for Grays Harbor and Willapa fall Chinook. The need to establish CWT indicators for stocks that are not significantly harvested by ocean fisheries (e.g., several spring stocks) should be reviewed.	Medium	Further analyses by the CoTC are needed to determine if additional wild stock tagging or DIT programs within the region are necessary. For example, wild stock tagging programs may be proposed for the Stillaguamish and Hoh River

	High	Review the distribution of DIT stocks		MUs if the current surrogate MUs used to assess survival and fishery impacts for these stocks are considered inadequate.
Columbia River	Medium	Establish wild stock tagging program where feasible. Where MM and MSF have potential significant impacts, additional coverage of DIT groups may be called for. Lower River origin tagged releases would need to be expanded to provide adequate representation of lower river wild stocks.	Low	Establish wild stock tagging program where feasible.
Oregon (excluding Columbia River)	High	Elevate Elk River to proper position as ER stock, development of Mid Oregon Coast indicator.	Low	Coho production facilities on the Oregon coast have been re-vamped in the recent past with agency prioritization on natural production groups over supplementation programs.
California	High	Develop hatchery surrogates to represent wild Chinook stock population parameters.		
	Medium	Develop marking strategies in hatcheries that would mimic the life history of the wild Chinook stocks (Yuba River& Upper Sac)		
	High	Increase the percentage of fall-run production marked at Iron Gate hatchery to a constant fraction (~25%)		

ISSUE 2: Determination of Tagging Levels

	Chinook		**Coho**	
Region	**Priority**	**Solution**	**Priority**	**Solution**
Alaska	High	Capture methodologies and effort have been increased to CWT > 40K smolt in 2005-2006 on the Stikine River, to levels that will produce population statistics with adequate levels of precision and accuracy.		
British Columbia	Medium to High	Tagging levels for existing and new indicator stocks should be adjusted to consider expectations for survival variation and fishery and escapement sampling rates to produce desired precision for stock parameters.	Medium	Tagging targets should be adjusted to consider expectations for survival and fishery and escapement sampling rates to produce a desired precision for stock parameters. DIT coverage for existing programs will be reviewed. Establishment of adequate indicator stock coverage is the first priority.

Washington (excluding Columbia River)			High	Recent survival rates, fishery ER, and sampling rates need to be reviewed. Given these rates, current tagging levels should be adjusted to produce a desired precision for ER and survival rate estimates.
Columbia River	High	Additional resources for tributary sampling for Chinook salmon.	High	Additional resources for tributary sampling for coho salmon.
Oregon (excluding Columbia River)	Medium	Confine release group(s) within narrow geographic range. Confine both DIT and SIT releases to one hatchery or co-location.	Low	Required tagging release group sizes on Oregon coast are inconsistent with concurrent ESA listed stock's needs.
California	High	Lack of technical oversight and review of estimation methodologies.	Low	No directed take of coho in California allowed.

ISSUE 3: Representation of Hatchery Production

	Chinook		**Coho**	
Region	**Priority**	**Solution**	**Priority**	**Solution**
California	High	Increase production tagging at Iron Gate in the Klamath and continue CFM in the Central Valley started in 2006		
Workgroup			High	For coho salmon a consistent, long-term indicator tagging program occurring simultaneously coast-wide can provide an extremely useful data source to detect and evaluate long-term trends. Without an indicator stock program which involves the consistent release of CWTs to represent important coho MUs, it is difficult to determine whether salmon have changed their migratory behavior over time, or how they're responding to particular conditions (e.g., the 1983 El Nino).

ISSUE 4: Sampling Rates in Terminal Fisheries

	Chinook		**Coho**	
Region	**Priority**	**Solution**	**Priority**	**Solution**
Alaska	Medium	Historical CWT sampling showed that terminal commercial fisheries were comprised primarily of Alaskan hatchery fish. These fisheries should be sampled again to verify that stock composition has not changed.	Medium	Historical CWT sampling showed that terminal commercial fisheries were comprised primarily of Alaskan hatchery fish. These fisheries should be sampled again to verify that stock composition has not changed.

British Columbia	Medium to High	Terminal Native fisheries should be sampled to produce statistically valid and representative CWT recoveries. Agreements to sample and expand CWTs must be obtained and plans for random and representative sampling implemented. Similarly, sampling of terminal recreational fisheries may be important for certain indicator stocks.	Low to Medium	Comments similar to Chinook but terminal Native and recreational fisheries tend to be less important to the existing Coho indicator stocks. This situation could vary with other indicators, particularly in the presence of mass-mark selective fishing. These terminal fisheries tend to be a relatively small component of the total fishing mortalities on these stocks.
Washington (excluding Columbia River)	Medium to High	Implement sampling programs for freshwater sport fisheries occurring in watersheds with ER indicator stocks, where feasible and cost-effective. Alternative approach, particularly applicable in situations of low catch rates is to devise methods for indirect estimation (e.g., apply nearby net fishery or hatchery sampling information to catch estimates). See Appendix A for more detail on individual systems.	High	Implement sampling programs for freshwater sport fisheries occurring in watersheds with ER indicator stocks, where feasible and cost-effective. Alternative approach, particularly applicable in situations of low catch rates is to devise methods for indirect estimation (e.g., apply nearby net fishery or hatchery sampling information to catch estimates). See Appendix A for more detail on individual systems.
Columbia River	Medium	Areas of low sampling coverage have been identified and ODFW is currently seeking funding to address those that have been identified. Additional resources needed to improve sampling rate.	Low	Terminal sport catch of coho has historically been low, apart from the Buoy 10 fishery. Additional resources needed to improve sampling rate.
Oregon (excluding Columbia River)	Medium	Terminal fishery sampling is more comprehensive in smaller area basins than in more geographically dispersed fisheries.	Low	There has historically been a low level of terminally caught coho.
California	High	Incomplete sampling of coastal recreational fisheries, upper Klamath and Trinity	Low	No reporting of Tribal harvest

ISSUE 5: Sampling Rates in Escapements

	Chinook		**Coho**	
Region	**Priority**	**Solution**	**Priority**	**Solution**
British Columbia	Low to Medium	For indicator stocks, the estimated escapements and sample rates follow a study design intended to produce the desired precision for indicator stock parameters.	Low to Medium	Same comment for indicator stocks but inadequate coverage of production regions by indicator stocks.
Washington (excluding Columbia River)	High	Chinook escapement is generally sampled to some degree in systems with tagged indicator stocks. However, the programs need to be reviewed with reference to	High	Escapement survey programs should be reviewed (see below for total estimation) and sample programs instituted where tagged stocks (particularly DIT) are present. Coho escapement in coastal systems are

		achieving precision goals and spawning distributions. See Appendix A for more detail on individual systems.		sampled at some level. These should be reviewed and sample designs adjusted where necessary to achieve precision objectives. Coho escapement in Hood Canal is sampled, but no expansions are available by individual river basins. The escapement estimation method should be stratified to supply estimates of total escapement where tagged fish are recovered.
Columbia River	Medium	As listed populations become drivers for North of Falcon fisheries, both accurate and precise escapement estimations of Columbia River Tributaries will be required. Some tributaries escapements are not sampled at standard rate. Additional resources would improve sampling rates.	Low-Medium	Escapement sampling is currently occurring to meet management objectives at ESU levels. Some tributaries escapements are not sampled at standard rate. Additional resources would improve sampling rates.
Oregon (excluding Columbia River)	Medium	Escapement sampling programs in smaller indicator streams are currently more comprehensive than those found in larger systems.	Low	Escapement sampling is currently occurring to meet management objectives at ESU levels.
California	Medium	Escapement sampling in coastal streams is inconsistent.	Low	Escapement sampling in coastal streams is inconsistent.

ISSUE 6: Uncertainty in Estimates of Escapement or Terminal Fishery Catch

	Chinook		Coho	
Region	**Priority**	**Solution**	**Priority**	**Solution**
British Columbia	Low	Existing indicator stock programs have adequate coverage and accurately estimate escapement.	Low	Existing indicator stock programs to accurately estimate escapement have adequate coverage, but the coverage of indicator stocks is acknowledged to be inadequate.
	High	Opportunities exist to implement new mark-recapture programs for indicator stocks identified above in Issue 1. All other facets of the indicator program are already in place.		
Washington (excluding Columbia River)	High	Escapement estimation in Puget Sound and WA coast for Chinook salmon is carried out using various methods. These need to be reviewed on a watershed basis and the sample designs evaluated. See Appendix A for further details.	High	Coho escapement in Puget Sound is estimated using expansions from index area to total river. The expansions used were estimated using mark-recapture; complete surveys or biologists best information anywhere from 15-30 years ago. The escapement estimation requires a complete evaluation and redesign for coho. See Appendix A for further

				details
Columbia River	Medium	As listed populations become drivers for North of Falcon fisheries, both accurate and precise escapement estimations of Columbia River Tributaries will be required. Escapement estimates for some tributaries rely on post-season run reconstruction rather than direct observation. Provide additional resources for direct observation.	Medium	ODFW is currently targeting 8 TRT populations to provide overall wild abundance in Columbia River Tributaries. Will recover carcasses and CWTs from those sampled. Expansion factors have historically not been calculated. Newly designed spawning surveys should be able to provide CWT expansions. Escapement estimates for some tributaries rely on post-season run reconstruction rather than direct observation. Provide additional resources for direct observation.
Oregon (excluding Columbia River)	Medium	The need for additional escapement sampling in larger systems has been identified and will be pursued in relation to concurrent regional objectives.	Medium	The need for additional escapement sampling in larger systems has been identified and will be pursued in relation to concurrent regional objectives.
California	Low	Implement counting weirs to measure bias in specific Chinook salmon surveys. (Upper Sac, Feather River)	Low	Implement counting weirs to measure bias in specific coho salmon spawning surveys.
	Medium	Develop agency oversight on funding priorities to improve the consistency of escapement monitoring	Medium	Develop agency oversight on funding priorities to improve the consistency and coverage of coastal stream escapement monitoring and Central Valley and coastal recreational inland fisheries

ISSUE 7: Sampling Rates in Highly Mixed Stock Fisheries

	Chinook		Coho	
Region	**Priority**	**Solution**	**Priority**	**Solution**
Alaska	Medium	Raise sampling rates in commercial purse seine and assure temporal representation in commercial net fisheries. Raise the sampling rates for the Petersburg and Wrangell area sport fisheries.	Medium	Raise sampling rates in commercial purse seine and assure temporal representation in commercial net fisheries.
British Columbia	Low to Medium	Sport fishery sample rates are generally low. Improved communication of voluntary head recovery program may improve sampling rates by increasing awareness. Few sampling programs exist for native fisheries in ocean waters, and main gaps are on WCVI and QCI.	Low to Medium	Sport fishery sample rates are generally extremely low and much lower than for Chinook. Improved communication of voluntary head recovery program may improve sampling rates by increasing awareness.
Washington (excluding Columbia		Review fisheries with low sample rates or no sampling		

River)		with reference to presence of tagged stocks.		
Columbia River	Low	Additional resources for sampling in certain fisheries.	Low	Additional resources for sampling in certain fisheries.
Oregon (excluding Columbia River)	Low	All pre-terminal fisheries have historically been adequately sampled.	Low	All pre-terminal fisheries have historically been adequately sampled.
California	Low	All pre-terminal fisheries have historically been adequately sampled.	Low	All pre-terminal fisheries have historically been adequately sampled.

ISSUE 8. Uncertainty in Estimates of Catch in Highly Mixed Stock Fisheries

	Chinook		Coho	
Region	**Priority**	**Solution**	**Priority**	**Solution**
British Columbia	Medium to High	Catch is not estimated for all time periods or areas of the sport or Native fisheries where significant catch of indicator stocks may occur. Estimates of precision are adequate.	Medium to High	Catch is not estimated for all time periods or areas of the sport or Native fisheries. Estimates of precision are adequate. Other priority activities above are more important.
Washington (excluding Columbia River)	Medium	Implement routine evaluations of potential bias with commercial and sport fisheries catch estimation programs (e.g. over the bank sales, egg sales, recent Skokomish River sport and Skokomish River tribal net evaluations) on systematic basis prioritizing highest impact fisheries.		
Columbia River	Low	The value of quantifying the uncertainty of catch estimates is yet to be determined.	Low	The value of quantifying the uncertainty of catch estimates is yet to be determined.
Oregon (excluding Columbia River)	Low	The value of quantifying the uncertainty of catch estimates is yet to be determined.	Low	The value of quantifying the uncertainty of catch estimates is yet to be determined.
California	Medium-low	Quantify the uncertainty of the ocean sport fisheries private access catch. Quantify the Bias in unreported landings and avoidance of sampling in the troll fishery.		

ISSUE 9: Non-representative Sampling

	Chinook		Coho	
Region	**Priority**	**Solution**	**Priority**	**Solution**
Alaska	Medium	Implement safeguards to ensure temporal sampling coverage in commercial purse seine and drift gillnet fisheries.	Medium	Implement safeguards to ensure temporal sampling coverage in commercial purse seine and drift gillnet fisheries.
British Columbia	Medium to High	In addition to comments in above tables, this problem has been recognized and steps have been taken to coordinate the creel survey study designs with the regulation stratification. Additional research is needed to assess issues associated with non-representative sampling. (e.g., implications of limiting creel survey sampling sites to public access sites, while excluding private marinas which may be frequently used by charter boats and guides, who may have higher CPUEs). Improvements to the sport logbook program are needed to improve catch data, CWT recovery, and improve cooperation from more lodges and charter operations.	Medium to High	Same comment as Chinook
Washington (excluding Columbia River)		Increase sampling staff to cover fisheries with broad geographic span and to account for over-bank, egging and non-commercial catches.		Increase sampling staff to cover fisheries with broad geographic span and to account for over-bank, egging and non-commercial catches.
Columbia River	High	The need to provide overview of state's sampling programs has been recognized and is being addressed.	High	The need to provide overview of state's sampling programs has been recognized and is being addressed.
Oregon (excluding Columbia River)	High	The need to provide overview of state's sampling programs has been recognized and is being addressed.	High	The need to provide overview of state's sampling programs has been recognized and is being addressed.
California	High	Management needs finer detailed catch/area stock composition.		
	High	Improve enforcement of trollers identifying block/area of catch. Seek regulations to enforce trollers to separate catch into management areas		
	Medium	Full GSI/CWT sampling along with Satellite Vessel Monitoring system of trollers. Catch and effort		

ISSUE 10. Incomplete Sampling Coverage for Fisheries and Escapement

	Chinook		Coho	
Region	**Priority**	**Solution**	**Priority**	**Solution**
British Columbia	Low to Medium	Unsampled commercial fisheries are small and past sampling indicated few, if any, indicator stock CWTs. Some sport and Native fisheries are unsampled.	Low to Medium	Same comment as Chinook.
Columbia River	High	Increase sampling of summer sport fisheries in the Columbia River given appropriate funding.	Low	Escapement sampling is currently occurring to meet management objectives at ESU levels. Additional funding would be needed to implement directed fishery sampling programs beyond those that are currently prosecuted
	High	Modify sampling in lower Columbia River to allow for recoveries of DIT fish		
	High	Equip samplers with appropriate gear to collect tags in escapement.		
Oregon (excluding Columbia River)	Medium	Additional funding will be needed to implement programs beyond those that are currently prosecuted.	Low	Escapement sampling is currently occurring to meet management objectives at ESU levels. Additional funding would be needed to implement directed fishery sampling programs beyond those that are currently prosecuted.
California	Medium	Incomplete sampling of CA coastal inland recreational Chinook salmon fisheries.	Medium-Low	Develop agency oversight on funding priorities to implement coastal monitoring plan including escapement monitoring.
	Medium	Develop agency oversight on funding priorities to improve the coverage of escapement monitoring.		

ISSUE 11: Voluntary Sampling Programs

	Chinook		Coho	
Region	**Priority**	**Solution**	**Priority**	**Solution**
British Columbia	High	Studies are needed to determine the degree of bias in the distribution of observed CWTs. The study would help plan opportunities to improve CWT data from the sport fisheries. Improvements to voluntary recovery program, and/or direct sampling of sport fisheries are needed to improve awareness and reduce bias.	High	Same comment as for Chinook.

ISSUE 12: Sampling Methods and Processing CWTs

	Chinook		Coho	
Region	**Priority**	**Solution**	**Priority**	**Solution**
Alaska	Low	Do nothing or institute electronic tagging, that is not fiscally or logistically feasible. Analytically must make assumption that the ERs of clipped and unclipped DIT groups		

		are the same.		
British Columbia	Low to Medium (medium for US agencies)	Reallocation of resources to sample unmarked CWTs could occur after canceling other stock assessment or fishery monitoring programs. Cost will be determined by the extent of electronic sampling. If restricted to major mixed stock commercial fisheries, costs will be modest (note that this is the estimated cost in Appendix A). If such sampling is expanded to all fisheries, the cost will increase significantly and perhaps double the current investment into sport fishery programs. The extent of catch estimation, sampling, and awareness needs to be reviewed across all Canadian sport fisheries. The tools used to estimate the total number of CWTs harvested will depend on funding. Options include additional creel surveys, improvements to study designs of current creel surveys, use of other survey instruments.	Low to Medium (medium for US agencies)	Same comment, likely greater priority than Chinook due to implementation of DIT tagging programs.
Oregon (excluding Columbia River)	Low	There is no need to modify sampling programs unless there are MSFs impacting Oregon fall Chinook, or if there is the need to reduce processing costs.	Low	Allocation of resources to examine the contribution of unmarked catch competes with alternate agency priorities.
California	High	Seek additional funding to increase staffing and recovery efforts associated with Central Valley Fall-run constant fractional marking that began in 2006.		

7.4 *Regional Priorities for Improving Data Coordination and Validation*

ISSUE 13: Timeliness of Reporting

	Chinook		Coho	
Region	**Priority**	**Solution**	**Priority**	**Solution**
British Columbia	High	Several indicator stocks (including those for stocks of conservation concern) are caught in southern U.S. fisheries, but those CWT recoveries are not reported bilaterally until two years after the fishery. Those CWT recoveries are extremely valuable to plan fisheries for the current year, prepare stock abundance forecasts, assess stock status, and evaluate previous year's fishery and PST performance (e.g. ISBM indices).	High	Same as Chinook.
California	High	Develop agency oversight to improve inconsistent reporting and coordination on state wide CWT releases and recoveries.		

ISSUE 15: Inter/Intra-agency Coordination

	Chinook		Coho	
Region	**Priority**	**Solution**	**Priority**	**Solution**
British Columbia	Medium	Bilateral coordination of ocean sampling program designs, objectives, and rationale are needed to establish clear PST-driven priorities and advice. Otherwise domestic program planning will continue to evaluate PST and domestic priorities and allocate available funding to highest priority activities.	Medium	Same comment as for Chinook.
California	Medium	Develop agency oversight to improve the consistency and timeliness of inland recovery reporting.	Medium	Develop agency oversight to improve the consistency and timeliness of inland recovery reporting.

7.5 Summary

The Expert Panel stated in their report (Hankin et.al. 2005) that "…it will be important to maintain a reliable CWT system during the transition period to ensure data continuity and to allow evaluation of the relative performance of some new technology or approach as compared to the CWT system" and the first three recommendations were intended to "correct deficiencies in data collection and reporting throughout the basic CWT system and to improve analysis of CWT recovery data". The CWT workgroup therefore focused its efforts on reviewing the current status of the CWT system with reference to the quality of the sampling and data collection, to the data validation and reporting (Chapter 4) and also reviewed the status of the data with respect to precision and accuracy of estimates derived from CWT data (Chapter 5).

The CWT workgroup developed a categorized list of issues that impact the quality of the CWT data and estimates derived from CWT data (Section 7.1 and 7.2). Workgroup members from each region reviewed their tagging, sampling, and data reporting programs with the assistance of agency staff. Actions and priorities to problems identified in this review are listed by region in Sections 7.3 and 7.4 and Appendix A.

The CWT workgroup recommends that agencies implement these solutions with reference to the priorities identified. The CWT workgroup recommends that the PSC and agencies take action on several recommendations described below:

1. The workgroup identified gaps in geographic and stock type tag representation (Section 7.1 and 7.3) which should be addressed by the PSC and agencies. Coho coverage. There is no formal coho coast-wide indicator stock program, but all tagged releases are used where appropriate. Consequently some regions are adequately represented and others have no or few tag recoveries (See Appendix D).
2. The PSC should focus additional consideration of uncertainty in determining tagging and sampling levels. Agencies and/or the CTC and CoTC should undertake evaluation of all Chinook indicator stocks and all tagged groups from coho regional grouping from the perspective of the uncertainty inherent in estimates of ER. For any indicator stock or tag group of interest the following must be in place:

   a. All fisheries and escapement locations should be sampled directly, ensuring unbiased estimates of ER for the tag group (Section 5.3 and Chapter 7).
   b. A minimum of 10 tags per fishery stratum is required to provide estimates of ER that are of minimally sufficient precision (which provides a 95% confidence interval no larger than ±60% of the estimate or a PSE of 30% – Section 5.3).
   a. In order to achieve the minimum number of tags recovered in fisheries and escapement, sample rates and/or tag release group size should be evaluated using the tool described in Chapter 6.
3. In some cases tagged hatchery fish stray to the spawning grounds, where sampling should occur to provide unbiased estimates of ER. However review of the sampling programs (Tables 4.2 and 4.3) indicate that spawning ground sampling is often not in place. In addition, estimates of escapement to the spawning grounds, and the associated expansion factors for CWTs, are often uncertain, and possibly biased. Agencies should evaluate their escapement estimation and sampling programs where tagged Chinook and coho groups are present.
4. Sampling methods must provide representative samples of all tagged fish (marked and unmarked) in the fishery or in escapement (Section 7.1.4), where applicable. Agencies should evaluate their sampling programs with this in mind.
5. The advent of mass marking and mark-selective fisheries has had an adverse impact on sampling methods and data reporting by agencies. Addition of new fields to the CWT data system due to MM and MSF has complicated use of the data for CoTC and CTC analyses. It is necessary that agencies use appropriate sample methods and data reporting to assure that data quality are maintained.
   a. Agencies should evaluate their sampling programs with reference to requirements now in place. Reporting of sample method (electronic vs. visual), fishery type (selective vs. non selective), tag group type (DIT vs. non-DIT), and mark status in release and recovery files are new data fields and are not consistently reported. Also, the reporting of the tag/mark status in catch-sample file has become more complicated and agencies should review their procedures.
   b. The CWT workgroup recommends that a workgroup including members of the CoTC and CTC should be charged to review the current validation process in reporting data to RMIS and provide recommendations on what additional validation procedures should be instituted (Section 7.2 and 7.4).

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Appendix A. Regional Reports on Issues with CWT System

Workgroup members from each region identified priorities for improving CWT data for the stocks and fisheries within their respective jurisdictions using the results from Chapters 4 and 5. This Appendix provides detail on the problems, identifies their consequences, provides the solutions recommended by the workgroup and, where possible, gives a preliminary estimate of the cost. The solution sections provided here are also outlined in section 7.3 where the workgroup members have also assigned a priority as recommended by the members from each region. The issues below are organized as described in sections 7.1 and 7.2.

Alaska Chinook

Tagging Issues

1. Low tagging rate on wild stock with no hatchery surrogate.
    - i. Problem: Stikine River (TBR system) wild Chinook have had low smolt tagging levels until 2005.
    - ii. Consequence: Run reconstruction, parameter estimates, and abundance-based management will be less precise than desired by technical committee data standards.
    - iii. Solution: Capture methodologies and effort have been increased to CWT > 40K smolts through funding from the PSC Northern Endowment Fund and PCSRF.
    - iv. Cost: $100,000 annually

2. Chinook stocks not represented by CWT data in the CTC analysis for the PSC.
    - i. Problem: Five SEAK/TBR stocks are not represented by CWT data in CTC work at present—Taku (TBR), Stikine (TBR), Alsek (TBR), Chilkat, and Situk Rivers. One other, the Unuk River, is likely poorly represented in the PSC Chinook Model by the ASI stock. The Alsek and Situk River stocks are not an issue because almost all harvest occurs in terminal areas (in river or in river mouths).
    - ii. Consequence: Incomplete representation of these spring yearling stocks in the PSC Chinook Model. Additionally, the ERs, survival, and distributional data are not tracked by the CTC.
    - iii. Solution: Two-fold. First, establish the Taku, Unuk, and Chilkat stocks as formal ER indicator stocks for the CTC. Second, consider including these as Model Stocks for the PSC Chinook Model if deemed necessary and beneficial.

Sampling Issues

3. Low sampling rate in the purse seine fishery.
    - i. Problem: The sampling rate in the traditional commercial purse seine fishery is low (about 15%), which drops the overall SEAK net sampling rate to slightly below 20% (19.7%), on average for the past five years.
    - ii. Consequence: Precision of estimates of ERs, etc, for some PSC indicator stocks present in low numbers will be less than desired by technical committee data standards.
    - iii. Solution: Raise sampling rates in total and assure temporal representation.

iv. Cost: $30,000 annually.

4. Low sampling rate in terminal commercial fisheries.
    i. Problem: The sampling rate in most terminal commercial fisheries is low (5-10%). When these fisheries were developed in the 1980s, sampling rates were above 20% and indicated that these harvests are almost all of Alaska-hatchery origin.
    ii. Consequence: Precision of estimates of ERs, etc, for some PSC indicator stocks present in low numbers will be less than desired by technical committee data standards.
    iii. Solution: Consider annual spot-checking (raising sampling in selected fisheries to above 20%) to verify historical results.
    iv. Cost: $25,000 annually.

5. Low sampling rate in sport fishery.
    i. Problem: The sampling rate in the SEAK sport fishery is slightly below 20%.
    ii. Consequence: Precision of estimates of ERs, etc, for three PSC indicator stocks (SEAK, Kitsumkalum, and Queets) will be less than desired by technical committee data standards.
    iii. Solution: Provide funding to staff dedicated solely to catch sampling across ports in SEAK to raise the sampling rate above 20% and increase precision of statistics used by the CTC.
    iv. Cost: $40,000 annually.

6. Alaska employs visual sampling, not electronic.
    i. Alaska has produced high-quality CWT data since 1981 using visual sampling for CWTs and will continue to do so into the foreseeable future.

Alaska Coho

Tagging Issues

7. Low stock representation for coho CWT indicator stocks in a geographic area.
    i. Problem: The southern inside sector of Southeast Alaska has only one small wild CWT indicator stock (Hugh Smith) with which to generate all stock parameters, including ER. The department bases management on wild-stock abundance and uses the wild-stock tagging in the region for management. The larger aggregation of wild stocks in the southern inside area is not likely well represented by the small CWT indicator.
    ii. Consequence: ERs, distribution, survival, etc. may not be indicative of all stocks in this area.
    iii. Solution: A program has been started on the Chickamin River, a stock that produces 50,000 to 100,000 adults annually, to estimate a full set of population parameters. This stock represents another life history and exploitation pattern present in this area. Future funding will need to be obtained to continue this program.
    iv. Cost: $150,000 annually.

Sampling Issues

8. Low sampling rate in selected fisheries.
   i. Problem: The traditional purse seine sampling rate is low overall (14-16%) and some individual net strata with significant catches are not sampled adequately.
   ii. Consequence: Precision of estimates for some stocks will be low and indicator stocks may be missed.
   iii. Solution: Raise sampling rates in total and assure temporal representation.
   iv. Cost: $30,000 annually.

Alaska Data Reporting, Coordination, and Validation

9. Sample expansion for escapement CWTs from tagged wild stocks of Chinook and coho salmon from SEAK are unavailable on the RMIS database.
   i. Problem: The number of fish sampled in escapements and the escapement estimates are not reported to RMIS for SEAK wild stocks.
   ii. Consequence: Analysts cannot expand CWTs reported from escapements for SEAK wild stocks.
   iii. Solution: Contact Alaskan representatives on PSC technical committees to obtain the correct expansion factors for tag codes for each fishery.

10. Harvest reporting strata for commercial spring troll openings.
   i. Problem: The management strata for spring troll openings are much finer and more numerous (by sub-district statistical area-statistical week) than for the general summer and winter troll strata, which are managed and reported by area quadrant (multiple districts for each and by troll period—multiple statistical weeks). These openings are managed to maximize the harvest of Alaskan hatchery Chinook as they return in near-terminal areas, proximal to hatcheries.
   ii. Consequence: The fine-scale MUs cause inconsistent CWT sampling statistics for the spring troll fishery, such as a sub-district sampled at > 100% or 0%.
   iii. Solution: Redefine and map the reporting strata for spring troll fisheries to larger aggregates of time and area to be more consistent with the remainder of the accounting year for the SEAK troll fishery.
   iv. Cost: Minimal.

Canada Chinook and Coho Salmon

Tagging Issues

1. Lack of CWT indicator stock coverage of production regions or stock aggregates.
   i. Problem: Major Chinook and coho production areas and life histories are poorly represented by CWT indicator stocks, which are used for assessments by the PSC technical committees. Chinook – A CWT indicator is needed for the central coast area, and 3-4 are needed to represent distinct life history patterns in the Fraser River not represented by the indicator for the Fraser River Lates. Coho – CWT indicators are needed to represent the central coast, northwest Vancouver Island and east Georgia Basin production regions and 3 of 4 production regions in the north coast.

ii. Consequence: Chinook - A number of large Chinook aggregates currently have no exploitation rate indicator to provide ERs and survival rates, or maturation rates as input data to the Coastwide Model. Coho – Due to lack of tagging, production in the unrepresented regions can not be modeled in the coho FRAM.
iii. Solution: Chinook - Indicator programs could be functional almost immediately for some of the aggregates if funding were secured for the escapement programs. Additional funding is needed to develop an adequate indicator for one (possibly two) Fraser River aggregates. Coho – Funding is required to develop tagging programs to represent the production regions.
iv. Cost: $1,235,000

2. Discontinuation of wild coho indicator programs.
   i. Problem: Due to lack of funding, several wild indicator programs were cancelled and in those remaining, escapement estimation and CWTs sampling are increasingly dependent on community volunteers.
   ii. Consequence: Wild coho indicators provide assessments of freshwater smolt production that cannot be assessed from hatchery stocks. Tag data in certain production regions has decreased overall or resulted in a greater proportion of the data coming from hatchery releases.
   iii. Solution: Greater funding would allow the optimization of existing indicator programs and allow the reinstatement of wild indicator programs.
   iv. Cost: Included in 1.

3. The coastwide standard tag release sizes for coho (40,000) and Chinook (200,000) are not met for some indicator stocks.
   i. Problem: When the coastwide standard tag release sizes are not met, usually too few CWTs are recovered to reliably represent stock dynamic and fishery impacts.
   ii. Consequence: In some cases, fishery and escapement recoveries are fewer than desired for producing reliable fishery harvest and brood statistics.
   iii. Solution: Where possible, steps are being taken to increase tag numbers for coho and Chinook. Tagging targets can be estimated by considering aspects such as survival and expected fishery and escapement sampling rates to produce desired precision for stock parameters.
   iv. Cost: $500,000

Sampling Issues

4. Voluntary Head Program for CWT recoveries from sport fisheries.
   i. Problem: DFO obtains CWT recoveries from all marine and freshwater sport fisheries through the voluntary submission of heads from adipose clipped fish into head depots.
   ii. Consequence: CWT recoveries may not represent the actual stock mixture; the magnitude of the bias is unknown. CWTs from unmarked fish in non-selective fisheries will not be obtained. Insufficient coho heads recovered in recent years,

while sufficient numbers of Chinook heads recovered: sport sector insufficiently informed about the value of coho CWT data.

iii. Solution: Studies are needed to determine the degree of bias in the distribution of observed CWTs. The results of the studies would be useful in determining the steps needed to improve CWT data from the sport fisheries. Improvements to voluntary recovery program, and/or direct sampling of sport fisheries to improve awareness and/or reduce bias.

iv. Cost: $150,000

5. Sport fishery catch estimates are incomplete but cover main periods of fishing activity.

    i. Problem: Catch is not estimated for all time periods and areas of the sport fishery. In addition, creel survey programs which obtain needed clip rate and CPUE data to estimate awareness do not cover all time periods (e.g., non-summer months in Georgia Strait) or areas (e.g., PFMAs 3-6 of northern sport; freshwater areas) where significant catch of indicators may occur.

    ii. Consequence: The estimated catch is incomplete and awareness factors to expand the CWTs turned in voluntarily by anglers must be derived from other times and areas for which awareness data are available.

    iii. Solution: The extent of catch estimation, sampling, and awareness needs to be reviewed across all Canadian sport fisheries. The tools used to estimate the total number of CWTs harvested will depend on funding. Options include additional creel surveys, improvements to study designs of current creel surveys, use of other survey instruments (e.g. mail surveys to recall a sample of licenses with recorded catch, charter and lodge logbooks, etc.), and status quo.

    iv. Cost: $750,000 to $1,500,000, depending on solution

6. Inadequate spatial and temporal representation of sport catch related to uncreeled areas, or lack of contribution of catch data and CWTs from all lodge and charter operations.

    i. Problem: DFO relies on cooperation from commercial lodge and charter operations to volunteer estimates of sport catch, and heads of adipose clipped fish; cooperation is less than universal. CPUEs and fishing effort may differ among lodge & charter fishers and the average fisher encountered by the creel survey.

    ii. Consequence: In some areas (e.g., WCVI, QCI, and Central Coast), lodge & charter operations represent a major portion of the sport harvest; catch estimates are incomplete because their catch is not accurately captured in the dockside creel surveys. In addition, the sample size of heads could be increased considerably with their contributions.

    iii. Solution: Improvements to the logbook program are needed to improve catch data, CWT recoveries and cooperation from more lodges.

    iv. Cost: $75,000

7. Inconsistent or lack of sampling and catch estimates for substantial Native fisheries.

i. Problem: While improvements have been made to estimate Native fishery catches, most fisheries have either not been sampled or have been inconsistently sampled for CWTs where indicator stocks occur.
ii. Consequence: Analyses such as cohort reconstructions are based on incomplete recovery data and the results are therefore, biased. Total exploitation and production are underestimated by an unknown and variable amount. Reduced quality of abundance forecasts, fishery impacts, and stock assessments.
iii. Solution: When Native fisheries are open, they should be sampled to produce statistically valid and representative CWT recoveries. Agreements to sample and expand CWTs must be obtained and plans for random and representative sampling implemented.
iv. Cost: $230,000

8. Lack of or incomplete sampling for unmarked CWTs in fisheries.
   i. Problem: Electronic sampling is not used in all fisheries, and in some cases unmarked and tagged fish are not processed.
   ii. Consequence: Unmarked recoveries are lacking or incomplete in the RMIS database and analyses of DIT releases will be compromised.
   iii. Solution: This has been an issue of funding level and allocation versus agency priorities. Utility of DIT recoveries in non-selective fisheries remains unclear. Reallocation of resources to sample unmarked CWTs could occur after canceling other programs.
   iv. Cost: $70,000 minimum

9. Lack of sampling in some fisheries where indicator CWTs are expected, which includes developing indicators.
   i. Problem: Reductions in funding have led to strategic cessation of sampling for CWTs in certain terminal areas where the presence of indicator CWTs is unlikely and in fisheries where species other than Chinook or coho are the target but where indicator CWTs may be landed in modest numbers. Fisheries with non-retention of Chinook and coho are not sampled (e.g. high volume net fisheries).
   ii. Consequence: This loss of CWTs, especially the indicator CWTs, is yet another unaccounted for bias in the results of cohort reconstructions. However, if assumption of minimal presence of indicator CWTs is true, then bias would be small.
   iii. Solution: Increased funding would enable the restoration of sampling in fisheries where CWTs are expected. Those fisheries where any indicator may occur would be given higher priority.
   iv. Cost: $50,000

10. Lack of coordination between the spatial and temporal coverage of regulations (e.g., MSFs) and the design of creel surveys.
   i. Problem: The design of the creel surveys has not been coordinated to match multiple and simultaneously occurring regulation sets (e.g., non-MSF, MSF and

mixed bag) which each need separate mark rate information and catch estimates for the estimation of CWTs reported caught under each regulation set.

ii. Consequence: Estimated numbers currently generated for individual recoveries from data collected across regulation boundaries are biased low or high depending on the regulation set.

iii. Solution: This problem has been recognized and steps have been taken to better coordinate the creel surveys with the regulations starting in 2006.

iv. Cost: $50,000

11. Escapements may have no or low CWT sampling rates or escapements may not be estimated quantitatively.

    i. Problem: Quantitative escapement estimates and CWT sampling are insufficient to use some stocks as indicators, or escapement sampling rates are too low to yield precise estimates of fishery impacts, stock dynamics, or total production at younger ages for effective sibling abundance forecasts.

    ii. Consequence: When escapements are not quantitatively estimated or sampled for CWTs, the stock cannot function as an indicator stock. When sampling rates are too low, the quality of parameters derived from CWTs (e.g. fishery impacts, stock dynamics) is reduced.

    iii. Solution: Estimate and sample escapements following a study design intended to produce the desired precision for indicator stock parameters.

    iv. Cost: $100,000

Canada Data Reporting, Coordination, and Validation

12. Non-reporting of estimated numbers for some escapement CWT recoveries.

    i. Problem: While all recoveries are reported to the RMIS database, estimated numbers are only reported for those escapement recoveries associated with a population estimate known without error (i.e., generally the hatchery portion of the run).

    ii. Consequence: Estimated numbers are available for these recoveries and are used in technical committee analyses but they are unavailable to others via RMIS.

    iii. Solution: If requested by the PSC to report the estimated numbers, DFO would consider whether a change in its long standing policy of not reporting such numbers was warranted and any issues associated with reconciliation.

    iv. Cost: $80,000

13. Non-completion of important recovery fields in RMIS.

    i. Problem: DFO has not reported recovery records with the ‘Adclip_selective’ field completed.

    ii. Consequence: Analyses by technical committees or others examining impacts due to MSFs are hindered because it is unknown whether the recoveries occurred in a MSF or not. This affects analyses of Canadian and US stocks.

iii. Solution: Fishery regulations have become implemented on an increasingly fine spatial and temporal scale, often bisecting PFMA's. A mapping tool is needed to map the CWT recoveries to MSF, non-MSF, or other (e.g., mixed bag) regulations.
iv. Cost: $50,000

14. Completion of the 'Sampling Method' recovery field in RMIS.
    i. Problem: Most samples in commercial fisheries are sampled electronically and detected recoveries identified by an 'E'. However, the dissection of CWTs from unmarked heads has either been incomplete or none done at all. Yet analysts regard the E in the Sampling_Method field to indicate that unmarked CWTs were sampled, dissected, and reported for the fishery.
    ii. Consequence: Assumptions about the meaning of values in the Sampling_Method field leads to confusion in completion of this data field by agencies and in use by analysts. Analyses may be unknowingly based on incorrect or incomplete data and the results misinterpreted.
    iii. Solution: New values could be considered to indicate the above situation or a new field indicating whether there was complete dissection of unmarked heads could be added or analysts need to find other ways to determine whether the set of observed marked and unmarked recoveries in a fishery are complete (i.e., were sampled, dissected, and reported with equal probability). It could be helpful to have the PSC Data Sharing Committee review this issue and develop corrective options to assist analysts.
    iv. Cost: $50,000

15. Non-dissection of unmarked heads.
    i. Problem: CWTs in unmarked heads are detected via electronic sampling in commercial fisheries, the heads are taken but then those from ice boat samples are not dissected (though those from freezer trollers are).
    ii. Consequence: The sample of unmarked CWTs is incomplete and analysts must account for this. Because some unmarked CWTs are present in RMIS for the freezer troll component fishery, naïve analysts may assume that the marked and unmarked CWTs are equally complete, resulting in false interpretations from analyses.
    iii. Solution: Demonstration of the value of sampling for DITs in non-selective fisheries is needed.

16. Transparency of catch-sample data relationships in RMIS.
    i. Problem: Catch and samples are frequently aggregated across multiple time strata (basic unit = stat week) for the estimation of CWTs in commercial fisheries. These aggregated strata vary in duration among fisheries and years, i.e. catch and sample data may be summed across several stat weeks. Fields are available for coding in RMIS to allow for the recognition of non-standard time strata, but Canada has not populated them.
    ii. Consequence: Estimated numbers for individual recoveries are difficult to recreate given the catch and sample data reported in RMIS. Analysts will

encounter strata with sample data but apparently, no associated catch as well as strata with catch but apparently no associated sample. These cases are a 'coding' artifact due to samples and estimated catch falling into different stat weeks (the freezer troll catch is a special case of this issue).

iii. Solution: Canada populates the appropriate field in RMIS. Strata with sample numbers exceeding catch are generally infrequent, usually occur in terminal net fisheries, and generally represent small fisheries. Steps are being taken to populate the field in RMIS.

17. Reporting of catch-sample data to RMIS.
    i. Problem: Catch data in the catch-sample file of RMIS are incomplete because several Canadian recreational and Native fisheries, with no sampling, are not reported in the database.
    ii. Consequence: There can be substantial discrepancies between catch reported in RMIS and catch reported directly to PSC technical committees for reporting and analyses. Some analysts are unaware of the incompleteness of the catch-sample data and raise concerns when discrepancies are identified.
    iii. Solution: The PSC Data Sharing Committee could review the extent of this issue and clarify the intent of catch-sample file data and prepare options to reconcile the situation (if needed).

Washington Coast and Puget Sound Chinook and coho salmon

Sampling Issues

Fishery Sampling Issues

1. Puget Sound & Coastal Freshwater Recreational Sampling Programs (Chinook and Coho)
    i. Problem: Currently, WDFW does not have CWT sampling programs in place for many coastal and Puget Sound freshwater recreational fisheries in watersheds with significant numbers of tagged fish from groups used by CTC and CoTC
    ii. Consequence: If ERs associated with these fisheries are significant, lack of sampling will contribute to bias of ER estimates.
    iii. Solution: Implement sampling programs for sport fisheries occurring in watersheds where there are significant impacts on CWT groups, where feasible and cost-effective. Alternative approach, particularly applicable in situations of low catch rates is to devise methods for indirect estimation (e.g., apply nearby net fishery or hatchery sampling information to catch estimates).

2. Incomplete or inaccurate accounting of catches has been documented in Puget Sound fisheries. Contributing causes for incomplete accounting include cases where fishers sell harvest over the bank, sell the fish for eggs, or take fish home without reporting these fish on fish tickets. In addition to not being reported, this catch is not sampled for tagged fish.
    i. Problem: Unreported and unsampled catch of coho and Chinook salmon.

ii. Consequence: Estimates of total catch will be biased resulting in biased sample expansions for estimation of tagged fish in harvest. Where there is no sampling as well, the number of tagged fish will be underestimated.
iii. Solution: Implement independent estimates of commercial fish landings and sales to be compared with existing fish ticket system. Results of this study will identify magnitude and source of accounting problems. Once catch accounting problems are identified, sampling programs may be increased to meet objectives including coverage of fisheries with broad geographic span and to account for over-bank, egging, and non-commercial catches.

Terminal area sampling general issues

3. Chinook and coho escapement estimates
   i. Problem: Estimation methods for escapement are inconsistent and may be biased or imprecise. Chinook and coho escapement methods require review to reduce bias and/or increase precision.
   ii. Consequence: Biased or imprecise estimates of escapement result in biased estimates of tagged escapement and ERs, the degree of bias depends on the method used for accounting of CWT strays onto the spawning ground.
   iii. Solution: Review of escapement methods should be carried out within the next 3-5 years to evaluate where improvements are necessary.

4. Chinook and coho escapement CWT sampling
   i. Problem: Natural spawning areas are not adequately sampled.
   ii. Consequence: Biased or imprecise estimates of escapement result in biased and imprecise estimates of tagged escapement and ERs.
   iii. Solution: Review of spawning ground CWT sampling design, including identification of the distribution of straying CWTs (as opposed to distribution of natural origin spawners), should be conducted to define problem and evaluate where improvement is necessary.

Terminal area sampling specific issues

5. Nooksack Chinook escapement estimates.
   i. Problem: Nooksack escapement. Chinook escapement estimates are made using an expansion from index areas to total escapement. Index areas have changed in character and fish distribution, which may result in biased estimates of escapement in future. The expansion is based on estimates of total escapement from work done in 2000-2004.
   ii. Consequence: Biased or imprecise estimates of escapement result in biased estimates of tagged escapement.
   iii. Solution: Validate estimation of expansion using a mark-recapture study. Or develop a stratified random sampling approach without permanent index areas.

6. Nooksack sport fishery for fall Chinook.
   i. Problem: Sport fishery for fall Chinook since 2004 targeting hatchery fish (Samish fall indicator stock) is not consistently sampled.

ii. Consequence: Tagged fish not sampled and accounted for, resulting in bias in ERs.
iii. Solution: Sample sport fishery.

7. Samish fall Chinook terminal sport fishery estimation.
i. Problem: Sport fishery is not sampled.
ii. Consequence: Impacts to Samish fall double index tagged fish are not estimated which will result in bias estimate of total return of tagged fish
iii. Solution: Sample sport fishery.

8. Skagit Chinook escapement estimation method includes ground and flight surveys for estimation of total number of redds. There are several stocks with indicator tag groups in the system, including springs in the Suiattle, Cascade and upper Sauk, summers in the upper Skagit and Sauk, and falls in the lower Skagit.
i. Problem: Estimates for summer and fall stocks have inadequate numbers of flights and there is uncertainty as to redd life which is required for estimates using flight survey methods.
ii. Consequence: Imprecise or biased estimates of tagged escapement.
iii. Solution: Increase frequency of surveys currently done.

9. Skagit coho escapement estimation uses index areas expansion approach where expansion was estimated 16 years ago, and the index areas used represent <1% of total distribution of coho salmon.
i. Problem: Estimation method used subject to substantial bias.
ii. Consequence: Biased escapement estimates will result in biased estimates of total tagged cohort and ERs.
iii. Solution: Coho escapement MR study to develop new escapement method; either random stratified or new index area expansion. Use study to evaluate distribution and recover tags for new sample design for Skagit coho.

10. Skagit coho escapement is not sampled for CWTs
i. Problem: No sampling of coho escapement.
ii. Consequence: Biased estimates of tagged escapement.
iii. Solution: Require sampling from October through March. Index surveys cover only about 1-2% of total escapement.

11. Skagit sport fisheries include a coho fishery in Skagit and Lower Cascade which is not sampled.
i. Problem: Coho fishery in Skagit and Lower Cascade not sampled.
ii. Consequence: Coho tagged escapement underestimated.
iii. Solution: Sample coho fishery for tags.

12. Skagit coho returning to hatchery escape above hatchery at a rate of 5-50% of the fish depending on the years and are not accounted for in estimate of hatchery origin escapement.

i. Problem: Design of hatchery rack results in an inconsistent rate of fish escaping above hatchery. Consequently, hatchery sampling is inconsistent and incomplete.
ii. Consequence: Biased estimate of hatchery escapement of tagged fish.
iii. Solution: Improve rack into hatchery. Until then count and sample above the hatchery.

13. Chinook escapement estimation in the Stillaquamish.
    i. Problem: Chinook escapement estimated as total redd counts assuming all areas are covered by foot, float, or flight. Viewing conditions for redd counts from foot surveys and flights are not always optimum, resulting in minimum estimates of escapement in some years.
    ii. Consequence: Biased estimates of escapement.
    iii. Solution: Improve escapement methods. Rely more on foot surveys and increase survey frequency. Redd life estimates need to be improved.

14. Stillaguamish coho escapement estimation.
    i. Problem: The method used is an index area expansion to total using expansion from 1970’s. Method needs to be evaluated.
    ii. Consequences: Estimate is possibly biased.
    iii. Solution: Mark-recapture study is currently underway, for 3 years.

15. Snohomish Chinook escapement estimation. Total redd counts are made using ground surveys or flight surveys using redd life estimates and calculating total redds using area under the curve methods (AUC). Flight surveys are used for the Skykomish. Float surveys are used for the mainstem Snoqualmie; certain areas are missed in some years. Snohomish –The Pilchuk (Snohomish tributary) is surveyed by float methods and the upper Snohomish by flight.
    i. Problem: Estimates using AUC are subject to uncertainty that cannot be measured.
    ii. Consequence: Imprecise and biased estimates of total escapement lead to biased estimates of total CWT escapement.
    iii. Solution: Several options are possible for improvement of escapement estimation where flight surveys are currently used. 1. Flights could be increased and estimates of redd life could be improved. 2. Ground to flight expansion factors could be estimated. 3. Increase area coverage where ground surveys are used.

16. Snohomish Chinook escapement sample rates should be improved.
    i. Problem: Sampling rates for Chinook from the Snohomish are low.
    ii. Consequences: Imprecise estimates of number of tagged fish in escapement.
    iii. Solution: Increase sampling on Pilchuk and Lower Skykomish to improve sample size.

17. Wallace Hatchery has a large number of surplus Chinook carcasses that are not sampled (~10K).

i. Problem: Sample rate of total return is well under 100% in the hatchery
ii. Consequences: Skykomish indicator stock coming back to the Wallace hatchery are under sampled resulting in estimates of total return of tagged fish being imprecise.
iii. Solution: Increase sampling, and improve hatchery sample design.

18. Skykomish Chinook mark-selective fishery exploits a tagged stock that is a new PSC indicator stock.
    i. Problem: The sport fishery is not sampled for CWTs.
    ii. Consequence: Underestimate of tagged fish including indicator tag groups in the system.
    iii. Solution: Sample sport fishery

19. Snohomish coho escapement is subject to bias. There is a DIT in the Snohomish.
    i. Problem: Coho escapement is estimated using an index area to total expansion from 70's. Method needs to be evaluated.
    ii. Consequences: Estimate is possibly biased
    iii. Solution: Tulalip using BIA money to develop sample design for improving escapement method.

20. Snohomish coho sport fishery is not sampled. This represents a large coho fishery (7,300 coho in 2004).
    i. Problem: Wallace River hatchery has a DIT group and tagged fish harvested in sport fishery will not be estimated.
    ii. Consequence: Tag escapement underestimated for DIT group.
    iii. Solution: Sample sport fishery for tags.

21. Green River Chinook escapement sampling.
    i. Problem: Chinook escapement sampling. Currently not sampling below hatchery at Soos Creek. There is a DIT group returning to Big Soos Creek. There would also have to be an escapement estimate for Big Soos Creek. This estimate and sampling was done in the past but not currently. Some of the fish spawning in Big Soos may end up as carcasses in the mainstem. Also should review distribution of sampling in mainstem, relative to spawning distribution
    ii. Consequence: Underestimate tagged fish returning. Possible bias if mainstem sampling is not distributed in proportion to spawning.
    iii. Solution: Review distribution of hatchery fish that do not enter hatchery. Estimate escapement and sample in Big Soos Creek.

22. Big Soos Creek hatchery sampling.
    i. Problem: Fish escape upstream of the Big Soos Creek hatchery and are not sampled.
    ii. Consequence: Bias in estimate of tagged fish.
    iii. Solution: Replace weir for hatchery.

23. Green River Chinook escapement estimation.

i. Problem: Chinook escapement estimation needs review. Estimate using redd count surveys from flights and ground surveys. Use area/ground adjustments and expand from peak count to estimate total escapement. Currently using correction from years when had mark-recovery (MR) and redd count surveys. MR validations should be repeated systematically.
ii. Consequence: MR corrections can provide improvement in estimates, but could introduce bias if not validated on a consistent basis.
iii. Solution: Provide for MR study every 5 years for 2 years.

24. Green River coho escapement estimation.
i. Problem: Green river coho estimate of escapement. Escapement estimation for coho uses index areas with expansion to total. The expansion factor was estimated 25 years ago; the index used represents a small percentage of total distribution of coho salmon.
ii. Consequence: Biased escapement estimates will result in biased estimates of total tagged cohort and ERs.
iii. Solution: A coho escapement mark-recovery study is needed to develop a new escapement method; e.g., random stratified or new index area expansion. Use study to evaluate tag distribution and to help design a new sample method for Green River coho tag recovery.

25. Green river sport fishery for coho salmon.
i. Problem: Sport sampling inadequate; coho fishery in Green-Duwamish is not sampled.
ii. Consequence: Big Soos has a DIT stock that needs to be sampled, but returning tagged coho are underestimated.
iii. Solution: Sample coho fishery for tags.

26. Puyallup – White River. Indicator stock tagged at White River Hatchery
i. Problem: White River springs are trapped at the Buckley trap. Fish not taken into the White River Hatchery are counted and released above the dam. The method of counting is subject to bias (visual count by staff at dam). It is assumed that no tagged fish are released above dam, but this cannot be verified. There is no escapement estimate for fish in Lower White River below dam and no sampling of these fish.
ii. Consequence: Estimates of total escapement and tagged fish are probably biased.
iii. Solution: Improve sample design and methods used to count and sample White River fish at the dam. Survey and sample spring Chinook below the Buckley dam.

27. Skokomish Chinook escapement estimation.
i. Problem: Method used is redd count with marking of observed redds. In some areas redd counts may be biased low.
ii. Consequence: Estimate of escapement bias will result in biased estimates of ER.

iii. Solution: Validate estimation of escapement using mark recapture study.

28. Hood Canal coho escapement sampling.
    i. Problem: Escapement sampling in Hood Canal has increased, however there are no estimates of escapement for coho in most streams being sampled. The recovered tags cannot be expanded to total tagged fish in escapement.
    ii. Consequence: Estimates of total tagged return for George Adams hatchery and Big Beef Creek wild coho salmon are biased.
    iii. Solutions: Review escapement methods for Hood Canal streams and develop methods that allow estimation for streams surveyed.

29. Queets escapement estimation and sampling for coho and Chinook.
    i. Problem: Method used is a redd count, with index areas surveyed every year plus some supplemental areas. Carcasses are sampled for CWTs.
    ii. Consequence: Precision of estimates is currenly low.
    iii. Solutions: Increase frequency of surveys and the sample rate.

Data Reporting, Coordination and Validation

30. Reporting of escapement recovery and catch and sample data.
    i. Problem: Lack of standards for reporting spawning ground escapement estimates and sampling statistics.
    ii. Consequence: Error in reporting of estimated total and inaccurate estimates of tagged fish in escapement.
    iii. Solution: Standardized reporting statewide for purposes of CWT estimation and reporting.

Oregon Chinook and coho

Tagging issues - Chinook

1. Geographically disperse CWT release groups within Willamette basin.
    i. Problem: Release groups for both DIT and SIT groups have been spread throughout the basin with no historic consistency. Different release strategies (locations etc) for a single tag code.
    ii. Consequence: Incomplete sampling within basin at various release locations. Needed sampling programs exceed the allocated resources required for adequate sampling.
    iii. Solution: Confine release group(s) within narrow geographic range. Confine both DIT and SIT releases to one hatchery or co-location.
    iv. Cost: Additional costs are estimated at $86,000 annually.

2. Only one Chinook ER stock to represent entire OR coast.
    i. Problem: Salmon River is currently the only functional Chinook ER stock to represent OR coast.
    ii. Consequence: Lack of proper representation of Oregon Coast natural production stocks with differing geographic distribution and maturation schedule. About one third of the production of the Oregon Coast consequently

has no representation via an associated release group. Earlier maturation life histories are observed in the Mid-Oregon Coast compared to the Northern Oregon Coast aggregate.

iii. Solution: Elevate Elk River to proper position as ER stock, development of Mid Oregon Coast (MOC) indicators to include Coquille and South Umpqua escapement indicator stocks as representatives of the MOC Chinook aggregate.

iv. Cost: Annual costs to tag, release, monitor, and sample a functional MOC aggregate are estimated at $374,000 2007 US dollars.

Tagging Issues- Coho

3. Lack of CWT groups to represent all coho production regions.

i. Problem: There is a paucity of CWT coho release groups in Oregon.

ii. Consequence: Lack of representation of major production groups.

iii. Solution: Coho production facilities on the Oregon coast have been re-vamped in the recent past with agency prioritization on natural production groups over supplementation programs. Currently there are two coho DIT groups released in Oregon, one in the Sandy River and the other from the Rogue. Coho SIT releases originate from the Rogue, Nehalem, Rock Creek (Cow Creek stock from Umpqua), most all coho release groups in the Columbia have an index group. There is opportunity to begin wild-stock coho tagging in Columbia tributaries, although the majority of outmigrant coho smolts are currently being trapped on the Washington side of the river.

Sampling Issues

4. Inconsistent use of electronic sampling in ocean fisheries sampling of Buoy 10 in the Columbia River.

i. Problem: Ocean fisheries sampling electronically sampled for Spring Chinook and coho but not for Fall Chinook (use time of year to differentiate).

ii. Consequence: Recoveries from unmarked CWT fish not sampled.

iii. Solution: ODFW recognizes the need to modify sampling programs in the Columbia River.

5. Escapement monitoring in Willamette poorly coordinated.

i. Problem: No centralized overview of CWT sampling programs within the basin; unmarked fish not examined for tags at escapement.

ii. Consequence: Confounding of data, lack of consistency in reporting of data. Cannot use Willamette DIT recoveries to evaluate impact of MSF in Willamette on unmarked fish.

iii. Solution: Provide overview of basin's sampling. Statewide workgroups to provide overview of regional CWT sampling and reporting responsibilities have been initiated and both Columbia River and Marine Regional groups have already convened. Other regional workgroups dealing with specific monitoring and reporting needs are planned and will help to provide understanding to regional authorities. Additional escapement and terminal fisheries monitoring would require the re-allocation of scarce resources within regional districts. Cost estimations as to what needed sampling programs (a full-basin creel sampling program and additional spawning ground sampling) have been initiated, but genuine estimates are not available at this time. ODFW has committed to providing needed facilitation and direction both within the Willamette basin and statewide.

Data Reporting, Coordination, and Validation

6. Data reporting for Willamette ER stock.
   i. Problem: Estimates for data expansion for Willamette sport catch and escapement are not provided to the RMIS database. Expansion and analysis takes place externally to RMIS.
   ii. Consequence: Data residing on RMIS are not representative of agency estimates of catch and escapement.
   iii. Solution: Report expanded Willamette sport and escapement data to RMIS. As part of a larger state-wide data reporting system overhaul in the summer of 2007, this issue is slated to be addressed.
   iv. Cost: This is estimated to cost about $10,000.

7. CWT release reporting.
   i. Problem: Updated information available through preliminary (August) and annual reports (March) to PSMFC. Only available records are entered. Data quality checks and training opportunities are limited. Many groups remain unreported from regional biologists for several months.
   ii. Consequence: Timeliness of data reporting compromised.
   iii. Solution: Timelines for reporting of data and deadlines shared within agency.

8. CWT recovery data.
   i. Problem: Sampling programs separate data from physical snout samples. Tags are decoded and re-associated with recovery data by third party, i.e., CWT data base coordinator. This practice leads to "missing" data, because (1) neither party is aware of what constitutes a "complete" data set and (2) high likelihood of substantial time lag (months, sometime years) between data collection and reporting compounds difficulty to retrieve missing data from field staff.
   ii. Consequence: Data are lost; tags cannot be tied to sample information (e.g., strata information) and are rejected by RMIS.
   iii. Solution: Tie physical snout samples to biological data collected at time of sampling. A statewide "snout tag" distributor has been established who is responsible for centralized disbursement and tracked collection of both snouts and data tags. ODFW is confident that with the advent of the centralization of this responsibility, the problem can be overcome.

9. DIT reporting problems.
   i. Problems: There are problems with the way DIT groups have been reported to RMIS from ODFW.
   ii. Consequence: The DIT data is confounded.
   iii. Solution: Being worked on.

Columbia River Chinook

Tagging Issues

1. Hanford wild tagging.
   i. Problem: In some years, environmental conditions limit ability to collect enough fish to tag to reach 200,000 standard.
   ii. Consequence: Number of recoveries generated is less than needed and precision suffers.
   iii. Solution: Additional resources for tagging effort.

2. Hatchery groups representing wild groups.
   i. Problem: Hatchery tag groups may not adequately represent wild groups of interest.
   ii. Consequence: Estimates of impacts on wild groups may be biased.
   iii. Solution: Establish wild stock tagging program where feasible.

3. Lack of representative tagging.
   i. Problem: Chinook tagging downstream of Bonneville Dam discontinued beginning 2006 due to budget reductions.
   ii. Consequence: Stocks are not adequately represented.
   iii. Solution: Reinstitute tagging program.
   iv. Cost: An additional $116,000 annually.

4. Lower Columbia DIT groups.
   i. Problem: Mass marked hatchery groups representing wild production.
   ii. Consequence: CWT groups no longer representative of wild production.
   iii. Solution: Expand the size and number of DIT groups. Tagging levels should be increased where tag recoveries goals are not met. Lower Columbia tule production groups have been DIT tagged with 200K marked and tagged group and 200K tagged group for the first time in 2007.
   iv. Cost: This has come at a cost of $90,000 for this release group.

Sampling Issues

5. Direct sales to public.
   i. Problem: Fish sold directly to the public by treaty fishermen are not sampled.
   ii. Consequence: Incomplete sampling, non-representative sampling, lost information, and potential bias in estimates.
   iii. Solution: Equip samplers with appropriate gear to collect tags.

6. Mainstem Recreational Fisheries.
   i. Problem: Up to 25% of strata representing 37-60% of the catch is sampled at a rate <20%.
   ii. Consequence: Incomplete sampling.
   iii. Solution: Additional resources.

7. Tributary Fisheries.

i. Problem: Low sampling or no sampling due to resources prioritized to the larger fisheries.
ii. Consequence: Incomplete sampling.
iii. Solution: Additional resources.

8. Mark-Selective Fisheries.
   i. Problem: Difficult to estimate numbers of released fish and release mortality. Differential mortality of marked and unmarked groups.
   ii. Consequence: Sampling not representative of impacts on unmarked groups. Bias in total mortality estimate.
   iii. Solution: Consider functional DIT group. Additional sampling coverage in fisheries and escapement. An additional DIT group of tule-origin Chinook will be released from Big Creek beginning spring of 2007. Sampling programs to allow for sufficient DIT representation will need to be in place to allow for unbiased assumptions to be made from the subsequent DIT analysis.
   iv. Cost: This costs an additional $90,000 annually for marking activities.

9. Hatchery sampling.
   i. Problem: Samplers not available at all times because of higher sampling priorities.
   ii. Consequence: Increased uncertainty in hatchery production estimates.
   iii. Solution: Requires that subsampling is accounted for in expansion of tagged recoveries. Additional resources are needed.

10. Escapement sampling.
   i. Problem: Inadequate or no sampling. There is potential size selectivity in carcass sampling.
   ii. Consequence: Increased uncertainty in natural production estimates
   iii. Solution: Additional resources needed. Sampling programs need to be designed to representatively cover spawning areas.

11. Columbia River Commercial harvest expansions.
   i. Problem: Commercial landings are expanded from poundage records tied to biological sampling. A true fish count does not occur.
   ii. Consequence: Increased uncertainty in estimates may be introduced, and subsequent variance around the point estimate will be dependent upon the sampling rate.
   iii. Solution: Report numbers of fish as well as poundage. ODFW believes this to be logistically difficult and fiscally prohibitive. This could be a more accurate method than trying to get a fish by fish count. There is a powerful incentive for both the buyer and fisher to provide as precise of a poundage estimate as possible. The variance associated with the catch estimate is more dependent on biological information (weight per fish) than other drivers.

12. Visual sampling in mainstem Columbia net and sport fisheries. (same as above)

i. Problem: Mark-selective Columbia net and sport fisheries (spring Chinook, summer Chinook, coho) are sampled electronically, but the fisheries for fall Chinook are not electronically sampled because they are non-selective.
ii. Consequence: Adequate sampling for recoveries of fall Chinook more difficult as proportion of clipped untagged fish increases.
iii. Solution: Consider electronic sampling for fall Chinook. Electronic sampling for fall Chinook is likely in the near future below Bonneville.

13. Columbia River creel sampling issues.
    i. Problem: Sampling program has not kept up with the development of summer recreational fisheries on Columbia River. Sampling is non-representative as some strata are sampled and other strata are not sampled. Catch sample rates may be lower in developing fisheries.
    ii. Consequence: Bias of estimates of sport fisheries catch.
    iii. Solution: Increase sampling given appropriate funding.

Data Reporting, Coordination and Validation

14. Inter-agency tag recovery and reporting.
    i. Problem: Multiple agencies sampling same fishery or escapement area.
    ii. Consequence: Potential confusion, incomplete data.
    iii. Solution: Inter-agency agreement/plan on sampling.

Columbia River Coho

Tagging Issues

15. Hatchery groups representing wild groups.
    i. Problem: Hatchery tag groups may not adequately represent wild groups of interest, especially in mark-selective fisheries.
    ii. Consequence: Estimates of impacts on wild groups may be biased.
    iii. Solution: Establish wild stock tagging program where feasible. A preliminary wild-group tagging effort could be engaged in either the Clackamas and or Sandy production basins. A collaborative effort between state, federal and industry groups could feasibly tag about 20K outmigrant coho, but costs would likely be prohibitively high to allow for mobile tagging crews to follow each of the screw-trap operators in these basins. An estimated 50k smolts would be available for tagging between Cedar Creek and Cowlitz basins on the Washington side of the Columbia. Additional groups of juveniles would be available through collaboration with Washington. Groups of interest on the lower Columbia would be much more logistically challenging to provide wild-stock tagging

Sampling Issues

16. Mainstem Recreational Fisheries.
    i. Problem: Up to 28% of strata representing 59-85% of the catch is sampled at a rate <20%.
    ii. Consequence: Incomplete sampling, bias estimates.
    iii. Solution: Additional resources need to increase sampling.

17. Tributary Fisheries.
    i. Problem: Low sampling or no sampling in tributaries since resources are prioritized to larger fisheries. Catch in most tributary areas is small but stock specific.
    ii. Consequence: Incomplete sampling, bias estimates.
    iii. Solution: Additional resources needed to increase sampling.

18. Mark-Selective Fisheries.
    i. Problem: Difficult to estimate number of released fish and the release mortality. Differential mortality of marked and unmarked groups.
    ii. Consequence: Sampling is not representative of impacts on unmarked groups. Bias in total mortality estimate.
    iii. Solution: Consider functional DIT group.

19. Hatchery sampling.
    i. Problem: Samplers not available at all times.
    ii. Consequence: Bias in escapement estimates.
    iii. Solution: Additional resources needed to provide more samples.

Data Reporting, Coordination and Validation

20. Inter-agency tag recovery and reporting.
    i. Problem: Multiple agencies sampling same fishery or escapement area.
    ii. Consequence: Potential incomplete data if there is no interagency coordination.
    iii. Solution: Inter-agency agreement/plan on sampling.

California Chinook

Tagging Issues - Chinook

1. Variable marking of fall run hatchery production.
    i. Problem: Fall run production is not consistently or representatively tagged.
    ii. Consequence: Unable to determine hatchery and natural contribution to the ocean fisheries and escapements.
    iii. Solution: Mark a constant fraction (25%) of the California (IGH & Central Valley hatcheries) fall run production.

2. Many streams have no CWT groups representing their production.
    i. Problem: Yuba River and other Central Valley and coastal tributaries currently have no CWT release groups representing them in the fisheries.
    ii. Consequence: Lack of proper representation of California stocks with differing geographic distribution and maturation schedule.
    iii. Solution: Develop marking and release strategies in hatcheries that would mimic the life history of the wild Chinook stocks.

3. Natural stocks in many tributaries have no CWT groups representing their production.

i. Problem: Wild tagging requires the use of half tags and half tags are difficult to detect with current electronic sampling.
ii. Consequence: Tags are missed and estimates of CWT returns are underestimated.
iii. Solution: Develop hatchery surrogates to represent wild Chinook stock population parameters. Develop GSI methodologies in coastwide fishery sampling to fill the gap created by electronic sampling. Use new small tags that are easier to read but more expensive.

Sampling Issues - Chinook

4. Non-representative sampling of the ocean commercial harvest.
    i. Problem: Management needs finer stock composition detail by catch area.
    ii. Consequence: Inferences of the catch and effort can be made only for large areas.
    iii. Solution: Improve reporting of ocean catch area block number.

5. Non-representative sampling of the ocean commercial harvest.
    i. Problem: Fish landed by freezer boats are not separated into catch from specific management areas.
    ii. Consequence: Inferences of catch and effort from these boats are difficult to make.
    iii. Solution: Seek regulations to enforce separation of catch by management area, or provide on-board samplers, or implement a Vessel Monitoring System with onboard GSI/CWT sampling.

6. Incomplete or no sampling of Central Valley (CV) and coastal inland recreational fisheries.
    i. Problem: The Central Valley river recreational Chinook fishery harvests a large number of the annual CV terminal run that is not consistently sampled for CWT recoveries or catch and effort.
    ii. Consequence: Assumptions have to be used about this fishery which can be erroneous from year to year.
    iii. Solution: Develop and implement a fishery sampling plan to estimate total catch, effort, and CWT contribution to the Central Valley recreational Chinook salmon fishery.

7. Insufficient or no sampling of Central Valley (CV) and coastal escapement.
    i. Problem: Some Central Valley tributaries and most all CA coastal streams have incomplete or no escapement surveys.
    ii. Consequence: Inconsistent or no escapement estimates and CWT monitoring.
    iii. Solution: Develop and implement a CV and CA coastal escapement sampling plan to estimate total escapement and CWT contribution to these streams.

8. Constant fractional marking of Central Valley fall-run salmon will increase the number of heads being recovered in fisheries and inland monitoring programs.

i. Problem: Increased adipose fin clip rate in the fishery increases the number of heads collected by the Department. Commercial buyers are increasingly reluctant to allow sampling due to weight of fish heads removed and an increasing fraction of the heads have no tags resulting in no data for the cost and effort of sampling.
ii. Consequence: Less cooperation by the commercial buyers and increasing difficulty in maintaining proper sampling rates of commercial landings.
iii. Solution: Improve enforcement of sampling and CWT collection laws.

9. Constant fractional marking of Central Valley fall-run salmon will increase the number of heads being recovered in fisheries and inland monitoring programs.
   i. Problem: Increased adipose fin clip rate in the fishery increases the number of heads collected by the Department.
   ii. Consequence: Additional staff will be required to collect and process the additional workload.
   iii. Solution: Additional funding and staffing will be required. Seek funding through the Department BCP process and CALFED funds to supply additional staff and equipment needed.

Issues with Estimation of Total Harvest or Escapement

10. Uncertainty in estimates of sport catch associated with private access areas.
    i. Problem: Fish landed by private access boats are not sampled.
    ii. Consequence: Uncertainty of inferences of catch and effort from these boats are difficult to estimate.
    iii. Solution: Implement a pilot sampling program to determine the degree of uncertainty if any associated with making inferences about their catch and effort.

11. Unknown bias associated with spawning escapement survey methodologies.
    i. Problem: Carcass surveys for estimation of total Chinook escapement have unknown size, stock, and sex bias.
    ii. Consequence: Natural spawning escapement estimates do not represent the real escapement numbers.
    iii. Solution: Implement counting weirs to measure bias in specific Chinook salmon surveys (Upper Sacramento River, Feather River).

12. Unknown bias in estimates of age structure.
    i. Problem: Age structure of the Central Valley stocks is currently determined by length frequency and designates only two general size classes: grilse and adults.
    ii. Consequence: Inaccurate age class estimates cause the accuracy of the Central Valley Index to be highly variable and unreliable.
    iii. Solution: Implement and fund age determination program for Central Valley escapement.

13. Lack of organized oversight to Central Valley salmon escapement monitoring.

i. Problem: No organized oversight of Central Valley escapement monitoring.
ii. Consequence: Inefficient use of resources and a shotgun approach to addressing monitoring needs
iii. Solution: Develop agency oversight on funding priorities to improve the consistency of escapement monitoring.

Data Reporting, Coordination and Validation

14. Estimation methodologies.
    i. Problem: Lack of technical oversight and review of sampling methods and estimation methodologies.
    ii. Consequence: Unknown bias of escapement estimates.
    iii. Solution: Implement a program to review sampling and estimation methodologies.

15. Data reporting.
    i. Problem: Inconsistent reporting on state wide CWT releases and recoveries.
    ii. Consequence: Not all of the California data is available on the RMIS system.
    iii. Solution: Provide agency oversight and positions that would be responsible for submitting all California CWT and catch/effort data to PSMFC.

16. Data reporting.
    i. Problem: Management needs finer detailed catch area stock composition and effort data for ocean fisheries.
    i. Consequence: Limited inferences on stock composition.
    ii. Solution: Develop methods for verifying area-of-catch for CWT recoveries to allow for finer resolution of reporting than is currently possible.

California Coho

Sampling Issues - Coho

17. Incomplete or no sampling of coastal recreational fisheries.
    i. Problem: The coastal recreational salmon fisheries catch and release (no directed take allowed of ESA listed stocks) an unknown number of the annual coho escapement that is not consistently sampled for CWT recoveries or catch and effort.
    ii. Consequence: Assumptions have to be used about this fishery which can be erroneous from year to year.
    iii. Solution: Develop and implement a fishery sampling plan to estimate total catch, effort, and CWT contribution to the inland coastal recreational salmon fishery.

18. Incomplete or no sampling of coastal coho salmon escapement.
    i. Problem: Inadequate or no sampling of California coastal streams.
    ii. Consequence: Increased uncertainty in natural production estimates.
    iii. Solution: Additional resources are needed to improve sampling. Sampling program needs to be designed to representatively cover spawning areas.

Appendix B. Specifications for a Prototype Tool Evaluating Alternative Sampling and Marking Strategies for Coded-Wire-Tag (CWT) Studies[4]

At the May CWT workgroup session, discussion centered on the development of a CWT planning tool that would help evaluate the implications and consequences of implementing various actions taken by jurisdictions coastwide to improve the CWT program. A small subgroup (Marianna, Gary, Annette, Norma) convened to further discuss desired attributes of a tool specifically designed to provide information to help plan and evaluate alternative measures to improve the quality of data that can be derived from CWT experiments. This draft reflects Gary's attempt to summarize the results of the subgroup deliberations; an auxiliary Excel workbook, *CWTToolTemplate.xls,* contains examples of various formats that could be employed in the tool.

Purpose:

> Provide a Tool to facilitate exploration and evaluation of the coast-wide effects of alternative sampling and marking strategies on selected statistics derived from cohort analyses of CWT experiments.

Language & Platform:

> MS Visual Basic (Net). PC Windows OS

Structure:

<u>Species:</u> Chinook and coho salmon

<u>General Description.</u> The Tool will integrate the following components:

- (a) FRAM-type, multi-stock, multi-fishery simulations to generate CWT recoveries of indicator stocks which would be expected to result from changes in fishing patterns, sampling rates, and marking levels;
- (b) databases of indicator stocks containing the data utilized by the PSC Chinook (CTC) and Coho (CoTC) technical committees to perform cohort analyses for selected indicator stocks;
- (c) a set of user-defined *packages* of alternative CWT sampling programs for individual fisheries and marking levels for individual indicator stocks;
- (d) a module that adjusts historical observations of CWT recoveries of indicator stocks to reflect expected impacts of implementing specific sampling and marking packages;

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[4] Gary S. Morishima, July 2006

(e) a module that performs cohort analyses on the indicator stocks and computes selected statistics that describe the effects of the packages on statistical uncertainty of CWT-based statistics;
(f) a *goal seeking* module designed to provide answers to a limited set of specific tagging and sampling questions; and
(g) user interfaces to define/select options and examine expected results.

The functions of the Tool would be accessed via a system of menus. The main menu would depict the following options:

Define Scenarios	Select Scenarios	RUN	Results	ASK

Define Scenarios

The Define Scenarios button enables the user to define packages of alternative fisheries, sampling regimes, and tagging levels. Clicking on the Define Scenarios would depict the following options

Fisheries	Sampling	Tagging	Risk

Selecting the *Fisheries* button would display the familiar FRAM input form used to provide specifications for individual fishery strata (quota, harvest rate scalar, mark selective, etc.)

Selecting the *Sampling* button would display an input screen to define a sampling scenario. After definition, the scenario would be saved in a database. - see worksheet *FishSampling* in *CWTToolTemplate.xls*.

Selecting the *Tagging* button would display an input screen to define alternative tagging levels for a given stocks - see worksheet *TaggingLevels* in *CWTToolTemplate.xls*. After definition, the scenario would be saved in a database.

Selecting the *Risk* button would display an input screen to describe acceptable levels of uncertainty surrounding a statistic of interest for the purpose of establishing a target ER. For example, the user could specify that the management objective would be to ensure that there is no greater than a y% chance that the ER on a given stock would not exceed X%. See worksheet *RiskDefn* in *CWTToolTemplate.xls*. After definition, the scenario would be saved in a database.

Select Scenarios

The Define Scenarios button enables the user to define packages of alternative fisheries, sampling regimes, and tagging levels. Clicking on the Define Scenarios would depict the following options:

Sampling   Tagging   Risk

Selecting the *Sampling* button would display a system of pull down menus for individual fisheries to allow the user to select from defined sampling scenarios for each FRAM fishery. A single click on a particular scenario would display a summary description. A double click would select the sampling scenario. See worksheet *Sampling* in *CWTToolTemplate.xls*.

Selecting the *Tagging* button would display a system of pull down menus to allow the user to select from defined tagging scenarios for each FRAM stock. A single click on a particular scenario would display a summary description. A double click would select the tagging scenario. See worksheet *Tagging* in *CWTToolTemplate.xls*.

Selecting the *Risk* button would display a system of pull down menus to allow the user to select from defined risk scenarios to evaluate. A single click on a particular scenario would display a summary description. A double click would select the risk scenario. See worksheet *Risk* in *CWTToolTemplate.xls*.

Run

The *Run* button initiates a simulation run. A sequence of events would be triggered: (1) the user-selected packages for evaluation and the fishery specifications would be saved in a *.cmd*-type file familiar to FRAM users; (2) fisheries would be simulated; (3) sampling and tagging packages would be employed to estimate CWT recoveries by stock and fishery strata; (4) cohort analysis would be performed and uncertainty statistics would be computed; and (5) results would be saved for generation of output reports. A general schematic is presented in fig 1 below.

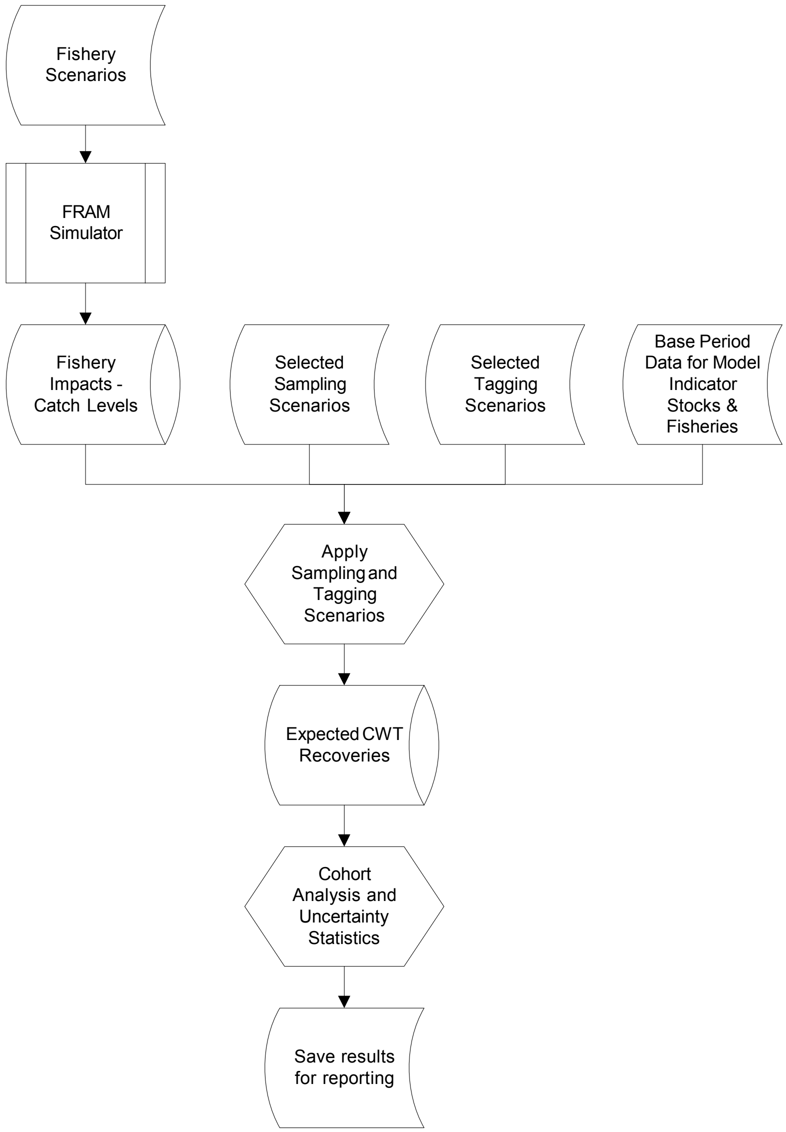

Fig 1. Schematic for Run Button

Estimated CWT recoveries

The expected CWT recoveries are computed by step 3 (the top hexagon) by taking into account changes in stock composition, sampling rates and marking levels from the FRAM base period. Expected CWT recoveries are simply the estimated CWT recoveries during the Base Period multiplied by four scalars as indicated below:

$$ECWT_{s,a,f,t} = BPCWT_{s,a,f,t} * \frac{Catch_{f,t}}{BPCatch_{f,t}} * \frac{StkComp_{s,a,f}}{BPStkComp_{s,a,f}} * \frac{SampRate_{f,t}}{BPSampRate_{f,t}} * \frac{Tags_s}{BPTags_s}$$

where:

$ECWT_{s,a,f,t}$	Estimated CWT Recoveries for stock s, age a, in fishery f, time period t
$BPCWT_{s,a,f,t}$	Estimated CWT Recoveries for stock s, age a, in fishery f, time period t during the model base period
$Catch_{f,t}$	Projected total catch in fishery f, time period t
$BPCatch_{f,t}$	Estimated total Base Period catch in fishery f, time period t
$StkComp_{s,a,f}$	Projected proportion of catch in fishery f, time period t, comprised of stock s, age a fish
$BPStkComp_{s,a,f}$	Estimated proportion of base period catch in fishery f, time period t, comprised of stock s, age a fish
$SampRate_{f,t}$	Specified catch sampling rate in fishery f, time period t
$BPSampRate_{f,t}$	Base period catch sampling rate in fishery f, time period t
$Tags_{s}$	Specified tagging level for stock s
$BPTags_{s}$	Base period tagging level for stock s

The first scalar is the ratio between the simulated catch under the proposed regulations and the catch during the model base period. For example, if the simulated catch is half the base period level, then the expected CWT recoveries would simply equal half the estimated CWT recoveries during the Base Period, all else being equal.

The second scalar is the ratio between the simulated catch composition under the proposed regulations and the catch composition during the model base period. This scalar is included because the stock composition would be expected to change from the Base Period as the simulation progresses through time.

The third scalar is simply the ratio between the catch sampling rate specified in the selected sampling package scenario and the catch sampling rate reported during the model base period.

The fourth scalar is simply the ratio between the tagging level specified in the selected tagging scenario and the tagging level reported during the model base period.

<u>Cohort Analysis</u>

Because FRAM is designed to operate for a single season, different procedures would need to be employed for Chinook and coho.

Coho: Fishery exploitation of coho salmon occurs predominantly during the last few months of ocean residence. Consequently, a normal cohort analysis can be performed using data generated by FRAM.

Chinook. Because fisheries in a single year exploit multiple broods of mature and immature Chinook, estimates of fishery impacts generated by FRAM will not form a suitable basis for routine cohort analysis based on reconstruction methods. Two alternative forms of pseudo cohort analyses could be applied, however. In one alternative, age-specific cohort sizes would be computed based on base period maturation rates, estimated mortalities and escapements.

$$Cohort_{s,a} = \frac{TermFishingMortalities_{s,a} + \dfrac{Escapement_{s,a}}{\Pr eSpawnSurvRate_{s,a}}}{MatRate_{s,a}} + \Pr eTermFishingMortalities_{s,a}$$

where:

$Cohort_{s,a}$	Estimated Pre-Fishery cohort size for stock s, age a
$TermFishingMortalities_{s,a}$	Estimated catch and incidental fishing mortalities in terminal fisheries stock s, age a
$Escapement_{s,a}$	Estimated spawning escapement for stock s, age a
$\Pr eSpawnSurvRate_{s,a}$	Assumed post-fishery, pre-spawning survival rate for stock s, age a
$MatRate_{s,a}$	Base period maturation rate for stock s, age a
$\Pr eTermFishingMortalities_{s,a}$	Estimated catch and incidental fishing mortalities for stock s, age a

Alternatively, mortalities in preterminal fisheries could be expressed in adult equivalents and an initial adult equivalent cohort size could be computed for use in cohort analysis.

$$\mathrm{AEQCohort} = \sum_{a} \frac{\mathrm{TermFishingMortalities}_{s,a} + \dfrac{\mathrm{Escapement}_{s,a}}{\mathrm{PreSpawnSurvRate}_{s,a}}}{\mathrm{MatRate}_{s,a}} + \sum_{a} \mathrm{PreTermFishingMortalities}_{s,a} * \mathrm{AEQ}_{s,a}$$

where: $\mathrm{AEQ}_{s,a}$ = Adult Equivalence Factor for preterminal fisheries for stock s, age a.

ERs – Statistics of Interest

The effects of alternative sampling programs and tagging levels on the uncertainty surrounding CWT-based statistics can be evaluated through the concepts of bias and precision surrounding estimates of ERs. Bias is commonly expressed as the squared difference between the CWT-based estimate of ERs and the true ER. Precision is commonly expressed in terms of variance.

Uncertainty has been defined by SFEC as the squared difference expected values of the reflected by the MSE statistic (SFEC 2002):

$$\sum_{f} (TrueER_{s,a,f} - EstER_{s,a,f})^2 + Variance(EstER_{s,a,f})$$

While it is not possible to estimate the true ERs and variances surrounding those estimates without knowing the true values of both the ER and the stock composition of the populations exploited by various fisheries, true catches, and true sampling rates, Bernard and Clark provide a means of approximating those variances (Bernard et al. 1998).

Two cohort analyses would be performed for each stock using different data sets. One data set would consist of FRAM estimates of CWT recoveries under the selected sampling and marking scenarios. The second data set would consist of FRAM estimates of catches and incidental fishing mortalities of a model stock divided by the Production Expansion Factors (PEFs) associated with the CWT group, adjusted for marking levels.

$$AdjFRAMmorts_{s,a,f,t} = \frac{FRAMmorts_{s,a,f,t}}{PEF_s * \frac{Tags_s}{BPTags_s}}$$

where:

$AdjFRAMmorts_{s,a,f,t}$	FRAM estimates of mortalities for stock s, age a, in fishery f, time period t, adjusted so magnitude is comparable to CWT release size under selected tagging scenario
$FRAMmorts_{s,a,f,t}$	FRAM estimates of mortalities for stock s, age a, in fishery f, time period t represented by the CWT release group
PEF_s	Production Expansion Factor for CWTs from stock s during the model base period
$Tags_s$	Specified tagging level for stock s
$BPTags_s$	Base period tagging level for stock s

ERs computed using the second dataset would represent "true" values for comparison with estimates generated from cohort analysis using the CWT recovery data set. Using Bernard and Clark's formulas, estimates of ERs and associated variances can be computed for these two datasets.

Results

Selecting the *Results* button would allow the user to select from a set of pre-formatted reports or to generate custom reports, similar to the capacity already incorporated into FRAM.

Ask

Selecting the *Ask* button from the main menu would enable the user to use the tool to ask for advice concerning certain common aspects of CWT experimental design:

(1) How many CWTs should be applied?

(2) What sampling rate should be used?

(3) Where should sampling funds be allocated to get the best estimate of the statistic of interest?

Constructing the Tool:

Steps to take:

(a) Put together the set of statistical methods (algorithms) to quantify the effect of marking levels and sampling programs on uncertainty, expressed in terms of accuracy and precision. These algorithms should focus on a limited set of questions such as: (1) age-specific ERs; (3) total fishery ERs on a brood.

(b) Identify data requirements for the algorithms:

- Marking/Tagging history by production region
- Historical profiles of fishery-related mortalities for major stock groups
- Historical CWT-based estimates of survival rates to catch + escapement
- Expected juvenile mortality pre-ocean entry (e.g., historical estimates of downstream juvenile passage mortalities by stock and dam)
- Post-fishery, pre-spawning mortality rates (e.g, historical estimates of upstream adult passage mortalities by stock and dam)
- Marking (CWT, clipping, both) costs per thousand fish
- Sampling requirements and costs by fishery
- Sampling costs for escapements (likely, stock-specific)
- Parameters for estimation of non-catch mortality (e.g., release mortality, drop-off, unmarked-retention error, mark recognition error)

(c) Collaborate with agency decision-makers to identify metrics that would best inform their decisions.

(d) Design the Tool, develop detailed specifications, & collate the data required for parameterization/evaluation.

(e) Construct, validate, and test the Tool.

Appendix C. Equations used in construction of a simple decision-theoretic model (Chapter 6)

Let

R	=	the number of tags released for a single stock,
S	=	the survival rate of tagged fish to the age 2 cohort,
ER	=	the fishery brood ER,
s	=	the fishery sampling rate,
T	=	the number of tags recovered in the fishery,
T_0	=	the target number of tags desired to be recovered in the fishery, and
α	=	the assurance level, i.e. the probability that at least T_0 tags will be recovered.

Assume that tags are independent so that T is a binomial random variable where each released tag has the same probability of being recovered in the fishery ($p = S*ER*s$). If T_0 is the target number of tags to be recovered in the fishery to meet precision criteria, then

$$P(T \geq T_0) = 1 - P(T < T_0) \cong 1 - P\left(Z < \frac{T_0 - Rp}{\sqrt{Rp(1-p)}}\right)$$

so that

$$P(T \geq T_0) = \alpha \Rightarrow P\left(Z < \frac{T_0 - Rp}{\sqrt{Rp(1-p)}}\right) = 1 - \alpha \Rightarrow$$

$$\frac{T_0 - Rp}{\sqrt{Rp(1-p)}} = \Phi^{-1}(1-\alpha).$$

where Φ^{-1} is the inverse of the standard normal cumulative density function.

From this we get the quadratic equation:

$$(T_0 - Rp)^2 = \left[\Phi^{-1}(1-\alpha)\right]^2 Rp(1-p) \Rightarrow$$

$$T_0^2 + R^2p^2 - 2T_0Rp - \left[\Phi^{-1}(1-\alpha)\right]^2 Rp + \left[\Phi^{-1}(1-\alpha)\right]^2 Rp^2 = 0$$

This equation can be solved for tagging level (release numbers R) given some recovery rate p, or it can be solved for the necessary recovery rate p given some release number R. In the second case, once p is determined, it can be used to solve for the appropriate sampling rate (s) given an expected survival and ER.

Tagging Level

Given a tag recovery rate $p = S*ER*s$, the following equation can be solved for the necessary tagging release level for a single stock:

$$R^2p^2 - 2T_0Rp - \left[\Phi^{-1}(1-\alpha)\right]^2 Rp + \left[\Phi^{-1}(1-\alpha)\right]^2 Rp^2 + T_0^2 =$$
$$R^2p^2 + R\left(\left[\Phi^{-1}(1-\alpha)\right]^2 p^2 - 2T_0p - \left[\Phi^{-1}(1-\alpha)\right]^2 p\right) + T_0^2 \Rightarrow$$

$$R = \frac{-\left(\left[\Phi^{-1}(1-\alpha)\right]^2 p^2 - 2T_0p - \left[\Phi^{-1}(1-\alpha)\right]^2 p\right) \pm \sqrt{\left(\left[\Phi^{-1}(1-\alpha)\right]^2 p^2 - 2T_0p - \left[\Phi^{-1}(1-\alpha)\right]^2 p\right)^2 - 4p^2T_0^2}}{2p^2}.$$

Sampling Level

Given a certain tagging level, the following equation can be solved for the necessary sampling rate for an expected survival and ERs:

$$R^2p^2 - 2T_0Rp - \left[\Phi^{-1}(1-\alpha)\right]^2 Rp + \left[\Phi^{-1}(1-\alpha)\right]^2 Rp^2 + T_0^2$$

$$= p^2\left(R^2 + \left[\Phi^{-1}(1-\alpha)\right]^2 R\right) - p\left(2T_0R + \left[\Phi^{-1}(1-\alpha)\right]^2 R\right) + T_0^2 \Rightarrow$$

$$p = \frac{\left(2T_0R + \left[\Phi^{-1}(1-\alpha)\right]^2 R\right) \pm \sqrt{\left(\left(2T_0R + \left[\Phi^{-1}(1-\alpha)\right]^2 R\right)\right)^2 - 4\left(R^2 + \left[\Phi^{-1}(1-\alpha)\right]^2 R\right)T_0^2}}{2\left(R^2 + \left[\Phi^{-1}(1-\alpha)\right]^2 R\right)}$$

with

$$s = \frac{p}{S * ER}.$$

In both cases, for the tagging level and the sampling rate, the positive root provides the correct solution. Figure 6-4 shows sampling rates necessary given a 200,000 release size for different exploitation and survival rates.

Using Tool to Minimize Cost

Given an assurance level α, an expected survival S and ER ER, one can use the above equations to identify the tagging/sampling needs that will minimize the cost to achieve α. To see this, one can optimize on either the sampling rate s or on the tagging rate R since either can be written as a function of the other. Let R be written as a function of s, $s = f(R)$. Then if the costs can be identified per unit of tagging and sampling, say C_R and C_s, the total cost for any combination of R and s for a single tag group and fishery is:

$$C = BT + C_R*(R - BSR)*100 + BS + C_s*(s - BSs)*100$$
$$= BT + C_R*(R - BSR)*100 + BS + C_s*(f(R) - BSs)*100$$

where

C	=	total cost
BT	=	baseline cost of tagging program (equipment, minimum staff, etc.)
C_R	=	cost per tag

R	=	number of tags
BSR	=	number of tags included in baseline cost of tagging program
BS	=	baseline cost of sampling program for minimum sampling rate
C_s	=	cost per additional sampling rate unit
s	=	desired sampling rate
BSs	=	sampling rate covered by baseline cost of sampling program.

Finding the tagging level that minimizes the square of this function that will minimize the cost is the solution to:

$$\frac{d}{dR}(C)^2 = 0.$$

Solving this equation for R will yield the optimum tagging rate and through the function $s=f(R)$ the optimum tagging/sampling rate combination.

This tool can be used with multiple fisheries and multiple stocks by expanding the cost equation. A simple but general-purpose expansion might be created under the assumption that the costs are the same for a number of stocks and fisheries.

$$C = (BT+C_R*(R- BSR)*100)*(\text{\# of sto cks}) + (BS + C_s*(f(R) -BSs)*100)*(\text{\# of fisheries}).$$

Appendix D. Summary of Indicator Stocks

D.1 PSC Indicator Stock Program

The PST specified that the parties maintain an ER indicator stock program to provide the Chinook and Coho technical committees with information from each production area for the annual evaluation of fisheries and to forecast future harvest impacts. The intent was to utilize these indicator stocks to monitor and evaluate the effectiveness of the management measures agreed to by the PSC. The indicator stock programs provide information needed for cohort and ER analyses for wild and hatchery coho and Chinook salmon.

In 1985, the CTC and CoTC of the PSC initiated the Chinook and Coho indicator stock programs. Stocks that were representative of particular basins, MUs, or the larger production regions were to be included in the programs based upon the following guidelines.   ER indicator stocks were to be chosen based on the following criteria (Morishima 1986):

1) In aggregate, their ability to represent all major regions and racial types of interest to the PSC;
2) The stock must be sufficiently abundant and easily tagged so that the agency responsible can make a long-term commitment for tagging the stock;
3) The agency responsible for tagging the stock must make a commitment to sample and estimate the escapement of tagged fish and report the results to the PSMFC in a timely manner.
4) Reliable estimates of catch and escapement must be available.

The first characteristic reflects the emphasis of PSC management on the conservation of wild stocks of Chinook and coho salmon. The major issue regarding the use of CWTs for this purpose is the selection of CWT release groups that have exploitation patterns that represent populations of interest. Because of the cost and logistical issues of tagging and recovering sufficient numbers of wild smolts, the usual practice is to apply CWTs to groups of hatchery fish from appropriate brood stocks and release strategies and use these groups as surrogates to estimate impacts on natural stocks of interest.

For Chinook salmon the CTC uses a set of indicator stocks, which have been consistently tagged over long time series, and which have a standard target tagging level of approximately 200K per year. No formal system of indicator stocks has been established by the CoTC, although for Puget Sound and Washington coastal stocks tagging group standards are set at 40 and 75K. The CoTC uses any tagged coho released within a production region that meets specified criteria in procedures that generate contribution estimates for natural production from geographic regions.

The key assumption underlying PSC regimes that the selected hatchery indicator stocks are representative of their associated natural stocks is difficult to assess. Because of the difficulty of tagging and recovering sufficient numbers of naturally produced fish, direct validation of this assumption through CWT methods can be difficult and costly. Currently, fishery managers largely rely upon CWT releases from hatcheries to estimate fishery impacts on associated wild stocks, except for 7 wild Chinook stocks coastwide and 12 wild coho stocks in SEAK.

The CWT Workgroup was tasked with the responsibility of collating available information relating to the distribution patterns of wild and hatchery fish.

RECOMMENDATION 4 – *We recommend completion of a comprehensive survey and statistical analysis of all relevant published and unpublished CWT studies that concerns the correspondence between exploitation patterns and rates for hatchery indicator stocks as compared to their natural counterparts. This review should also include new analysis of relevant agency-collected data that have not yet been previously subject to analysis. Recommendations for additional studies should be made if they are judged necessary.*

Workgroup Tasks

3) Summarize the results from all the relevant management agencies' published and unpublished CWT studies that concern the correspondence between exploitation patterns and rates for hatchery indicator stocks as compared to their natural counterparts.
4) Review current indicator stock coverage and provide recommendations where additional analysis could be conducted for peer review that would advance understanding of the relationship between hatchery indicator stocks and their natural counterparts.

The workgroup did not have the time to examine the issue of correspondence of hatchery and wild fish to any degree. The Expert Panel in their report (Hankin et.al. 2005) provided a survey of existing published results and some agency information. Additional information regarding coho salmon from the CoTC is provided below, plus one comparison of three years of hatchery vs. wild ERs and marine survival. Additional studies can be completed with existing or new data for coho in some geographic areas of the Pacific coast. Additional studies regarding this topic for Chinook salmon are underway in Alaska, Canada, and the Columbia River and on the Oregon Coast. The results of these efforts for both species will be compiled and reported in the future.

D.2 Correspondence between Exploitation Patterns and Rates for Hatchery Indicator Stocks as Compared to Their Natural Counterparts

The CWT Expert Panel has reported that available information indicates that the assumption that hatchery stocks can be used as surrogates for natural stocks appears reasonable. Some studies have evaluated the validity of this assumption for coho. The CoTC has performed cluster analyses on several years of CWT recovery data and found that the distribution of hatchery and their corresponding wild stocks among fisheries are very similar. The CoTC relies upon this relationship to generate estimates of production expansion factors for coho MUs. In the Skagit MU, nine years of tagging wild coho smolts provides managers with reasonable comfort that Marblemount Hatchery indicator stock groups adequately represent the fisheries distribution of Skagit wild coho. However, a concern remains over whether the marine survival of wild Baker coho really represents the average wild coho marine survival from the entire Skagit system. In one year, Baker coho were tagged along with tributary-rearing wild coho, and the survival to fisheries of the Baker coho was within the range shown by the other wild coho groups. But, this was a single year study, and the Baker coho are lake-rearing fish, and generally larger than the typical stream-rearing coho at outmigration. In addition, although the ER and catch distribution of Baker coho are usually very close to that of the Marblemount Hatchery indicator stock, substantial differences have been observed among the return years assessed.

Additional studies of hatchery and wild correspondence have been undertaken in Alaska. Three years of comparisons in published technical reports for a coho hatchery stock near Juneau (DIPAC) and the wild Taku River coho stock support the conclusion of similar ERs (Table D-1). However, the marine survival of the hatchery stock was lower than the wild stock in each of the three years. It is recommended that further analysis of additional years (1996-2004) be compared, along with statistical tests, to determine significance of any differences.

Table D-1. Comparisons of estimated ER for DIPAC hatchery coho salmon releases and Taku River wild coho salmon.

Adult Run Year	Coho Stock	Estimated ER	Estimated Marine Survival	Citation
1993	DIPAC Hatchery	57.1%	10.0%	McPherson et al. 1994
	Taku River Wild	50.3%	17.2%	McPherson et al. 1994
1994	DIPAC Hatchery	69.6%	17.6%	McPherson and Bernard 1995
	Taku River Wild	67.3%	23.0%	McPherson and Bernard 1995
1995	DIPAC Hatchery	58.8%	6.1%	McPherson and Bernard 1995
	Taku River Wild	61.6%	11.9%	McPherson and Bernard 1995

D.3 CWT Indicator Stock Program Coverage

The Workgroup was tasked with evaluating the current indicator program coverage, tagging levels, and compliance with current target levels. Below is a summary of all coho salmon coded-wire-tag indicator programs available coastwide for ER and distribution analyses. The summaries of hatchery and wild stock release levels include brood years (BY) 2002-2004, unless stated otherwise. A similar analysis of the Chinook indicator program was not completed to date.

D.4 Coho Indicator Stock Program Coverage – Key MUs

In 2002, the PSC adopted the Southern Coho Management Plan pursuant to Annex IV Chapter 5 of the Pacific Salmon Treaty. This plan is directed at the conservation of key MUs (MU), four from Southern British Columbia (Interior Fraser, Lower Fraser, Strait of Georgia Mainland, and Strait of Georgia Vancouver Island), and nine from Washington (Skagit, Stillaguamish, Snohomish, Hood Canal, Strait of Juan de Fuca, Quillayute, Hoh, Queets, and Grays Harbor). Ensuring adequate tagging coverage of each MU coastwide would further the objective of implementing this plan.

In addition to the key MUs listed above, domestic conservation concerns exist for the coho stocks listed under the Endangered Species Act (ESA). Research and monitoring of the distribution, status, and trends of coho have been identified as priority recovery actions needed for the following evolutionarily significant units (ESU): Lower Columbia River Coho ESU, Southern Oregon/Northern California Coast Coho ESU, and Central California Coast Coho ESU.

In addition to addressing international and domestic conservation concerns, the CWT data supports continued development and implementation of the core fisheries regional planning model, FRAM. The regional planning model used for Coho salmon in the PSC and PFMC management forums depends critically on CWT release and recovery data to represent the distribution and exploitation patterns of individual MUs. To create the model base data the CoTC relies on available CWT recovery data to reconstruct the cohorts to produce estimates of total abundance and fishery impacts for coho MUs coastwide. This requires all MUs caught in pre-terminal fisheries from Southeast Alaska to Central California to be represented by one or more CWT groups.

No formal, coastwide indicator stock program presently exists for coho and all CWT release groups submitted to RMIS are considered for inclusion in the modeling efforts. However, the CoTC made a recommendation in the 1980s that, depending upon average survival rates, 40,000 to 75,000 smolts per ER indicator stock be adipose fin clipped and tagged (Morishima 1986). This recommendation is likely to be re-evaluated by the CoTC, given the lower survival and ER experienced by some stocks in more recent years.

Data from the RMIS database, published reports, and hatchery websites were used to determine recent and proposed annual hatchery production and tagging levels for coho coastwide. Using these data sources, gaps in the CWT program indicators for MUs, or the smaller subregions or subpopulations in some cases, were identified and summarized below.

D.5 Coho Indicator Stock Program – Data Gaps in Coastwide Coverage

Representation of Total Production

Reported coho hatchery production from Southeast Alaska to Central California in recent years has averaged 69.1 million fish per year (BY 2002-2004) (Figure D-1). Of those fish released, approximately 39 million were associated with a tagged fish release group and a total of 4.3 million (6.2%) were coded-wire tagged and adipose-fin clipped. Tagging levels among hatchery facilities varied from 0 to 99.2% of all fish released. However, 76% of all MUs evaluated had tagging rates of 3% or greater during this time period. Currently some important sub regions, such as ESA-listed stocks and those listed in the 1999 PST coho agreement, and even entire MUs are not represented by tagging programs. In addition, many indicator programs for wild stocks, such as the wild stock tagging programs and hatchery DIT programs have recently been discontinued, creating data gaps coastwide. A summary of these data gaps in hatchery and wild indicator coho stock tagging programs is listed in Table D-2 and further summarized below. See Section D.7 for further description of coho indicator programs by MU.

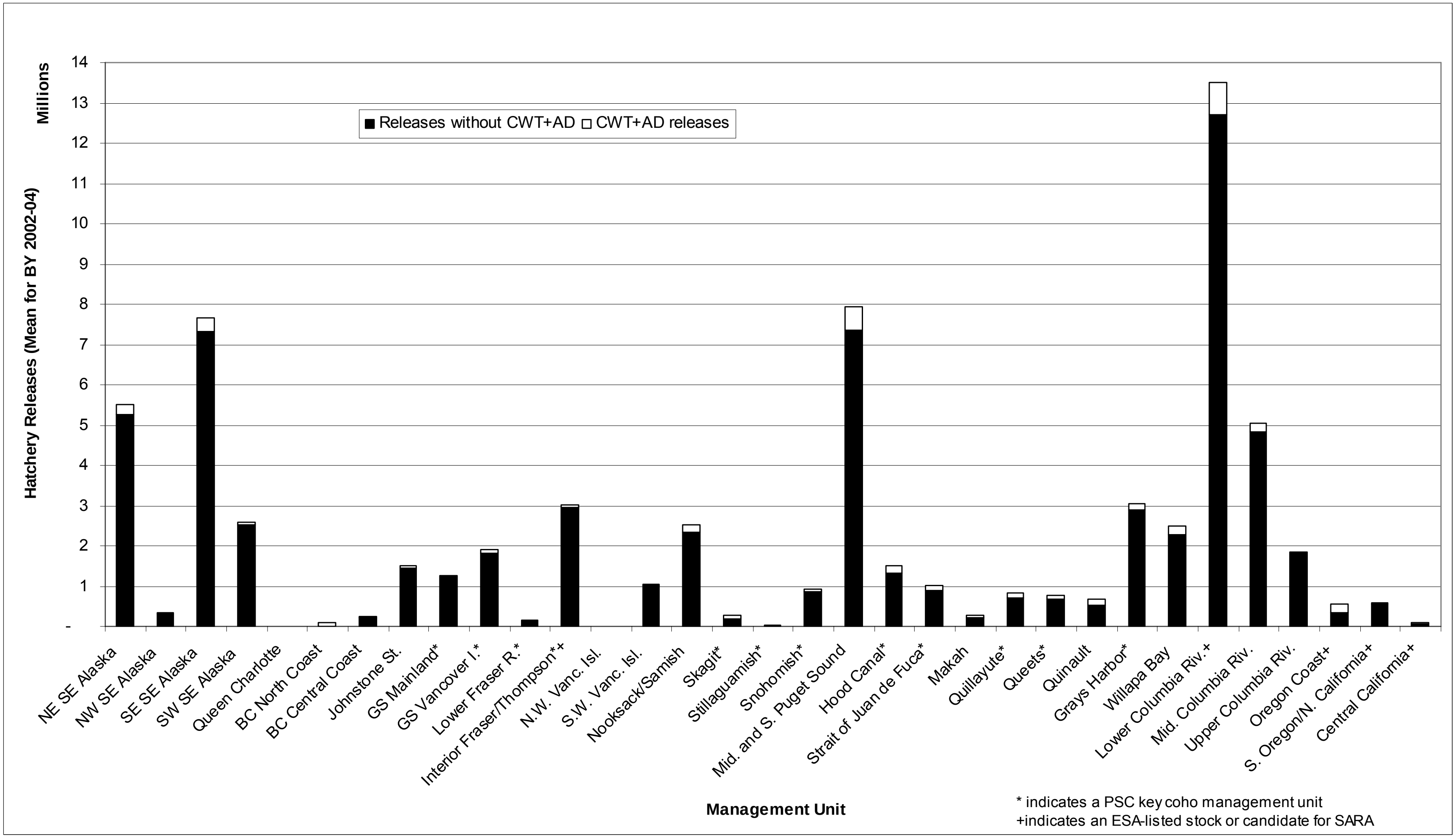

Figure D-1. Mean total number of hatchery coho salmon released annually by MU for brood years 2002-04. Clear bars represent fish released with coded-wire-tags and adipose fin clips (Ad+CWT). Data downloaded from RMIS in August, 2007.

For brood years 2002 through 2004 there are 89 indicator programs available to represent coho hatchery production coastwide. However, the following large geographic MUs do not have any indicator programs: Queen Charlotte, B.C. Central Coast, Georgia Strait Mainland, and Northwest Vancouver Island. Other MUs with one or more current hatchery indicator programs may still need additional programs to represent all hatchery production within the MU. For example, not all hatchery production is represented by tagged fish for all sub-populations of interest within the Upper Fraser River and Southern Oregon/Northern California Coast MUs, both of which are key MUs or stocks of concern. Within the Upper Fraser MU, no indicator programs exist to represent the hatchery production in the North and South Thompson sub-basins. Within the Southern Oregon/Northern California Coast MU, no indicators exist for the production released in northern California. Further assessment of the indicator tag program is needed by the CoTC to determine other gaps in MU subpopulation coverage.

Representation of Wild Production

Indicator programs used to represent wild production vary among the regions. Some regions implement wild stock tagging, others have hatchery DIT programs to represent the wild stocks within the region, and some regions have both or only single indicator tagging programs. In southeast Alaska, wild stocks are represented by wild stock tagging in all 4 quadrants (Table D-2). These programs are generally small, ranging from 4,000 to 35,000 tagged and clipped fish released annually; however, given marine survival at 10%, ERs at 30-60%, and precise estimates of escapement, these programs produce statistics sufficiently precise for management. There is concern that because the southern inside sector of Southeast Alaska has only one small wild CWT indicator stock (Hugh Smith) with which to generate all stock parameters, including ERs, the larger aggregation of wild stocks in the southern inside area is not likely well represented by the small CWT indicator. Stocks from Southeast Alaska are not caught in selective fisheries, so no hatchery DIT programs are needed nor implemented in Alaska.

In Canada, due to lack of funding, a number of the wild indicator programs have been cancelled. All but two DIT programs and four wild stock tagging programs in Canada have been discontinued in recent years (Table D-2). Currently, there are no indicator programs of any type in the Queen Charlotte, Georgia Strait Mainland, and Northwest Vancouver Island MUs. In addition, there are no wild stock indicators if the following MUs are exploited in selective fisheries: Queen Charlotte, BC North Coast, Georgia Strait Mainland, and Northwest Vancouver Island MU. Additional tagging may be needed in MUs where single indicator tag groups from hatcheries are used to represent the wild stocks. For example, not all wild subpopulations of interest within the Upper Fraser River MU are represented by an indicator program. Further analyses by the CoTC are needed to determine other gaps in MU wild subpopulation coverage.

In the Puget Sound and Washington Coast regions, wild stocks within all MUs, except the Stillaguamish and Hoh River MUs, are currently represented by hatchery DIT programs and three wild stock tagging programs (Table D-2). Currently, there are no indicator programs in the Stillaguamish and Hoh River MUs and surrogate MUs are used to assess fishery impacts for these stocks. The wild stock tagging programs within the Puget Sound and Washington Coast regions are located within the Skagit River, Hood Canal, and Grays Harbor MUs. All other MUs have hatchery DIT programs to represent the wild stocks. Analyses by the CoTC are needed to determine if additional wild stock tagging or DIT programs within the regions are necessary. For example, wild stock tagging programs may be proposed for the Stillaguamish and Hoh River MUs if the current surrogate MUs used to assess survival and fishery impacts for these stocks are considered inadequate. Another wild stock tagging program may be warranted in the Skagit system if Baker River natural-origin smolts survive and are exploited in fisheries at a different rate as the rest of the Skagit MU natural-origin smolts. There is also a concern Big Beef Creek wild fish and Hood Canal hatchery DIT fish are exploited in terminal fisheries at a higher rate than the rest of the Hood Canal MU natural-origin smolts. Wild stock tagging or DIT programs may also be needed to represent all racial types within the Quillayute (summer run), Grays Harbor (late run), and Willapa (late run) MUs.

In the Columbia River region, wild stocks are represented by DIT programs in the lower river subregion and by unclipped and tagged hatchery fish in the upper subregion (Table D-2). Currently, there are no wild stock tagging programs in the Columbia River for coho salmon and no DIT programs to represent the Mid-Columbia River wild stocks. Within the Lower Columbia River Subregion, there are four DIT programs, three of which release Type N fish (north turning and early run type) and one that releases Type S fish (south turning and late run type). Further analysis by the CoTC is needed to determine if wild stock tagging or additional DIT programs within the Lower Columbia River Basin are necessary. For example, hatchery tag groups within this subregion may not adequately represent all wild groups of interest, especially in MSFs, and the establishment of wild stock tagging programs may be warranted.

Along the Oregon and California coasts, wild stocks are not well represented. Within the Oregon Coast MU, wild stocks are represented solely by single indicator hatchery tagging programs. Without wild stock tagging or hatchery DIT programs available, no direct estimates of exploitation in mark-selective fisheries are possible for the wild stocks within this MU. In addition, the Lakes subpopulation within this MU is not represented by any indicator program. Wild stocks within the Southern Oregon/Northern California Coast MU are represented solely by a DIT program at Cole Rivers Hatchery on the Rogue River. No indicator tagging programs currently exist in Northern California. There are also no indicator tagging programs in the Central California Coast MU for wild stocks. Small releases of tagged and clipped fish are made from the Warm Springs Hatchery on the Russian River, but the releases are sporadic and the program is not used for ER analysis. Further assessment of the indicator stock coverage for the Oregon and California coast MUs by the CoTC is needed.

D.6 Coho Indicator Stock Program – Tagging Rates

Given the lower survival and fishery ER experienced by some stocks in more recent years, the most recent tag recovery data need to be assessed by the CoTC and the current tagging level recommendations need to be updated. Assuming the recommendations made in the1980s are still adequate, many current tagging programs have been releasing fewer tagged fish than advised. For example, of the 89 hatchery indicator programs listed in Table D-2, 23 (28%) of these programs have released fewer than 40,000 tagged fish per year in recent years (BY 2002-2004). In addition, many of these hatcheries are located on the Pacific Coast, where the recommendation has been made to release 40,000 to 75,000 tagged fish per release group. Tagging levels among the wild stock indicator programs has been, on average, much smaller than the hatchery indicator programs. Twelve of the 13 wild stock tagging programs currently in operation have released fewer than 40,000 tagged fish per year, on average, in recent years

(Table D-2). The average release size of all wild stock tagging programs currently operating has been approximately 23,000 fish per year per program in recent years.

Table D-2. A summary of wild and hatchery coho salmon indicator tag programs available for each MU from Southeast Alaska to Central California. Recent tagging levels are mean releases of tagged fish from brood years 2002-2004, unless otherwise noted. MUs in bold are Key MUs identified in the Southern Coho Management Plan..

MU (Code)	MU or Subpopulation	Stock (W = Wild)	Recent Tagging Level	Indicator Needed?
Southeast AK				
SEAK Northeast Quadrant (NIASKA)	Hatchery	Hidden Falls	68,000	No
		Macaulay	37,000	
		Port Armstrong	107,000	
	Wild	Auke Creek (W)	4,000	No
		Berners River (W)	35,000	
		Chilkat River (W)	22,000	
		Slippery Creek (W)	17,064	
SEAK Northwest Quadrant (NOASKA)	Hatchery	Medvejie Hatchery	22,000	Possibly[1]
	Wild	Ford Arm Lake (W)	10,000	Possibly[1]
		Nakwasina River (W)	11,000	
SEAK Southeast Quadrant (SIASKA)	Hatchery	Burnett Inlet	82,000	No
		Crystal Creek	27,000	
		Ketchikan Creek	34,000	
		Neets Bay	10,000	
		Tamgas	31,000	
		Whitman Lake	166,000	
	Wild	Hugh Smith Lk (W)	28,000	Possibly[1,2]
SEAK Southwest Quadrant (SOASKA)	Hatchery	Klawock Hatchery	79,000	No
	Wild	Chuck Creek (W)	13,000	Possibly[1]
Alaska and B.C. Transboundary Rivers				
Alaska and B.C. Transboundary Rivers	Hatchery	no hatchery production	NA	NA
	Wild	Taku River (W)	28,000	No
Canada				
Queen Charlotte (QUEENC)	Hatchery	-	-	Yes
	Wild	Deena Creek (W)	21,000	Yes
BC North Coast (BCNCST)	Hatchery	Toboggan Hatchery	36,000	Possibly[1]
	Wild	Lachmach (Skeena) (W)	discontinued	Yes
		Zoulzap (Nass) (W)	discontinued	
		Slamgeesh (W)	discontinued	
BC Central Coast (BCCNTL)	Hatchery	Martin River	discontinued	Yes
	Wild	West Arm Cr (W)	8,000	No
Johnstone Strait (JNSTRT)	Hatchery	Quinsam DIT	49,000	No
	Wild	Keogh (W)	17,000	Possibly[3]
		Quinsam DIT Program	49,000	
Georgia Strait Mainland (GSMLND)	Hatchery	-	-	Yes
	Wild	-	-	Yes
Georgia Strait Vancouver Island (GSVNCI)	Hatchery	Big Qualicum	41,000	No
		Goldstream	19,000	
	Wild	Black Creek (W)	11,000	No

MU (Code)	MU or Subpopulation	Stock (W = Wild)	Recent Tagging Level	Indicator Needed?
Upper Fraser River, including Thompson River (FRSUPP)	North Thompson Hatchery	Louis/Lemieux/Dunn	??	No
	North Thompson Wild	-	-	Yes
	South Thompson Hatchery	-	-	Yes
	South Thompson Wild	Eagle River (W)	14,000	Yes
	Lower Thompson/Nicola	Coldwater DIT (Coldwater	42,000	No
	Lower Thompson/Nicola	Coldwater DIT	discontinued	Yes
	Fraser Canyon Hatchery	no hatchery production	NA	NA
	Fraser Canyon Wild	-	-	Yes
	Upper Fraser Hatchery	no hatchery production	NA	NA
	Upper Fraser Wild	-	-	Yes
Lower Fraser River (FRSLOW)	Hatchery	Chilliwack	discontinued	Yes
		Inch DIT	47,000	Yes
	Wild	Inch DIT Program	40,000	Possibly[4]
Northwest Vancouver Island (NWVNCI)	Hatchery	-		Yes
	Wild	-		Yes
Southwest Vancouver Island (SWVNCI)	Hatchery	Robertson	40,000	Yes
	Wild	Carnation (W)	discontinued	Yes
Washington				
Nooksack and Sammish Rivers (NOOKSM)	Hatchery	Kendall Creek H. DIT	47,000	No
		Lummi Sea Ponds	43,000	
		Skookum Creek H.	43,000	
	Wild	Kendall Creek H. DIT	47,000	Possibly[4]
Skagit River (SKAGIT)	Hatchery	Cascade River H. DIT	84,000	No
	Wild	Baker River (W)	17,000	Possibly[6]
		Cascade River H. DIT	44,000	
Stillaguamish River	Hatchery	no hatchery production	NA	NA
	Wild	Jim Creek Hatchery (W)	discontinued	Possibly[5]
Snohomish River (STILSN)	Hatchery	Tulalip Bay (Bernie	32,000	No
		Wallace River H. DIT	40,000	
	Wild	Wallace River H. DIT	40,000	Possibly[4]
South Puget Sound (SPGSND)	Hatchery	Soos Creek H. DIT	45,000	No
		Puyallup Tribal Hatchery	66,000	
		Voights Creek H. DIT	45,000	
		South Sound Net Pens	114,000	
	Wild	Soos Creek H. DIT	45,000	Possibly[4]
		Voights Creek H. DIT	45,000	
Hood Canal (HOODCL)	Hatchery	George Adams H. DIT	43,000	No
		Quilcene NFH DIT	44,000	
		Pt. Gamble Bay Pens	60,000	
		Quilcene Bay Sea Pen	56,000	
	Wild	Big Beef (W)	28,000	Possibly[6]
		George Adams H. DIT	43,000	
		Quilcene NFH DIT	44,000	
Strait of Juan de Fuca (SJDFCA)	Hatchery	Lower Elwha H. DIT	111,000	No
		Dungeness H.	discontinued	
	Wild	Lower Elwha H. DIT	68,000	Possibly[4]
Makah (MAKAHC)	Hatchery	Makah NFH DIT	39,000	No
	Wild	Makah NFH DIT	38,000	Possibly[4]
Quillayute River (QUILUT)	Fall Run - Hatchery	Solduc H. DIT	78,000	No
	Fall Run - Wild	Solduc H. DIT	74,000	Possibly[4]

MU (Code)	MU or Subpopulation	Stock (W = Wild)	Recent Tagging Level	Indicator Needed?
	Summer Run - Hatchery	Solduc H. - summer	43,000	No
	Summer Run - Wild	-	-	Yes
Hoh River (HOHRIV)	Hatchery	no hatchery production	NA	NA
	Wild	-		Possibly[5]
Queets River (QUEETS)	Hatchery	Salmon R. Fish Cult. DIT	130,000	No
	Wild	Queets (W)	discontinued	Possibly[4]
		Salmon R. Fish Cult. DIT	76,000	
Quinault River (QUINLT)	Hatchery	Quinault NFH DIT	77,000	No
	Wild	Quinault NFH DIT	82,000	Possibly[4]
Grays Harbor Basin (GRAYHB)	Late Run - Hatchery	Bingham Creek H. - Late	49,000	No
		Skookumchuck H - Late[8]	50,000	
		Humptulips R. H - Late[8]	50,000	
	Late Run - Wild	-	-	Possibly[4]
	Early Run - Hatchery	Bingham Creek H. DIT -	85,000	No
		Skookumchuck H	50,000	
		Humptulips R. H [8]	50,000	
		Aberdeen Net Pens[8]	50,000	
		Friend's Landing Net Pens[8]	50,000	
		Lake Aberdeen H[8]	30,000	
		Satsop Springs Ponds	43,000	
	Early Run - Wild	Bingham Creek (W)	22,000	No
		Chehalis River (W)	40,000	
		Bingham Creek H. DIT	72,000	
Willapa Basin (WILLAP)	Late Run - Hatchery	Forks Creek H. - late	48,000	
	Late Run - Wild	-	-	Yes
	Early Run - Hatchery	Forks Creek H. DIT	73,000	No
		Nemah R. H.	50,000	
		Naselle H.	50,000	
		Nahcotta Net Pens	discontinued	
	Early Run - Wild	Forks Creek H. DIT	71,000	Possibly[4]
Columbia River				
Columbia River (COLRIV)	Lower Columbia River - Hatchery Type S (South Turning) and Type N (North Turning) Production	Lewis H. DIT - type S	70,000	No
		Lewis H. DIT - type N	66,000	
		Sandy H. DIT	53,000	
		Eagle Creek NFH DIT	24,000	
		North Toutle H. - type S	30,000	
		Elochoman H. - type S	29,000	
		Elochoman H. - type N	43,000	
		Grays River H. - type S	27,000	
		Fallert Creek H. - type S	25,000	
		Cowlitz Salmon H. - type	89,000	
		Kalama Falls H - Type N	28,000	
		Klaskanine S.F. Pond	discontinued	
		Deep River Net Pens	24,000	
		Cedc Youngs Bay Net	50,000	
		Oxbow H.	27,000	
	Lower Columbia River - Wild	Lewis H. DIT - type S	96,000	Possibly[4]
		Lewis H. DIT - type N	69,000	
		Sandy H. DIT	26,000	
		Eagle Creek NFH DIT	24,000	

MU (Code)	MU or Subpopulation	Stock (W = Wild)	Recent Tagging Level	Indicator Needed?
	Mid Columbia River -	Klickitat, Washougal,	223,000	No
	Mid Columbia River -	-	-	Yes
	Upper Columbia River	Cascade, Clearwater,	999,800	No[7]
Oregon/California				
Oregon Coast (OREGON)	North Coast - Hatchery	Nehalem H. (N. Coast)	48,000	No
		Trask River Ponds	49,000	
	North Coast - Wild	-	-	Yes
	Mid Coast - Hatchery	Salmon River H. (Siletz)	25,000	Possibly[1]
	Mid Coast - Wild	-	-	Yes
	Umpqua - Hatchery	Rock Creek H. (Umpqua)	48,332	Possibly[1]
	Umpqua - Wild	-	-	Yes
	Mid South Coast - Hatchery	Coos Hatchery	27,000	Possibly[1]
		Coquille Hatchery	22,000	
	Mid South Coast - Wild	-	-	Yes
	Lakes - Hatchery	no hatchery production	NA	NA
	Lakes - Wild	-	-	Yes
Southern Oregon and Northern California Coast (ORECAL)	Hatchery	Cole Rivers H. DIT	27,000	Possibly[1,4]
		Klamath and Trinity	discontinued	
	Wild	Cole Rivers H. DIT	27,000	Possibly[4]
Central California Coast (CENCAL)	Hatchery	Warm Springs Hatchery	16,000	Possibly[1]
	Wild	-	-	Possibly[9]

[1] Tagging levels are low. Further evaluation by the management agency and the Coho Technical Committee is needed to determine if more tagging is necessary to represent this MU.

[2] If escapement was sampled, Chickamin wild could be added as an ER indicator stock (21,000 mean release size).

[3] Wild stock is tagged and ad-clipped. Further evaluation is needed to determine if DIT program in MU adequately represents the wild component of the MU.

[4] No wild stock tagging. Further evaluation is needed to determine if DIT program in MU adequately represents the wild component of the MU.

[5] No wild stock tagging. A surrogate MU is currently used to evaluate fishery impacts on this MU. Further evaluation is needed to determine if DIT program in surrogate MU adequately represents the wild component of the MU.

[6] Wild stock tagging level is low. Further evaluation is needed to determine if DIT program(s) with wild stock tagging in MU adequately represents the wild component of the MU.

[7] Indicator stocks at these facilities are tagged and unclipped.

[8] Iindicator tagging has been implemented after BY 2004 (Future Brood Document 2007).

[9] Not harvested in directed fisheries. Further evaluation by the management agency and the Coho Technical Committee is needed to determine if more tagging is necessary to represent this MU

D.7 Coho Indicator Program Descriptions by MU

Southeast Alaska

In recent years, approximately 16 million coho have been released annually from Southeast Alaska hatcheries. Cohort reconstruction methods used by the Coho Technical Committee currently divide Southeast Alaska coho stocks into 4 quadrants or regions: Northeast, Northwest, Southeast, and Southwest Quadrants. Hatchery tagging levels among the regions have ranged between 3% and 11%. In addition to the hatchery tagging programs, CWT programs used for ER analyses have been implemented for 12 wild stocks throughout the Southeast Alaska. These programs are generally small, ranging from 4,000 to 35,000 tagged and clipped fish released annually; however, given marine sursvival at 10%, ERs at 30-60% and precise estimates of escapement, these programs produce statistics sufficiently precise for mangement. No DIT programs currently exist in Alaska as none are needed.

Northeast Quadrant (NIASKA) – Approximately 4.6% of the 5.5 million hatchery coho released are CWT'd and adipose fin clipped. In addition to the hatchery programs, there are four wild stock tagging programs implemented in this region. These include the Auke Creek, Berners River, Chilkat River, and Slippery Creek programs, which ranged in size from 4,000 to 35,000 tagged and clipped fish released annually.

Northwest Quadrant (NOASKA) – Medvejie is the only hatchery production in the region. Approximately 35,000 (10.5%) of the 329,000 fish released annually from this hatchery were tagged and clipped in recent years. Two wild stock tagging programs exist in this region. These include the Ford Arm Lake (BY 2003-2004 only) and Nakwasina River programs which have released in recent years approximately 10,000 and 11,000 tagged fish annually, respectively.

Southeast Quadrant (SIASKA) – Approximately 340,000 (4.5%) of the 7.7 million hatchery coho released are CWT'd and adipose fin clipped. In this region the wild stock tagging program in the Hugh Smith Lake system where an average of 28,000 tagged fish have been released annually in recent years is used for ER analyses (ER). The wild stock tagging program on the Chickamin River, where 22,000 tagged and clipped fish are released annually on average, could also be used for ER analyses if escapement estimates were made for this program.

Southwest Quadrant (SOASKA) – Klawock is the only hatchery production in the region. Approximately 79,000 (3%) of the 2.6 million hatchery coho released are CWT'd and adipose fin clipped. This tagging program is used for stock distribution assessment only because data on terminal catch and escapement are poor. In addition to the hatchery program, a wild stock tagging program is implemented on Chuck Creek where recent releases have averaged approximately 13,000 tagged fish annually.

Alaska and British Columbia Transboundary Rivers (TRANAC) – No hatchery production exists in this region. A wild stock tagging program used for ER analyses is implemented in the Taku River basin. An average of 28,000 tagged and clipped fish were released annually in recent years. The wild stock tagging program on the Stikine River where 20,000 tagged and clipped fish are released annually on average, could also be used in ER analyses if escapement estimates were made for this program.

British Columbia

In recent years, approximately 9.3 million coho have been released annually from British Columbia hatcheries. For brood years 2002-2004, hatchery tagging levels among the MUs have ranged between 0% and 97%, but many tagging programs have been recently discontinued. Currently, three MUs are lacking ER indicator stock programs. In addition, of the nine wild coho stock tagging programs that operated in the late 1990's, only four remain in existence.

The Southern Coho Management Plan adopted by the Pacific Salmon Commission pursuant to the 1999 Pacific Salmon Treaty Agreement defines 4 key natural-origin coho MUs (MUs) in British Columbia where the Parties agree to develop management measures and programs to prevent further decline in spawning escapements, adjust fishing patterns, and initiate, develop, or improve management programs for these stocks. These MUs include Upper Fraser River (FRSUPP), Lower Fraser River (FRSLOW), Georgia Strait Mainland (GSMLD), and Georgia Strait/Vancouver Island (GSVCI) (PSC 2004). Exploitation rate indicator programs do not currently exist for most of the Upper Fraser River MU and all of the Georgia Strait Mainland MU.

Queen Charlotte Islands MU (QUEENC) – Coho releases within this MU have been reduced from approximately 695,000 annually for BY 2000-2001 to 10,000 for BY 2003. No hatchery tagging programs currently exists, but a tagging program has been reinstated on wild coho in Deena Creek.

B.C. North Coast (BCNCST) – Hatchery Production in the North Coast MU has been much reduced in recent years from approximately 476,000 fish released annually for BYs 2000 and 2001 to approximately 89,000 released for BYs 2002 to 2004. A total of 86,000 of these fish released annually were tagged and ad-clipped. The Toboggan Hatchery stock is the only hatchery ER indicator program currently implemented in the region, where, on average, 36,000 tagged and clipped fish were released annually in recent years. The Fort Babine Hatchery tagging program has been used for distributional analyses, but this program was discontinued with BY 2002. Wild stock tagging of the Zolzap, Lachmach, and Slamgeesh stocks within the region have also been discontinued recently and there are no DIT programs implemented in the region.

B.C. Central Coast (BCCNTL) – Hatchery Production in the Central Coast MU has been much reduced in recent years from approximately 481,000 fish released for BYs 2002 to 15,000 for BY 2003. No hatchery fish were recorded in RMIS to have been released into this MU for BY 2004. The Snootli, Kitimat, and Heiltsuk stock tagging programs have been used for distributional analyses, but all hatchery tagging programs in this MU have been recently discontinued. An indicator program on the Martin River is currently under consideration (Riddell 2004). A wild stock indicator program is still in operation on West Arm Creek, where approximately 8,000 tagged and clipped fish have been released annually in recent years.

Johnstone Strait (JNSTRT) – Approximately 1.5 million coho have been released annually from hatcheries in the Johnstone Strait MU in recent years. Hatchery production includes releases from Port Hardy, Kokish, Woss Community, and Quinsam Hatchery programs. The

Johnstone Strait MU is represented by a DIT indicator program at Quinsam Hatchery, where recent releases have averaged 49,000 tagged fish annually (each DIT group). In addition, a wild stock indicator program has been implemented for the Keogh stock, where approximately 14,000 fish from BY 2002 and 2003 each were tagged and released without adipose fin clips. The Keogh River indicator program was changed for BY 2004, where 24,000 fish were tagged and released with adipose fin clips. Incomplete escapement sampling has impacted both the hatchery and wild stock indicator programs in existence.

Georgia Strait Mainland (GSMLND) – Approximately 1.3 million coho have been released annually from 11 hatchery programs in the Georgia Strait Mainland MU in recent years, but no indicator programs currently exist.

Georgia Strait Vancouver Island (GSVNCI) – Approximately 1.9 million hatchery coho have been released annually from hatcheries in the Georgia Strait/Vancouver Island MU in recent years. Single indicator tagging programs exists for the Big Qualicum River Hatchery and Goldstream River Hatchery stocks. Big Qualicum has had average annual release sizes of 41,000 tagged and clipped fish in recent years. Approximately 19,000 tagged and clipped fish have been released from Goldstream River Hatchery in recent years. DIT programs were discontinued at both of these facilities after BY 2002. The Puntledge Hatchery indicator program was discontinued after BY 2002.

A wild stock tagging program exists on Black Creek, where approximately 11,000 fish were tagged each year. Tagging of wild coho salmon smolts began at Black Creek in 1976. The stock represents the freshwater survival, marine survival, and fishery impacts of wild coho salmon in the Georgia Strait, east coast Vancouver Island region. The tagged fraction of the freshwater production is estimated the following year by sampling mark rates in the adult escapement program.

Upper Fraser River, including Thompson River (FRSUPP) – In 2002, Interior Fraser River coho salmon (IFC), which includes the upper Fraser River and Thompson River, were recognized as a 'species' under the Species At Risk Act (SARA) and designated as endangered by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). Studies of the genetic structure of this MU indicate that there are five subpopulations; three within the Thompson (North Thompson, South Thompson, and Lower Thompson/Nicola regions) and two within the Fraser (the area between the Fraser Canyon and the Thompson-Fraser confluence, and the Fraser River and tributaries above the Thompson-Fraser confluence).

Hatchery production in the Upper Fraser River MU has declined from approximately 1 million fish each from brood years 2000 and 2001 to 164,000 fish released annually in more recent years. An indicator program at the Spius Creek Hatchery, where approximately 40,000 tagged and clipped fish have been released annually in recent years, is currently implemented in the Lower Thompson/Nicola subregion. Incomplete escapement sampling has impacted this hatchery indicator program. A DIT program at this facility was discontinued after the 2002 brood. Other hatchery tagging programs on Louis, Lemieux, and Dunn Creek stocks, located within the North Thompson subregion have been used for analysis of stock distribution.

Early estimates of exploitation of this MU were based on catches and escapements of coded-wire tagged hatchery coho. More recent analyses (1998-2000), where CWT data were inadequate, have been completed using a DNA based approach. Interior Fraser/Thompson coho have been found to be sufficiently distinct genetically to allow estimation of numbers of fish caught using a DNA-based approach (DFO 2002). Specifically, stock identification estimates by catch area have been applied to estimates of coho encounters. Historically, estimates of marine survival for IFC hatchery stocks are limited to the North and South Thompson, and are not consistently available for a sufficient number of years to be a reliable time series. Therefore, annual average marine survival rates for two Strait of Georgia wild indicator stocks have been used as a survival index for IFC.

Lower Fraser River (FRSLOW) – Approximately 3 million hatchery coho have been released within the Lower Fraser River MU annually in recent years. One tagging program is currently implemented in this MU. It is the DIT program at Inch Creek Hatchery, where release sizes have averaged approximately 46,000 for the CWT+AD group and 40,000 for the CWT only group over the 2002-2004 broods. The indicator tag program at Chilliwack Hatchery, which was impacted by incomplete escapement sampling, was discontinued after the 2002 brood.

Northwest Vancouver Island (NWVNCI) – Recent hatchery production in this MU has been reduced from approximately 800,000 (BY 2000 and 2001) to 7,500 hatchery coho per year (BY 2003-2004). No hatchery or wild stock indicator programs exist in the Northwest Vancouver Island MU.

Southwest Vancouver Island (SWVNCI) – Approximately 1 million hatchery coho have been released within this MU annually in recent years. This region is represented by the Robertson Creek Hatchery index program, where annual release sizes have been approximately 40,000 tagged and clipped fish in recent years. Annual counts of returning salmon are made at the Stamp Falls fishway downstream of the hatchery and escapement to the hatchery is also estimated. The DIT program at this facility was discontinued after the 2002 brood. Coded wire tagging of wild coho smolts at Kirby Creek began in 1999 and at Carnation Creek in 2001, but these programs have been discontinued.

Washington

The Southern Coho Management Plan adopted by the Pacific Salmon Commission pursuant to the 1999 Pacific Salmon Treaty Agreement defines 9 key natural-origin coho MUs in Washington where the Parties agree to develop management measures and programs to prevent further decline in spawning escapements, adjust fishing patterns, and initiate, develop, or improve management programs for these stocks. These MUs include Skagit, Stillaguamish, Snohomish, Hood Canal, Strait of Juan de Fuca, Quillayute, Hoh, Queets, and Grays Harbor (PSC 2004). Indicator tag programs for Washington stocks were summarized using releases recorded in RMIS (downloaded August 2007) and the draft 2007 Future Brood Document.

Puget Sound and Strait of Juan de Fuca (Washington)

All naturally spawned populations of coho salmon in Puget Sound, Hood Canal, and the eastern Olympic Peninsula (east of Salt Creek) are included in the Puget Sound/Strait of Georgia ESU which was classified as a Species of Concern in April 2004 due to specific risk factors (Federal

Register Notice: 69 FR 19976 [April 15, 2004]). This ESU includes the following coho MUs: Nooksack/Samish, Skagit, Stillaguamish, Snohomish, South Puget Sound, Hood Canal, and Strait of Juan de Fuca.

Nooksack/Samish MU (NOOKSM) – Approximately 2.5 million hatchery fish were released into this MU annually in recent years. Tag indicator programs for this MU include the DIT program at Kendall Creek hatchery that has a goal of releasing 45,000 tagged fish in each group, and the single indicator tag programs at Skookum Creek and Lummi Sea Ponds which have a goal of releasing 50,000 tagged and clipped fish each.

Skagit River MU (SKAGIT) – Approximately 280,000 hatchery fish were released into this MU annually in recent years. Survival and ER estimates of this MU are derived using CWT data from the Cascade River Hatchery (AKA Marblemount) and Baker River Wild coho tagging programs. The Cascade River Hatchery employs a DIT program with a goal of 45,000 tagged fish in each group; therefore, providing the non-ad clipped+CWT coho as surrogates to estimate exploitation of natural-origin coho from this MU

Stillaguamish MU (STILSN) – There have been no harvest-oriented hatchery coho release programs implemented in the Stillaguamish River basin. Only one small CWT tagging program, the Stillaguamish Tribe's wild stock enhancement program, has been conducted in recent years (prior to BY 2002). Approximately 5,000 fish were tagged and released per year, but there are no direct estimates of marine survival or exploitation for this MU due to the limited numbers of CWTs released from the enhancement project, and lack of formal escapement accounting for the returning tagged coho. The CWT tagging program ended with BY 1998 and the enhancement program was suspended in 2004, pending review. In the recent development of the FRAM base period, CWT data from the indicator stocks in the Snohomish MU are used as surrogates for assessing pre-terminal fishery exploitation patterns and rates for the Stillaguamish MU.

Snohomish MU (STILSN) – Hatchery releases in this MU in recent years has averaged 920,000 coho annually. Hatchery production is represented by Tulalip Bay and Wallace River hatchery programs. The Tulalip Bay indicator program has released approximately 32,000 tagged fish in recent years, but the current goal is to release 50,000 tagged fish in the future. The Wallace Hatchery CWT release is a DIT program with a goal of 45,000 tagged fish to be released of each group. Survival rates are estimated using both hatchery programs, while the Wallace program provides a means for ER analysis. There is incomplete accounting of tagged coho escapement at the Tulalip Hatchery. Annual estimates of marine survival for Snohomish River natural-origin coho are made using the total number of adults returning to the Sunset Falls Fishway, annual estimates of adult ocean recruitment using fishery exploitation values derived from the Wallace River Hatchery CWT data, and predicted parent smolt production for the watershed above the falls. The smolt production predictions are based upon smolt monitoring studies conducted by WDFW at Sunset Falls in the in the mid-1980s. Exploitation rate values for the non-ad clipped+CWT coho from Wallace Hatchery provide a surrogate measure of exploitation for natural origin coho in this MU.

South Puget Sound MU (SPGSND) – Hatchery releases in the South and mid Puget Sound region have averaged approximately 7.9 million coho annually in recent years. Mid Puget

Sound hatchery production is represented by the Soos Creek, Voights Creek, and Puyallup Tribal hatchery programs. The Soos Creek and Voights Creek hatchery CWT releases are DIT programs with a goal of 45,000 tagged fish to be released of each group at each facility. Exploitation rate values for the non-ad clipped+CWT coho from these hatchery provide a surrogate measure of exploitation for natural origin coho in this MU. The release goal at the Puyallup Tribal Hatchery is 100,000 tagged and clipped fish. In South Sound the hatchery production has averaged 4.3 million coho per year. This subregion is represented by the South Sound Net Pen indicator program, where the release goal is 50,000 tagged and clipped coho per year. In addition to the ER indicator programs listed above, other CWT programs within the MU are used for distributional analyses. These include the tagging programs implemented in the Lake Washington and Duwamish River basins, the mid Puget Sound Net Pens, Kennedy Creek, and the Nisqually River.

Hood Canal MU (HOODCL) – Hatchery production in this MU has been approximately 1.5 million coho annually in recent years. Hatchery production is currently represented by the DIT programs at Big Quilcene National Fish Hatchery (QNFH) and George Adams Hatchery. CWT recovery-based estimates of exploitation and survival rates are available for these hatchery programs. Survival rate estimates are also available for the Port Gamble Net Pen and Quilcene Bay Net Pen production. All hatchery indicator programs have a release goal of 45,000 tagged coho from each group, except for QNFH, which has a release goal of 50,000 tagged fish of each DIT component. Wild coho survival and ER are monitored by natural-origin CWT marked coho from the WDFW Big Beef Creek Research Station. Recent releases from this station have averaged 28,000 tagged wild coho annually. There is concern Big Beef Creek wild fish and non-ad clipped+CWT coho from the hatchery programs are exploited in terminal fisheries at a higher rate than the rest of the Hood Canal MU natural-origin smolts.

Strait of Juan de Fuca MU (SJDFCA) – Approximately 1 million hatchery coho salmon have been released into this MU annually in recent years. CWT recovery-based estimates of exploitation and survival rates are available for the Lower Elwha Hatchery Program. The Lower Elwha Hatchery utilizes a DIT program where ER values for the non-ad clipped+CWT coho from this program provide a surrogate measure of non-terminal exploitation for natural-origin coho from this region. This program has a release goal of 75,000 tagged fish of each DIT component. The Dungeness River Hatchery program has also been tagged periodically in the past, but the last CWT releases from this facility were BY 2004 releases.

Olympic Peninsula (West of the Elwha River) and Washington Coast
The coastal region includes the Olympic Peninsula and Southwest Washington coho salmon ESUs. The Olympic Peninsula ESU includes all naturally spawned populations of coho salmon in Washington coastal rivers and streams from Point Grenville, which is south of the Quinault River, north to and including Salt Creek (west of the Elwha River). This ESU includes the Makah, Quillayute, Hoh, Queets, and Quinault MUs. Listing of this ESU under the ESA was determined to be not warranted in 1995 (60 FR 38011 [July 25, 1995]). Approximately 2.6 million hatchery coho have been released annually into this ESU in recent years.

The Southwest Washington coho ESU includes all naturally spawned populations of coho salmon from coastal drainages in southwest Washington between the Columbia River and Point

Grenville. This ESU includes the Grays Harbor and Willapa MUs. The status of this ESU under the ESA is currently classified as Undetermined. Approximately 5.5 million hatchery coho have been released annually into this ESU in recent years.

Makah MU (MAKAHC) – Approximately 260,000 hatchery coho have been released annually into the Sooes River in this MU in recent years. Hatchery and wild production in this MU is represented by a DIT program at the Makah National Fish Hatchery, where the goal is to release 40,000 tagged fish of each DIT component.

Quillayute River MU (QUILUT) – Approximately 820,000 hatchery coho have been released into this MU annually in recent years. The Quillayute River MU has two unique populations of coho, a *summer* coho run, and a *fall* coho run. The Sol Duc Hatchery releases both summer and fall runs of CW-tagged coho. A DIT program for the fall run was employed with brood year's 2002 and 2003, with a goal of releasing 75,000 tagged fish of each DIT component. The indicator program for the summer run has a goal of releasing 50,000 tagged and clipped fish. No CWT recovery-based estimates of survival and ER are available for the 1993 to 2002 brood years due to unreported terminal fishery CWT recovery data. This fishery is a major portion of the total harvest for this population.

Hoh River MU (HOHRIV) – There is currently no hatchery coho production or a CWT program present in this MU. The Queets River MU tagging program is used as a surrogate to estimate pre-terminal fishery ER.

Queets River MU (QUEETS) – Approximately 780,000 hatchery coho have been released into this MU annually in recent years. CWT recovery-based estimates of survival and ER are available for the Salmon River Hatchery program. This program is a DIT program, with a release goal of 75,000 fish each DIT component; thus, pre-terminal ER estimates for the non-ad clipped+CWT coho provide a surrogate measure of exploitation for natural-origin coho in this MU. Salmon River Hatchery coho return earlier than the Queets wild population, resulting in terminal fishery ER are that are higher on Salmon River Hatchery coho than the wild coho. No CWT recovery-based estimates of survival and ER are available for the 1999, 2000, and 2002 brood years due to incomplete escapement accounting in the RMIS database. A natural production enhancement program, where natural-origin juveniles were periodically reared, CWT'd, and released unclipped at several locations has been operated by the Quinault Tribe in the basin. This program was suspended after the 2004 brood year, pending review of the project results to date and future coho management objectives for this MU.

Quinault River MU (QUINLT) – Approximately 680,000 hatchery coho have been released into the Quinault River MU annually in recent years. Hatchery coho production in this MU is represented by the DIT program implemented at the Quinault National Fish Hatchery. The release goal of the program is 80,000 tagged fish of each DIT component. Pre-terminal ER estimates for the non-ad clipped+CWT coho also provide a surrogate measure of exploitation for natural-origin coho in this MU.

Grays Harbor MU (GRAYHB) – The Grays Harbor MU has an early and late run of coho salmon. Recent hatchery production has averaged 3 million coho total annually. This includes production by Humptulips (Steven Creek), Bingham Creek (Satsop River), and Lake Aberdeen

Hatcheries and a number of net pen operations. CWT recovery-based exploitation and survival rate estimates are available for the Bingham Creek early and late run programs. The early run tagging program is a DIT program with a release goal of 75,000 tagged fish of each DIT component. The release goal for the late run tagging program is 50,000 tagged and clipped fish. Wild coho survival and ER are monitored by natural-origin CWT marked coho from the WDFW Bingham Creek Research Station, where an average of 22,000 tagged and unclipped fish have been released annually in recent years. Another wild stock tagging program is implemented in the upper Chehalis River, where approximately 40,000 tagged and unclipped fish have been released annually in recent years. In addition to the ER indicator programs listed above, other CWT programs within the MU are used for distributional analyses. These include the tagging programs implemented at the Skookumchuck Hatchery (late and early run), and Friend's Landing and Aberdeen net pen operations (early run programs).

Willapa Basin MU (WILLAP) – The Willapa Basin MU has early and late runs of coho salmon. Approximately 2.5 million hatchery coho total were released into this MU annually in recent years. The early run production is represented by a DIT program at Forks Creek Hatchery and single indicator programs at Nemah River and Naselle hatcheries, and the Nahcotta Net Pen operation. A single indicator tag program for the late run is also implemented at Forks Creek Hatchery.

Columbia River MU (COLRIV) – The Columbia River Basin is split into the following three subregions for coho salmon management: Snake River/Upper Columba River, Mid Columbia River, and Lower Columbia River subregions. Approximately 20.4 million hatchery coho were reported to have been released annually in the entire Columbia River Basin in recent years. Of these, approximately 1 million were tagged. There are currently no wild stock tagging programs in the Columbia River.

Approximately 1.8 million hatchery coho from the Cascade, Clearwater, Kooskia, Leavenworth, Willard, and Winthrop hatcheries were released annually in the upper subregion in recent years. Approximately 1 million of these were released tagged and unclipped. No tagged and clipped hatchery coho have been released from this subregion in recent years.

In the Mid Columbia subregion, approximately 5 million hatchery fish from the Klickitat, Washougal, Willard, and Cascade hatcheries have been released annually in recent years. This subregion's hatchery program is expected to be represented by approximately 145,000 tagged and clipped fish from the Klickitat, Washougal, and Cascade hatcheries in the future. The DIT program at Willard National Fish Hatchery was discontinued after the 2002 brood.

The Lower Columbia River subregion encompasses the Lower Columbia River ESU. Lower Columbia River coho were identified as a separate ESU from the Southwest Washington ESU and were listed as threatened in June 2005 (70 FR 37160). This ESU includes all naturally spawned populations of coho salmon in the Columbia River and its tributaries in Washington and Oregon, from the mouth of the Columbia up to and including the Big White Salmon and Hood Rivers, and includes the Willamette River to Willamette Falls, Oregon, as well as twenty-five artificial propagation programs: the Grays River, Sea Resources Hatchery, Peterson Coho Project, Big Creek Hatchery, Astoria High School (STEP) Coho Program, Warrenton High

School (STEP) Coho Program, Elochoman Type-S Coho Program, Elochoman Type-N Coho Program, Cathlamet High School FFA Type-N Coho Program, Cowlitz Type-N Coho Program in the Upper and Lower Cowlitz Rivers, Cowlitz Game and Anglers Coho Program, Friends of the Cowlitz Coho Program, North Fork Toutle River Hatchery, Kalama River Type-N Coho Program, Kalama River Type-S Coho Program, Washougal Hatchery Type-N Coho Program, Lewis River Type-N Coho Program, Lewis River Type-S Coho Program, Fish First Wild Coho Program, Fish First Type-N Coho Program, Syverson Project Type-N Coho Program, Eagle Creek National Fish Hatchery, Sandy Hatchery, and the Bonneville/Cascade/Oxbow complex coho hatchery programs. Populations that are Type-N predominantly head north once they outmigrate to the ocean, while Type-S populations predominantly turn south upon exiting the Columbia River.

In the Lower Columbia River subregion, approximately 13.5 million hatchery coho were released annually from production facilities in recent years. Of these, 780,000 were CWTd and clipped. CWT recovery-based exploitation and survival rate estimates are available for the Lewis Hatchery (Type-S and Type-N), Sandy River, and Eagle Creek National Fish Hatchery (NFH) DIT programs. The Lewis Hatchery tagging program has a release goal of 75,000 tagged fish of each DIT component of each run type. The Sandy River and Eagle Creek NFH tagging programs each have a release goal of 25,000 tagged fish of each DIT component. In addition to the ER indicator programs listed above, other CWT programs within the MU are used for distributional analyses. These include the tagging programs implemented at the North Toutle, Elochoman, Grays River, Kalama Falls, and Oxbow hatcheries, and the Deep River and Youngs Bay Net Pen operations.

Oregon and California

Oregon Coast MU (OREGON) – This region is represented by the Oregon Coast ESU, which is currently not listed under the ESA. This ESU includes all naturally spawned populations of coho salmon in Oregon coastal streams south of the Columbia River and north of Cape Blanco, as well as five artificial propagation programs: the North Umpqua River, Cow Creek, Coos Basin, Coquille River, and North Fork Nehalem River coho hatchery programs. This ESU is split into five geographical strata for assessment (Chilcote et al. 2005). These include North Coast, Mid Coast, Umpqua, Mid South Coast, and the Coastal Lakes subregions. In recent years, approximately 550,000 coho have been released annually from this ESU. Hatchery tagging levels among the subregions have ranged between 12% and 54%. No wild stock tagging programs or DIT programs are currently implemented in the Oregon Coast MU.

The North Coast subregion includes the North Fork Nehalem and Trask River Hatchery tagging programs, where approximately 48,000 tagged and clipped fish have been released in recent years from each facility, annually (BY 2000-2003). Hatchery production in the Mid Coast subregion is represented by the Siletz Hatchery tagging program where approximately 25,000 tagged and clipped fish have been released annually in recent years. A tagging program also exists in the Umpqua subregion at Rock Creek Hatchery, where approximately 64,000 tagged and clipped fish were released annually in recent years. Tagging programs within the Mid South subregion include the Coos and Coquille River hatchery CWT programs, where approximately 25,000 tagged fish have been released from each program through BY 2002. There are currently no hatchery programs within the Coastal Lakes subregion. However, because of its geographical proximity to the Lakes subregion, the North Umpqua River Hatchery coho tagging program has been used to estimate ocean survival rates for the Lakes natural coho populations (Zhou 2000).

Southern Oregon/Northern California MU (ORECAL) – This MU includes the Southern Oregon/Northern California Coast (SONCC) Coho ESU which was listed as threatened under the ESA in 1997 (Good et al. 2005). This listing was reaffirmed in 2005. The ESU includes all naturally spawned populations of coho salmon in coastal streams between Cape Blanco, Oregon, and Punta Gorda, California, as well three artificial propagation programs: the Cole Rivers Hatchery, Trinity River Hatchery, and Iron Gate Hatchery coho hatchery programs. The Cole Rivers Hatchery on the Rogue River currently implements a DIT program, where release sizes have averaged 27,000 tagged fish per DIT group annually. Hatchery programs on the Klamath and Trinity Rivers currently release over 500,000 fish combined, annually, but tagging programs at these facilities were discontinued after BY 1992. There are currently no hatchery or wild index or production CWT releases from California. However, research and monitoring of the distribution, status, and trends of coho have been identified as priority recovery actions needed for the SONCC coho salmon ESU.

Central California Coast Coho MU (CENCAL) – This MU includes the Central California Coast Coho Salmon ESU which was first listed as threatened in October 1996 and then as endangered in June 2005. This ESU includes all naturally spawned populations of coho salmon from Punta Gorda in northern California south to and including the San Lorenza River in central California, as well as populations in tributaries to San Francisco Bay, excluding the Sacramento-San Joaquin River system, as well as four artificial propagation programs: the Don Clausen Fish Hatchery Captive Broodstork Program, Scott Creek/Kind Fisher Flats Conservation Program, Scott Creek Captive Broodstock Program, and the Noyo River Fish Station egg-take Program coho hatchery Programs. The Noyo Station releases an average of 75,000 fish annually, none of which are tagged. Tagged fish have been released recently from the Warm Springs Hatchery on the Russian River, but this program is not considered an index program at this time. Retention of coho has been prohibited in ocean fisheries off California since 1994 and in fresh water recreational fisheries in the Klamath-Trinity Basin since 1997. There are currently no hatchery or wild index or production CWT releases from Central California, but research and monitoring of the distribution, status, and trends of coho have been identified as priority recovery actions needed for the Central California Coast coho salmon ESU.

Agenda Item F.3.d
SSC Report
April 2008

SCIENTIFIC AND STATISTICAL COMMITTEE REPORT ON PACIFIC SALMON COMMISSION CODED-WIRE-TAG WORKING GROUP REPORT

The Scientific and Statistical Committee (SSC) was briefed by Dr. Marianna Alexandersdottir on the Pacific Salmon Commission (PSC) Working Group's recommendations for an action plan to correct deficiencies in data collection and reporting of the Coded Wire Tag (CWT) system and to improve analysis of CWT recovery data.

The SSC endorses the PSC Working Group recommendations for an action plan to improve the CWT program. Strengths of the CWT program include long time series of age and area specific exploitation rate estimates for indicator stocks. The SSC recommends that future improvements to the CWT program should also incorporate development of Genetic Stock Identification (GSI), which has the potential to provide additional information to compliment the CWT program.

PFMC
4/8/08

METHODOLOGY REVIEW PROCESS AND PRELIMINARY TOPIC SELECTION FOR 2008

Each year, the Scientific and Statistical Committee (SSC) completes a methodology review to help assure new or significantly modified methodologies employed to estimate impacts of the Council's salmon management use the best available science. The process normally involves: developing a list of potential topics for review at the April Council meeting; final selection of review topics at the September Council meeting; review of selected topics in October by the SSC Salmon Subcommittee and the Salmon Technical Team (STT); and review by the full SSC at the November Council meeting. This review process is preparatory to the Council's adoption, at the November meeting, of all proposed changes to be implemented in the coming season or, in certain limited cases, providing directions for handling any unresolved methodology problems prior to the formulation of salmon management options in March. Because there is insufficient time to review new or modified methods at the March meeting, the Council may reject their use if they have not been approved the preceding November.

The SSC will receive input from the STT and the Model Evaluation Workgroup, and provide recommendations for methodologies to be reviewed in 2008.

Council Task:

1. **Provide guidance to the SSC regarding potential topics and priorities for methodologies to be reviewed in 2008.**
2. **Request affected agencies develop and provide needed materials to the SSC, as appropriate.**

Reference Materials:

1. Agenda Item F.4.b, Supplemental SSC Report: Scientific and Statistical Committee Report on Methodology Reviews for 2008.

Agenda Order:

a.	Agenda Item Overview	Chuck Tracy
b.	Scientific and Statistical Committee Report	Steve Ralston
c.	State, Tribal, and Federal Agency Recommendations	
d.	Reports and Comments of Advisory Bodies	
e.	Public Comment	
f.	Council Guidance on Potential Methodologies to Review in 2008	

PFMC
03/19/08

Agenda Item F.4.b
Supplemental SSC Report
April 2008

SCIENTIFIC AND STATISTICAL COMMITTEE REPORT ON METHODOLOGY REVIEW PROCESS AND PRELIMINARY TOPIC SELECTION FOR 2008

The Scientific and Statistical Committee (SSC) met with members of the Salmon Technical Team (STT) and the Model Evaluation Workgroup (MEW) to identify and discuss methodology reviews for 2008. The following five items (not in priority order) were identified for potential SSC review this fall:

- Consultation standards for Lower Columbia River natural coho (to be completed by National Marine Fisheries Service Northwest Region).

- Sensitivity analyses of the Chinook and Coho Fishery Regulation Assessment Models to major assumptions (to be completed by MEW). The SSC recommended that the sensitivity analyses be focused on possible error propagation in model estimation process. The SSC will assist the MEW in designing these sensitivity analyses.

- September 1 maturity boundary for Klamath River fall Chinook (to be completed by Pacific States Marine Fisheries Commission & STT).

- Sacramento River fall Chinook harvest model (to be completed by STT).

- Sacramento River fall Chinook abundance predictors (to be completed by STT).

PFMC
4/08/08

Agenda Item F.4.d
Supplemental MEW Report
April 2008

MODEL EVALUATION WORKGROUP REPORT ON METHODOLOGY REVIEW PROCESS PRELIMINARY TOPIC SELECTION FOR 2008

On Monday, the Model Evaluation Workgroup (MEW) met to review progress on past work tasks and to discuss future salmon fishery modeling projects of interest to the Council.

Over the past year there were new coho and Chinook stocks added to the Fishery Regulation Assessment Model (FRAM) modeling Base Periods. The set of FRAM documentation provided almost two years ago needs to be updated to include these new stocks and also capture the associated changes from the recent model calibrations. The need for periodic updates of the documentation was anticipated, and provides the opportunity for correcting errors and expanding documentation as needed or identified.

Analysis of the sensitivity in Chinook and coho FRAM to model parameters (e.g. various release mortality rates), and of input parameters (e.g. Chinook forecast age structure), has always been topic of technical discussions. With the advent, and potential expansions, of mark-selective fisheries (MSF) these issues potentially become more important as another layer of assumptions is necessarily imposed on the model (e.g., unmarked and marked retention errors, and mark rates).

Earlier this week, a FRAM sensitivity analysis was discussed between the Salmon Technical Team (STT), the Scientific and Statistical Committee (SSC), and MEW. Evaluation of MSF parameters using coho FRAM may be relatively straightforward, however the same task with multi-aged Chinook FRAM becomes challenging. The SSC has offered to provide an analysis design to add efficiency to the project and help insure that the effort will provide usable results.

The MEW would like to work with the STT and the SSC members on developing a sensitivity analysis on FRAM. We expect that this could be a multiyear assessment but considerable progress could be made in 2008 for a progress report at the fall Salmon Methodology Review Meeting.

In summary, the MEW proposes two tasks for the coming year:

- Update the sets of FRAM documentation.

- Initiate coho and Chinook FRAM Sensitivity Analysis, with an emphasis on the modeling of Mark Selective Fisheries.

PFMC
04/09/08

SALMON ADVISORY SUBPANEL REPORT ON METHODOLOGY REVIEW PROCESS AND PRELIMINARY TOPIC SELECTION FOR 2008

Each year, the Council sets salmon seasons for the current calendar year. This task must be accomplished based on projections that are available during the spring of each year. However, the Klamath Ocean Harvest Model (KOHM) does not estimate impacts to future broods in fisheries occurring in the fall time frame, September to November of the current year. Impacts from fisheries occurring in that period, the “credit card” debt, are accounted for in the analysis conducted the following spring.

Fall fisheries are historic and valuable fisheries; however without an estimate of the fish likely to be caught in the credit card fishery (the magnitude of “credit card” debt), the ability to fish the following year can be placed at risk. The magnitude of the uncertainty is not known until after the fact, and the size of the debt can range from insignificant in years of plenty, to unacceptable in years of scarcity.

The Salmon Advisory Subpanel (SAS) requests that the Salmon Technical Team (STT) develop some type of credit card catch projection methodology to provide us with some guidance regarding the size of the debt and the risks that we are exposing next year’s fishery to. Along with the development of this projection methodology, it is imperative that the September 1 maturation boundary for Klamath River fall Chinook be reviewed, as this will have a direct influence on the projection of fall impacts.

We recognize that the availability of quality data may not support as detailed a projection as is currently used; however the absence of any kind of credit card projection of Klamath catch overly complicates the creation of our season structure. We strongly urge that the STT address this issue and develop a modeling methodology that will allow us to assess, and thereby better manage, the following year’s fishery.

The SAS also recommends the Scientific and Statistical Committee review the new Sacramento Index prediction and the Sacramento harvest model.

PFMC
4/09/08

SALMON TECHNICAL TEAM REPORT ON METHODOLOGY REVIEW PROCESS PRELIMINARY TOPIC SELECTION FOR 2008

The Salmon Technical Team (STT) believes the items below should be considered by the Council for review in the fall of 2008.

1) A new stock abundance forecast model for Sacramento River fall Chinook was developed this year. The model was reviewed by the Scientific and Statistical Committee (SSC) in March, but further review is warranted.

2) The harvest forecast model for Sacramento River fall Chinook was substantially revised this year to directly account for all ocean fisheries south of Cape Falcon and the river recreational fishery. The model was reviewed by the SSC in March, but further review is warranted.

3) The Model Evaluation Workgroup (MEW) has completed draft documentation of the Fishery Regulation Assessment Models (FRAMs). In the past year, however, several natural stocks have been added to the Chinook FRAM model. The documentation should be updated to reflect the addition of these stocks.

4) Now that the documentation of the FRAMs is essentially complete, the MEW should undertake a sensitivity analysis of the FRAMs to major assumptions, including assumptions about incidental mortality and drop off rates in both mark selective and non-selective coho and Chinook fisheries.

PFMC
04/08/08

FINAL ACTION ON 2008 SALMON MANAGEMENT MEASURES

The Salmon Technical Team (STT) will briefly review its analysis of the tentative management measures and answer Council questions. Final adoption of management measures will follow the comments of the advisors, tribes, agencies, and public.

At its March 2008 meeting, the Council adopted a set of recommendations comprising a rebuilding strategy for Klamath River fall Chinook for public review. The proposed rebuilding strategy is described in Agenda Item F.5.a, Attachment 1 and in Preseason Report II, Appendix A. The Council should adopt a final rebuilding strategy at this time, which will be implemented through the annual management measures and a regulatory amendment. The rebuilding strategy will be incorporated in the 2008 ocean salmon management measures, and in future management measures, as appropriate.

This action is for submission to the U.S. Secretary of Commerce, and the final motions must be visible in writing. To avoid unnecessary delay and confusion in proposing final regulations, minor edits may be made to the STT analysis and other documents provided by staff. If major deviations from existing documents are anticipated, Council members should be prepared to provide a written motion that can be projected on a screen or quickly photocopied. Please prepare your motion documents or advise Council staff of the need for, or existence of, additional working documents as early as possible before the final vote.

Council Action:

1. **Adopt a final rebuilding strategy for Klamath River fall Chinook.**
2. **Adopt final treaty Indian troll, non-Indian commercial and recreational ocean salmon fishery management measures for submission to the U.S. Secretary of Commerce.**

Reference Materials:

1. Agenda Item F.5.a, Attachment 1: Proposed Klamath River Fall Chinook Rebuilding Strategy.
2. Agenda Item F.5.c, Hoopa Valley Tribal Comments: Hoopa Valley Tribal Comments on Criteria for Ending Overfishing Concern for Klamath River Fall Chinook.
3. Agenda Item F.5.b, Supplemental STT Report: STT Analysis of Tentative 2008 Ocean Salmon Fishery Management Measures.

Agenda Order:

a. Agenda Item Overview — Chuck Tracy
b. STT Analysis of Impacts — Dell Simmons
c. Agency and Tribal Comments
d. Reports and Comments of Advisory Bodies
e. Public Comment
f. **Council Action:** Adopt Klamath River Fall Chinook Rebuilding Strategy and Final Management Measures for 2008 Ocean Salmon Fisheries

PROPOSED KLAMATH RIVER FALL CHINOOK REBUILDING STRATEGY

Klamath River fall Chinook (KRFC) failed to meet the Council's conservation objective of at least 35,000 adult natural spawners in 2004, 2005, and 2006. When a stock fails to meet its conservation objective for three consecutive years an Overfishing Concern is triggered under the terms of the Pacific Coast Salmon Fishery Management Plan (FMP). Specific actions required by the FMP when an Overfishing Concern is triggered include directing the Salmon Technical Team (STT) to work with state and tribal fishery managers to complete an assessment of the stock and the pertinent factors causing the stock depression, and directing the habitat committee to work with government habitat experts to review essential fish habitat (EFH) status affecting the stock. After review of the stock and EFH assessments, the Council is required to recommend actions to: 1) end any excessive fishing mortality; 2) specify criteria for determining the end of the Overfishing Concern; 3) achieve the conservation objective of the stock; and 4) specify actions necessary to rebuild the stock. The STT completed a stock assessment, which was presented to the Council in March 2008, and included a number of recommendations intended to address the required actions identified above.

Section 3.1.2 of the FMP states:

> *"… The applicable annual objectives of Council-adopted rebuilding programs developed in response to an overfishing concern or the requirements of consultation standards promulgated by NMFS under the ESA may be employed without plan amendment to assure timely implementation. All of these changes will be documented during the Council's preseason planning process."*

The Council adopted for public review a proposed set of recommendations, based on those presented in the STT stock assessment, to be implemented through the annual management measures and a regulatory amendment beginning with the 2008 ocean fishery management measures. The Council will take public comment on the proposed regulatory amendment at the public hearings and during the April Council meeting prior to taking final action.

Council Proposed KRFC Rebuilding Strategy

1. Consider the Overfishing Concern of KRFC ended when a natural spawning escapement of at least 35,000 adults is achieved in three out of four consecutive years or when a natural spawning escapement of at least 40,700 adult KRFC is achieved in two consecutive years.

2. Target a natural spawning escapement of 40,700 adult KRFC until the Overfishing Concern is ended (the rebuilding period). When implementing *de minimis* fisheries during the rebuilding period, provide for an age-4 ocean impact rate of no more than 10 percent when preseason stock abundance forecasts result in pre-fishing spawning escapement projections of less than about 54,000.

3. No further modifications in parameterizing the Klamath Ocean Harvest Model (KOHM) components are recommended at this time.

4. During periods of stock rebuilding, fall fishing opportunity in areas impacting KRFC abundance should be restricted.

5. The practice of reopening the upper Klamath and Trinity rivers to recreational fishing once hatchery egg take goals are met should be suspended during rebuilding periods or when an Overfishing Concern is imminent.

6. All river fishery strata should be sampled at a minimum sampling rate of 20 percent for catch and biological information, including coded-wire tags (CWTs) used to estimate impact on natural area spawners and returns of hatchery fish.

7. No change to the current FMP conservation objective for KRFC.

8. Encourage implementation of a 25 percent constant fractional marking program at Iron Gate Hatchery.

9. Encourage further research on disease issues in the Klamath Basin as they relate to population dynamics and fishery management.

10. Encourage expanded studies of tributary and mainstem production and survival rates of KRFC.

11. Encourage studies of early-life marine survival rates for KRFC.

12. Continued Council involvement in the Federal Energy Regulatory Commission (FERC) relicensing process, and consideration of Council recommendations by FERC.

Additional information on the recommendations contained in the STT stock assessment and the analyses that support them can be found in the stock assessment, which was distributed as Agenda Item D.3.b, KRFC Stock Assessment in the Council's March 2008 briefing book (http://www.pcouncil.org/bb/2008/0308/D3b_KRFC.pdf), or upon request from the Council office (pfmc.comments@noaa.gov).

PFMC
03/21/08

SALMON TECHNICAL TEAM

ANALYSIS OF TENTATIVE 2008 OCEAN SALMON FISHERY MANAGEMENT MEASURES

Thursday
April 10, 2008

TABLE 1. Commercial troll management measures collated by the STT for non-Indian ocean salmon fisheries, 2008. (Page 1 of 5)

North of Cape Falcon

A. SEASON DESCRIPTIONS

Supplemental Management Information

1. Overall non-Indian TAC: 40,000 Chinook and 25,000 coho marked with a healed adipose fin clip (marked).
2. Trade: none.
3. Non-Indian commercial troll TAC: 20,000 Chinook and 4,000 marked coho.

U.S./Canada Border to Cape Falcon

- May 3 through earlier of June 30 or 11,700 Chinook quota.

Saturday through Tuesday with a landing and possession limit of 50 Chinook per vessel for each open period north of Leadbetter Point or 50 Chinook south of Leadbetter Point (C.1). All salmon except coho (C.7). Cape Flattery, Mandatory Yelloweye Rockfish Conservation Area, and Columbia Control Zones closed (C.5). See gear restrictions and definitions (C.2, C.3). Oregon State regulations require that fishers south of Cape Falcon, OR intending to fish within this area notify Oregon Department of Fish and Wildlife before transiting the Cape Falcon, OR line (45º46'00" N. lat.) at the following number: 541-867-0300 Ext. 271. Vessels must land and deliver their fish within 24 hours of any closure of this fishery. Under state law, vessels must report their catch on a state fish receiving ticket. Vessels fishing or in possession of salmon while fishing north of Leadbetter Point must land and deliver their fish within the area and north of Leadbetter Point. Vessels fishing or in possession of salmon while fishing south of Leadbetter Point must land and deliver their fish within the area and south of Leadbetter Point, except that Oregon permitted vessels may also land their fish in Garibaldi, Oregon. Oregon State regulations require all fishers landing salmon into Oregon from any fishery between Leadbetter Point, Washington and Cape Falcon, Oregon must notify ODFW within one hour of delivery or prior to transport away from the port of landing by calling 541-867-0300 Ext. 271. Notification shall include vessel name and number, number of salmon by species, port of landing and location of delivery, and estimated time of delivery. Inseason actions may modify harvest guidelines in later fisheries to achieve or prevent exceeding the overall allowable troll harvest impacts (C.8).

U.S./Canada Border to Cape Falcon

- July 1 through earlier of September 16 or 8,300 preseason Chinook guideline (C.8) or a 4,000 marked coho quota (C.8.d).

Open July 1-2, then Saturday through Tuesday thereafter. Landing and possession limit of 35 Chinook and 25 coho per vessel per open period north of Leadbetter Point or 35 Chinook and 25 coho south of Leadbetter Point (C.1). All Salmon except no chum retention north of Cape Alava, Washington in August and September (C.7). All coho must have a healed adipose fin clip (C.8.d). Gear restricted to plugs six inches or longer. See gear restrictions and definitions (C.2, C.3). Cape Flattery, Mandatory Yelloweye Rockfish Conservation Area, and Columbia Control Zones closed (C.5). Oregon State regulations require that fishers south of Cape Falcon, OR intending to fish within this area notify Oregon Department of Fish and Wildlife before transiting the Cape Falcon, OR line (45º46'00" N. lat.) at the following number: 541-867-0300 Ext. 271. Vessels must land and deliver their fish within 24 hours of any closure of this fishery. Under state law, vessels must report their catch on a state fish receiving ticket. Vessels fishing or in possession of salmon while fishing north of Leadbetter Point must land and deliver their fish within the area and north of Leadbetter Point. Vessels fishing or in possession of salmon while fishing south of Leadbetter Point must land and deliver their fish within the area and south of Leadbetter Point, except that Oregon permitted vessels may also land their fish in Garibaldi, Oregon. Oregon State regulations require all fishers landing salmon into Oregon from any fishery between Leadbetter Point, Washington and Cape Falcon, Oregon must notify ODFW within one hour of delivery or prior to transport away from the port of landing by calling 541-867-0300 Ext. 271. Notification shall include vessel name and number, number of salmon by species, port of landing and location of delivery, and estimated time of delivery. Inseason actions may modify harvest guidelines in later fisheries to achieve or prevent exceeding the overall allowable troll harvest impacts (C.8).

TABLE 1. Commercial troll management measures collated by the STT for non-Indian ocean salmon fisheries, 2008.
(Page 2 of 5)

A. SEASON DESCRIPTIONS

South of Cape Falcon

Supplemental Management Information

1. Sacramento Basin recreational fishery allocation: 1,000.
2. Klamath River recreational fishery allocation: 20,200.
3. Klamath tribal allocation: 26,500.

Cape Falcon to Humbug Mt.

- May 1-31.

All salmon except coho (C.7). Chinook 28 inch total length minimum size (B). All vessels fishing in the area must land their fish in the State of Oregon. See gear restrictions and definitions (C.2, C.3) and Oregon State regulations for a description of special regulations at the mouth of Tillamook Bay.

- June 1 through August 31: closed except for sufficient impacts to conduct experimental genetic stock identification study.

All salmon must be released in good condition after collection of biological samples.

In 2009, the season will open March 15 for all salmon except coho. This opening could be modified following Council review at its March 2009 meeting.

Humbug Mt. to OR/CA Border (Oregon KMZ)

- May 1 through August 31: closed except for sufficient impacts to conduct experimental genetic stock identification study.

All salmon must be released in good condition after collection of biological samples.

In 2009, the season will open March 15 for all salmon except coho, with a 28 inch Chinook minimum size limit. This opening could be modified following Council review at its March 2009 meeting..

OR/CA Border to Humboldt South Jetty (California KMZ)

- May 1 through August 31: closed except for sufficient impacts to conduct experimental genetic stock identification study.

All salmon must be released in good condition after collection of biological samples.

Humboldt South Jetty to Horse Mt.

- May 1 through August 31: closed except for sufficient impacts to conduct experimental genetic stock identification study.

All salmon must be released in good condition after collection of biological samples.

Horse Mt. to Point Arena (Fort Bragg)

- May 1 through August 31: closed except for sufficient impacts to conduct experimental genetic stock identification study.

All salmon must be released in good condition after collection of biological samples.

Pt. Arena to Pigeon Pt. (San Francisco)

- May 1 through August 31: closed except for sufficient impacts to conduct experimental genetic stock identification study.

All salmon must be released in good condition after collection of biological samples.

Pigeon Pt. to Pt. Sur (Monterey)

- May 1 through August 31: closed except for sufficient impacts to conduct experimental genetic stock identification study.

All salmon must be released in good condition after collection of biological samples.

Pt. Sur to U.S./Mexico Border (Morro Bay)

- May 1 through August 31: closed except for sufficient impacts to conduct experimental genetic stock identification study.

All salmon must be released in good condition after collection of biological samples.

TABLE 1. Commercial troll management measures Collated by the STT for non-Indian ocean salmon fisheries, 2008.
(Page 3 of 5)

A. SEASON DESCRIPTIONS

B. MINIMUM SIZE (Inches) (See C.1)

	Chinook		Coho		
Area (when open)	Total Length	Head-off	Total Length	Head-off	Pink
North of Cape Falcon	28.0	21.5	16.0	12.0	None
Cape Falcon to OR/CA Border	28.0	21.5	16.0	12.0	
OR/CA Border to Horse Mt.	28.0	21.5	-	-	None
Horse Mt. to U.S./Mexico Border					
Prior to July 1 and after August 31	27.0	20.5	-	-	None
July 1-August 31	28.0	21.5	-	-	None

C. REQUIREMENTS, DEFINITIONS, RESTRICTIONS, OR EXCEPTIONS

C.1. Compliance with Minimum Size or Other Special Restrictions: All salmon on board a vessel must meet the minimum size, landing/possession limit, or other special requirements for the area being fished and the area in which they are landed if the area is open. Salmon may be landed in an area that has been closed more than 96 hours only if they meet the minimum size, landing/possession limit, or other special requirements for the area in which they were caught. Salmon may be landed in an area that has been closed less than 96 hours only if they meet the minimum size, landing/possession limit, or other special requirements for the areas in which they were caught and landed.

States may require fish landing/receiving tickets be kept on board the vessel for 90 days after landing to account for all previous salmon landings.

C.2. Gear Restrictions: Salmon may be taken only by hook and line using barbless hooks.

a. Single point, single shank, barbless hooks are required in all fisheries.
b. Cape Falcon, Oregon, to the OR/CA border: No more than 4 spreads are allowed per line.
c. OR/CA border to U.S./Mexico border: No more than 6 lines are allowed per vessel, and barbless circle hooks are required when fishing with bait by any means other than trolling.

C.3. Gear Definitions:

Trolling defined: Fishing from a boat or floating device that is making way by means of a source of power, other than drifting by means of the prevailing water current or weather conditions.

Troll fishing gear defined: One or more lines that drag hooks behind a moving fishing vessel. In that portion of the fishery management area (FMA) off Oregon and Washington, the line or lines must be affixed to the vessel and must not be intentionally disengaged from the vessel at any time during the fishing operation.

Spread defined: A single leader connected to an individual lure or bait.

Circle hook defined: A hook with a generally circular shape and a point which turns inward, pointing directly to the shank at a 90º angle.

C.4. Transit Through Closed Areas with Salmon on Board: It is unlawful for a vessel to have troll or recreational gear in the water while transiting any area closed to fishing for a certain species of salmon, while possessing that species of salmon; however, fishing for species other than salmon is not prohibited if the area is open for such species, and no salmon are in possession.

TABLE 1. Commercial troll management measures collated by the STT for non-Indian ocean salmon fisheries, 2008. (Page 4 of 5)
C. REQUIREMENTS, DEFINITIONS, RESTRICTIONS, OR EXCEPTIONS (continued)

C.5. Control Zone Definitions:

a. *Cape Flattery Control Zone* - The area from Cape Flattery (48º23'00" N. lat.) to the northern boundary of the U.S. EEZ; and the area from Cape Flattery south to Cape Alava (48º10'00" N. lat.) and east of 125º05'00" W. long.

b. *Mandatory Yelloweye Rockfish Conservation Area* – The area in Washington Marine Catch Area 3 from 48°00.00' N. lat.; 125°14.00' W. long. to 48°02.00' N. lat.; 125°14.00' W. long. to 48°02.00' N. lat.; 125°16.50' W. long. to 48°00.00' N. lat.; 125°16.50' W. long. and connecting back to 48°00.00' N. lat.; 125°14.00' W. long.

c. *Columbia Control Zone* - An area at the Columbia River mouth, bounded on the west by a line running northeast/southwest between the red lighted Buoy #4 (46°13'35" N. lat., 124°06'50" W. long.) and the green lighted Buoy #7 (46°15'09' N. lat., 124°06'16" W. long.); on the east, by the Buoy #10 line which bears north/south at 357° true from the south jetty at 46°14'00" N. lat.,124°03'07" W. long. to its intersection with the north jetty; on the north, by a line running northeast/southwest between the green lighted Buoy #7 to the tip of the north jetty (46°15'48" N. lat., 124°05'20" W. long.), and then along the north jetty to the point of intersection with the Buoy #10 line; and, on the south, by a line running northeast/southwest between the red lighted Buoy #4 and tip of the south jetty (46°14'03" N. lat., 124°04'05" W. long.), and then along the south jetty to the point of intersection with the Buoy #10 line.

d. *Bandon High Spot Control Zone* - The area west of a line between 43º07'00" N. lat.; 124º37'00" W. long. and 42º40'30" N. lat; 124º 52'0" W. long. extending to the western edge of the exclusive economic zone (EEZ).

e. *Klamath Control Zone* - The ocean area at the Klamath River mouth bounded on the north by 41°38'48" N. lat. (approximately six nautical miles north of the Klamath River mouth); on the west, by 124°23'00" W. long. (approximately 12 nautical miles off shore); and on the south, by 41°26'48" N. lat. (approximately six nautical miles south of the Klamath River mouth).

C.6. Notification When Unsafe Conditions Prevent Compliance with Regulations: If prevented by unsafe weather conditions or mechanical problems from meeting special management area landing restrictions, vessels must notify the U.S. Coast Guard and receive acknowledgment of such notification prior to leaving the area. This notification shall include the name of the vessel, port where delivery will be made, approximate amount of salmon (by species) on board, and the estimated time of arrival.

C.7. Incidental Halibut Harvest: During authorized periods, the operator of a vessel that has been issued an incidental halibut harvest license may retain Pacific halibut caught incidentally in Area 2A while trolling for salmon. Halibut retained must be no less than 32 inches in total length, measured from the tip of the lower jaw with the mouth closed to the extreme end of the middle of the tail, and must be landed with the head on. License applications for incidental harvest must be obtained from the International Pacific Halibut Commission (phone: 206-634-1838). Applicants must apply prior to April 1 of each year. Incidental harvest is authorized only during May and June troll seasons and after June 30 if quota remains and if announced on the NMFS hotline (phone: 800-662-9825). ODFW and Washington Department of Fish and Wildlife (WDFW) will monitor landings. If the landings are projected to exceed the 37,707 pound preseason allocation or the total Area 2A non-Indian commercial halibut allocation, NMFS will take inseason action to close the incidental halibut fishery.

Beginning May 1, license holders may land no more than one Pacific halibut per each 2 Chinook, except one Pacific halibut may be landed without meeting the ratio requirement, and no more than 35 halibut may be landed per trip. Pacific halibut retained must be no less than 32 inches in total length (with head on).

A "C-shaped" yelloweye rockfish conservation area is an area to be voluntarily avoided for salmon trolling. NMFS and the Council request salmon trollers voluntarily avoid this area in order to protect yelloweye rockfish. The area is defined in the Pacific Council Halibut Catch Sharing Plan in the North Coast subarea (Washington marine area 3), with the following coordinates in the order listed:

48°18' N. lat.; 125°18' W. long.;
48°18' N. lat.; 124°59' W. long.;
48°11' N. lat.; 124°59' W. long.;
48°11' N. lat.; 125°11' W. long.;
48°04' N. lat.; 125°11' W. long.;
48°04' N. lat.; 124°59' W. long.;
48°00' N. lat.; 124°59' W. long.;
48°00' N. lat.; 125°18' W. long.;
and connecting back to 48°18' N. lat.; 125°18' W. long.

TABLE 1. Commercial troll management measures collated by the STT for non-Indian ocean salmon fisheries, 2008. (Page 5 of 5)
C. REQUIREMENTS, DEFINITIONS, RESTRICTIONS, OR EXCEPTIONS (continued)

C.8. Inseason Management: In addition to standard inseason actions or modifications already noted under the season description, the following inseason guidance is provided to NMFS:

a. Chinook remaining from the May through June non-Indian commercial troll harvest guideline north of Cape Falcon may be transferred to the July through September harvest guideline on a fishery impact equivalent basis.

b. NMFS may transfer fish between the recreational and commercial fisheries north of Cape Falcon if there is agreement among the areas' representatives on the SAS.

c. At the March 2009 meeting, the Council will consider inseason recommendations for special regulations for any experimental fisheries (proposals must meet Council protocol and be received in November 2008).

d. If retention of unmarked coho is permitted in the area from the U.S./Canada border to Cape Falcon, Oregon, by inseason action, the allowable coho quota will be adjusted to ensure preseason projected mortality of critical stocks is not exceeded.

C.9. Consistent with Council management objectives:

a. the State of Oregon may establish additional late-season fisheries in state waters.

b. the State of California may establish limited fisheries in selected state waters.

Check state regulations for details.

C.10. For the purposes of California Department of Fish and Game (CDFG) Code, Section 8232.5, the definition of the KMZ for the ocean salmon season shall be that area from Humbug Mt., Oregon, to Horse Mt., California.

TABLE 2. Recreational management measures collated by the STT for non-Indian ocean salmon fisheries, 2008. (Page 1 of 4)

A. SEASON DESCRIPTIONS

North of Cape Falcon

Supplemental Management Information

1. Overall non-Indian TAC: 40,000 Chinook and 25,000 coho marked with a healed adipose fin clip (marked).
2. Recreational TAC: 20,000 Chinook and 20,350 marked coho; all retained coho must be marked.
3. Trade: none.
4. Area 4B add-on fishery opens upon ocean closure with a quota of 4,000 marked coho and Chinook retention subject to the 950 Chinook guideline in the Neah Bay Subarea (C.5).
5. Buoy 10 fishery opens Aug. 1 with an expected landed catch of 4,000 marked coho in August and September.

U.S./Canada Border to Leadbetter Point

- June 1 through earlier of June 28 or a quota of 8,200 Chinook (C.5).

Tuesday through Saturday north of the Queets River (Neah Bay and La Push Subareas) and Sunday through Thursday south of the Queets River (Westport subarea). Chinook only, one fish per day. Chinook 24-inch total length minimum size limit (B). See gear restrictions (C.2). Inseason management may be used to sustain season length and keep harvest within the overall Chinook recreational TAC for north of Cape Falcon (C.5).

Leadbetter Point to Cape Falcon (Columbia River Subarea)

- June 1 through earlier of June 28 or a subarea guideline of 5,300 Chinook (C.5).

Seven days per week. Chinook only, one fish per day. Chinook 24-inch total length minimum size limit (B). See gear restrictions (C.2). Inseason management may be used to sustain season length and keep harvest within the overall Chinook recreational TAC for north of Cape Falcon (C.5).

U.S./Canada Border to Cape Alava (Neah Bay)

- July 1 through earlier of September 13 or 2,060 marked coho subarea quota with a subarea guideline of 950 Chinook (C.5).

Tuesday through Saturday. All salmon two fish per day, no more than one of which can be a Chinook and no chum retention August 1 through Sept. 13. Chinook 24-inch total length minimum size limit (B). All retained coho must be marked. See gear restrictions (C.2). Closed east of a true north-south line running through Sail Rock in July. Beginning August 1, Chinook non-retention east of the Bonilla-Tatoosh line (C.4.a) during Council managed ocean fishery. Inseason management may be used to sustain season length and keep harvest within the overall Chinook recreational TAC for north of Cape Falcon (C.5).

Cape Alava to Queets River (La Push Subarea)

- July 1 through earlier of September 13 or 540 marked coho subarea quota with a subarea guideline of 350 Chinook (C5).
- September 20 through earlier of October 5 or 50 marked coho quota or 100 Chinook quota (C5): In the area north of 47°50'00 N. lat. and south of 48°00'00" N. lat. (C.6).

Tuesday through Saturday through September 13. All salmon, two fish per day, no more than one of which can be a Chinook. Chinook 24-inch total length minimum size limit (B). All retained coho must be marked. See gear restrictions (C.2). Inseason management may be used to sustain season length and keep harvest within the overall Chinook recreational TAC for north of Cape Falcon (C.5).

Queets River to Leadbetter Point (Westport Subarea)

- June 29 through earlier of September 13 or 7,520 marked coho subarea quota with a subarea guideline of 5,100 Chinook (C.5).

Sunday through Thursday. All salmon, two fish per day, no more than one of which can be a Chinook. Chinook 24-inch total length minimum size limit (B). All retained coho must be marked. See gear restrictions and definitions (C.2, C.3). Grays Harbor Control Zone closed beginning August 1 (C.4.b). Inseason management may be used to sustain season length and keep harvest within the overall Chinook recreational TAC for north of Cape Falcon (C.5).

Leadbetter Point to Cape Falcon (Columbia River Subarea)

- June 29 through earlier of September 30 or 10,180 marked coho subarea quota with any remainder of the 5,300 Chinook subarea guideline from the June Chinook directed fishery (C.5).

Sunday through Thursday. All salmon, two fish per day, no more than one of which can be a Chinook. Chinook 24-inch total length minimum size limit (B). All retained coho must be marked. See gear restrictions and definitions (C.2, C.3). Columbia Control Zone closed (C.4.c). Inseason management may be used to sustain season length and keep harvest within the overall Chinook recreational TAC for north of Cape Falcon (C.5).

TABLE 2. Recreational management options **adopted by the Council** for non-Indian ocean salmon fisheries, 2008. (Page 3 of 8)

A. SEASON OPTION DESCRIPTIONS		
OPTION I	OPTION II	OPTION III
South of Cape Falcon	**South of Cape Falcon**	**South of Cape Falcon**
Supplemental Management Information	**Supplemental Management Information**	**Supplemental Management Information**
1. Sacramento Basin recreational fishery allocation: 1,000. 2. Klamath River recreational fishery allocation: 20,200. 3. Klamath tribal allocation: 26,500. 4. All retained coho must be marked with a healed adipose fin clip (marked).	1. Sacramento Basin recreational fishery allocation: 1,000. 2. Klamath River recreational fishery allocation: 20,200. 3. Klamath tribal allocation: 26,500. 4. All retained coho must be marked with a healed adipose fin clip (marked).	1. Sacramento Basin recreational fishery allocation: 1,000. 2. Klamath River recreational fishery allocation: 20,200. 3. Klamath tribal allocation: 26,500. 4. All retained coho must be marked with a healed adipose fin clip (marked).
Cape Falcon to Humbug Mt. • May 1 through June 15 (C.6). Seven days per week. All salmon except coho; one fish per day (C.1). Chinook minimum size limit of 24 inches total length (B). See gear restrictions and definitions (C.2, C.3). Fishing in the Stonewall Bank groundfish conservation area restricted to trolling only on days the all depth recreational halibut fishery is open (see 70 FR 20304, and call the halibut fishing hotline 1-800-662-9825 for additional dates) In 2009, the season will open March 15 for all salmon except coho, two fish per day (C.1). Chinook minimum size limit of 24 inches total length (B); and the same gear restrictions as in 2008 (C.2, C.3).	**Cape Falcon to Humbug Mt.** Same as Option I	**Cape Falcon to Humbug Mt.** Same as Option I
Cape Falcon to OR/CA Border • June 22 through earlier of August 31 or a landed catch of 9,000 marked coho. Seven days per week. Except as provided below in the Humbug Mt. to OR/CA border fishery for July 4-6 and August 28-31, all salmon except Chinook, two fish per day (C.1). All retained coho must be marked with a healed adipose fin clip. Fishing in the Stonewall Bank groundfish conservation area restricted to trolling only on days the all depth recreational halibut fishery is open (see 70 FR 20304, and call the halibut fishing hotline 1-800-662-9825 for additional dates) (C.3, C.4.d). Open days may be adjusted inseason to utilize the available quota (C.5).	**Cape Falcon to OR/CA Border.** Coho fishery same as Option I	**Cape Falcon to OR/CA Border.** Coho fishery same as Option I

TABLE 2. Recreational management options **analyzed by the STT** for non-Indian ocean salmon fisheries, 2008. (Page 4 of 8)

A. SEASON OPTION DESCRIPTIONS

OPTION I	OPTION II	OPTION III
Humbug Mt. to OR/CA Border. (Oregon KMZ) • May 24-26; July 4-6; August 28-31 (C.6). Except as provided above in the selective coho fishery, all salmon except coho, two fish per day (C.1). Chinook minimum size limit of 24 inches total length (B). See gear restrictions and definitions (C.2, C.3). In 2009, the season will open March 15 for all salmon except coho, two fish per day (C.1). Chinook minimum size limit of 24 inches total length (B); and the same gear restrictions as in 2008 (C.2, C.3).	**Humbug Mt. to OR/CA Border. (Oregon KMZ)** • May 24-26; July 4-6; August 16-31 (C.6). Except as provided above in the selective coho fishery, all salmon except coho, two fish per day (C.1). Chinook minimum size limit of 24 inches total length (B). See gear restrictions and definitions (C.2, C.3). In 2009, same as Option I.	**Humbug Mt. to OR/CA Border. (Oregon KMZ)** • August 16-31 (C.6). Except as provided above in the selective coho fishery, all salmon except coho, two fish per day (C.1). Chinook minimum size limit of 24 inches total length (B). See gear restrictions and definitions (C.2, C.3). In 2009, same as Option I.
OR/CA Border to Horse Mt. (California KMZ) • May 24-26; July 4-6; August 28-31 (C.6). All salmon except coho, two fish per day (C.1). Chinook minimum size limit of 24 inches total length (B). See gear restrictions and definitions (C.2, C.3). Klamath Control Zone closed in August (C.4.e). See California State regulations for additional closures adjacent to the Smith, Klamath, and Eel rivers.	**OR/CA Border to Horse Mt. (California KMZ)** • May 24-26; July 4-6; August 16-31 (C.6). All salmon except coho, two fish per day (C.1). Chinook minimum size limit of 24 inches total length (B). See gear restrictions and definitions (C.2, C.3). Klamath Control Zone closed in August (C.4.e). See California State regulations for additional closures adjacent to the Smith, Klamath, and Eel rivers.	**OR/CA Border to Horse Mt. (California KMZ)** • August 16-31 (C.6). All salmon except coho, two fish per day (C.1). Chinook minimum size limit of 24 inches total length (B). See gear restrictions and definitions (C.2, C.3). Klamath Control Zone closed in August (C.4.e). See California State regulations for additional closures adjacent to the Smith, Klamath, and Eel rivers.
Horse Mt. to Point Arena (Fort Bragg) • February 16 through March 31; • May 24-26; July 4-6; August 28-31 (C.6). All salmon except coho. Two fish per day (C.1). Chinook minimum size limit of 20 inches total length (B). See gear restrictions and definitions (C.2, C.3). In 2009, season opens February 14 for all salmon except coho, two fish per day (C.1). Chinook minimum size limit of 20 inches total length (B); and the same gear restrictions as in 2008 (C.2, C.3).	**Horse Mt. to Point Arena (Fort Bragg)** • February 16 through March 31. • July 4-6 (C.6). All salmon except coho. Two fish per day (C.1). Chinook minimum size limit of 20 inches total length (B). See gear restrictions and definitions (C.2, C.3). In 2009, the season will open April 18 for all salmon except coho, two fish per day (C.1). Chinook minimum size limit of 20 inches total length (B); and the same gear restrictions as in 2008 (C.2, C.3).	**Horse Mt. to Point Arena (Fort Bragg)** • February 16 through March 31. In 2009, same as Option II.
Point Arena to Pigeon Point (San Francisco) • May 24-26; July 4-6; August 28-31 (C.6). All salmon except coho. Two fish per day (C.1). Chinook minimum size limit of 20 inches total length (B). See gear restrictions and definitions (C.2, C.3). In 2009, the season will open April 4 for all salmon except coho, two fish per day (C.1). Chinook minimum size limit of 20 inches total length (B); and the same gear restrictions as in 2008 (C.2, C.3).	**Point Arena to Pigeon Point (San Francisco)** • July 4-6 (C.6). All salmon except coho. Two fish per day (C.1). Chinook minimum size limit of 20 inches total length (B). See gear restrictions and definitions (C.2, C.3). In 2009, the season will open April 18 for all salmon except coho, two fish per day (C.1). Chinook minimum size limit of 20 inches total length (B); and the same gear restrictions as in 2008 (C.2, C.3).	**Point Arena to Pigeon Point (San Francisco)** • Closed. In 2009, same as Option II.

TABLE 2. Recreational management options **analyzed by the STT** for non-Indian ocean salmon fisheries, 2008. (Page 5 of 8)

A. SEASON OPTION DESCRIPTIONS

OPTION I	OPTION II	OPTION III
Pigeon Point to U.S./Mexico Border (Monterey South) • May 18-26 (C.6). All salmon except coho. Two fish per day (C.1). Chinook minimum size limit of 20 inches total length (B). See gear restrictions and definitions (C.2, C.3). In 2009, the season will open April 4 for all salmon except coho, two fish per day (C.1). Chinook minimum size limit of 20 inches total length (B); and the same gear restrictions as in 2008 (C.2, C.3).	**Pigeon Point to U.S./Mexico Border (Monterey South)** • May 23-26 (C.6). All salmon except coho. Two fish per day (C.1). Chinook minimum size limit of 20 inches total length (B). See gear restrictions and definitions (C.2, C.3). In 2009, the season will open April 18 for all salmon except coho, two fish per day (C.1). Chinook minimum size limit of 20 inches total length (B); and the same gear restrictions as in 2008 (C.2, C.3).	**Pigeon Point to U.S./Mexico Border (Monterey)** • Closed. In 2009, same as Option II.

TABLE 2. Recreational management measures collated by the STT for non-Indian ocean salmon fisheries, 2008. (Page 3 of 4)

B. MINIMUM SIZE (Inches) (See C.1)

Area (when open)	Chinook	Coho	Pink
North of Cape Falcon	24.0	16.0	None
Cape Falcon to OR/CA Border	24.0	16.0	None
OR/CA Border to Horse Mountain	24.0	-	20.0
Horse Mt. to U.S./Mexico Border	20.0	-	20.0

C. REQUIREMENTS, DEFINITIONS, RESTRICTIONS, OR EXCEPTIONS

C.1. Compliance with Minimum Size and Other Special Restrictions: All salmon on board a vessel must meet the minimum size or other special requirements for the area being fished and the area in which they are landed if that area is open. Salmon may be landed in an area that is closed only if they meet the minimum size or other special requirements for the area in which they were caught.

Ocean Boat Limits: Off the coast of Washington, Oregon, and California, each fisher aboard a vessel may continue to use angling gear until the combined daily limits of salmon for all licensed and juvenile anglers aboard has been attained (additional state restrictions may apply).

C.2. Gear Restrictions: Salmon may be taken only by hook and line using barbless hooks. All persons fishing for salmon, and all persons fishing from a boat with salmon on board, must meet the gear restrictions listed below for specific areas or seasons.

a. U.S./Canada Border to Point Conception, California: No more than one rod may be used per angler; and no more than two single point, single shank barbless hooks are required for all fishing gear. [Note: ODFW regulations in the state-water fishery off Tillamook Bay may allow the use of barbed hooks to be consistent with inside regulations.]

b. Cape Falcon, Oregon, to Point Conception, California: Anglers must use no more than two single point, single shank, barbless hooks.

c. Horse Mt., California, to Point Conception, California: Single point, single shank, barbless circle hooks (below) are required when fishing with bait by any means other than trolling, and no more than two such hooks shall be used. When angling with two hooks, the distance between the hooks must not exceed five inches when measured from the top of the eye of the top hook to the inner base of the curve of the lower hook, and both hooks must be permanently tied in place (hard tied). Circle hooks are not required when artificial lures are used without bait.

C.3. Gear Definitions:

a. *Recreational fishing gear defined*: Angling tackle consisting of a line with no more than one artificial lure or natural bait attached. Off Oregon and Washington, the line must be attached to a rod and reel held by hand or closely attended; the rod and reel must be held by hand while playing a hooked fish. No person may use more than one rod and line while fishing off Oregon or Washington. Off California, the line must be attached to a rod and reel held by hand or closely attended. Weights directly attached to a line may not exceed four pounds (1.8 kg). While fishing off California north of Point Conception, no person fishing for salmon, and no person fishing from a boat with salmon on board, may use more than one rod and line. Fishing includes any activity which can reasonably be expected to result in the catching, taking, or harvesting of fish.

b. *Trolling defined*: Angling from a boat or floating device that is making way by means of a source of power, other than drifting by means of the prevailing water current or weather conditions.

c. Circle hook defined: A hook with a generally circular shape and a point which turns inward, pointing directly to the shank at a 90° angle.

TABLE 2. Recreational management measures collated by the STT for non-Indian ocean salmon fisheries, 2008. (Page 4 of 4)
C. REQUIREMENTS, DEFINITIONS, RESTRICTIONS, OR EXCEPTIONS (continued)

C.4. Control Zone Definitions:

a. *The Bonilla-Tatoosh Line*: A line running from the western end of Cape Flattery to Tatoosh Island Lighthouse (48°23'30" N. lat., 124°44'12" W. long.) to the buoy adjacent to Duntze Rock (48°28'00" N. lat., 124°45'00" W. long.), then in a straight line to Bonilla Point (48°35'30" N. lat., 124°43'00" W. long.) on Vancouver Island, British Columbia.

b. *Grays Harbor Control Zone* - The area defined by a line drawn from the Westport Lighthouse (46° 53'18" N. lat., 124° 07'01" W. long.) to Buoy #2 (46° 52'42" N. lat., 124°12'42" W. long.) to Buoy #3 (46° 55'00" N. lat., 124°14'48" W. long.) to the Grays Harbor north jetty (46° 36'00" N. lat., 124°10'51" W. long.).

c. *Columbia Control Zone*: An area at the Columbia River mouth, bounded on the west by a line running northeast/southwest between the red lighted Buoy #4 (46°13'35" N. lat., 124°06'50" W. long.) and the green lighted Buoy #7 (46°15'09' N. lat., 124°06'16" W. long.); on the east, by the Buoy #10 line which bears north/south at 357° true from the south jetty at 46°14'00" N. lat., 124°03'07" W. long. to its intersection with the north jetty; on the north, by a line running northeast/southwest between the green lighted Buoy #7 to the tip of the north jetty (46°15'48" N. lat., 124°05'20" W. long. and then along the north jetty to the point of intersection with the Buoy #10 line; and on the south, by a line running northeast/southwest between the red lighted Buoy #4 and tip of the south jetty (46°14'03" N. lat., 124°04'05" W. long.), and then along the south jetty to the point of intersection with the Buoy #10 line.

d. *Stonewall Bank Groundfish Conservation Area*: The area defined by the following coordinates in the order listed:
44°37.46' N. lat.; 124°24.92' W. long.;
44°37.46' N. lat.; 124°23.63' W. long.;
44°28.71' N. lat.; 124°21.80' W. long.;
44°28.71' N. lat.; 124°24.10' W. long.;
44°31.42' N. lat.; 124°25.47' W. long.;
and connecting back to 44°37.46' N. lat.; 124°24.92' W. long.

e. *Klamath Control Zone*: The ocean area at the Klamath River mouth bounded on the north by 41°38'48" N. lat. (approximately six nautical miles north of the Klamath River mouth); on the west, by 124°23'00" W. long. (approximately 12 nautical miles off shore); and, on the south, by 41°26'48" N. lat. (approximately 6 nautical miles south of the Klamath River mouth).

C.5. Inseason Management: Regulatory modifications may become necessary inseason to meet preseason management objectives such as quotas, harvest guidelines, and season duration. In addition to standard inseason actions or modifications already noted under the season description, the following inseason guidance is provided to NMFS:

a. Actions could include modifications to bag limits, or days open to fishing, and extensions or reductions in areas open to fishing.

b. Coho may be transferred inseason among recreational subareas north of Cape Falcon on an impact neutral basis to help meet the recreational season duration objectives (for each subarea) after conferring with representatives of the affected ports and the Council’s SAS recreational representatives north of Cape Falcon.

c. Chinook and coho may be transferred between the recreational and commercial fisheries north of Cape Falcon on an impact neutral basis if there is agreement among the representatives of the SAS.

d. If retention of unmarked coho is permitted in the area from the U.S./Canada border to Cape Falcon, Oregon, by inseason action, the allowable coho quota will be adjusted to ensure preseason projected mortality of critical stocks is not exceeded.

C.6. Additional Seasons in State Territorial Waters: Consistent with Council management objectives, the States of Washington and Oregon, and California may establish limited seasons in state waters. Oregon State-water fisheries are limited to Chinook salmon. Check state regulations for details.

TABLE 3. Treaty Indian ocean troll management measures collated by the STT for ocean salmon fisheries, 2008.
(Page 1 of 1)

A. SEASON DESCRIPTIONS

Supplemental Management Information

1. Overall Treaty-Indian TAC: 37,500 Chinook and 20,000 coho.

U.S./Canada Border to Cape Falcon

- May 1 through the earlier of June 30 or 20,000 Chinook quota.

All salmon except coho. If the Chinook quota for the May-June fishery is not fully utilized, the excess fish cannot be transferred into the later all-salmon season. If the Chinook quota is exceeded, the excess will be deducted from the later all-salmon season. See size limit (B) and other restrictions (C).

- July 1 through the earlier of September 15, or 17,500 preseason Chinook quota, or 20,000 coho quota.

All Salmon. See size limit (B) and other restrictions (C).

B. MINIMUM SIZE (Inches)

	Chinook		Coho		
Area (when open)	Total Length	Head-off	Total Length	Head-off	Pink
North of Cape Falcon	24.0	18.0	16.0	12.0	None

C. REQUIREMENTS, DEFINITIONS, RESTRICTIONS, OR EXCEPTIONS

C.1. Tribe and Area Boundaries. All boundaries may be changed to include such other areas as may hereafter be authorized by a Federal court for that tribe's treaty fishery.

S'KLALLAM - Washington State Statistical Area 4B (All).

MAKAH - Washington State Statistical Area 4B and that portion of the FMA north of 48°02'15" N. lat. (Norwegian Memorial) and east of 125°44'00" W. long.

QUILEUTE - That portion of the FMA between 48°07'36" N. lat. (Sand Pt.) and 47°31'42" N. lat. (Queets River) and east of 125°44'00" W. long.

HOH - That portion of the FMA between 47°54'18" N. lat. (Quillayute River) and 47°21'00" N. lat. (Quinault River) and east of 125°44'00" W. long.

QUINAULT - That portion of the FMA between 47°40'06" N. lat. (Destruction Island) and 46°53'18"N. lat. (Point Chehalis) and east of 125°44'00" W. long.

C.2. Gear restrictions

a. Single point, single shank, barbless hooks are required in all fisheries.
b. No more than 8 fixed lines per boat.
c. No more than four hand held lines per person in the Makah area fishery (Washington State Statistical Area 4B and that portion of the FMA north of 48°02'15" N. lat. (Norwegian Memorial) and east of 125°44'00" W. long.)

C.3. Quotas

a. The quotas include troll catches by the S'Klallam and Makah tribes in Washington State Statistical Area 4B from May 1 through September 15.
b. The Quileute Tribe will continue a ceremonial and subsistence fishery during the time frame of September 15 through October 15 in the same manner as in 2004, 2005, 2006, and 2007. Fish taken during this fishery are to be counted against treaty troll quotas established for the 2008 season (estimated harvest during the October ceremonial and subsistence fishery: 100 Chinook; 200 coho).

C.4. Area Closures

a. The area within a six nautical mile radius of the mouths of the Queets River (47°31'42" N. lat.) and the Hoh River (47°45'12" N. lat.) will be closed to commercial fishing.
b. A closure within two nautical miles of the mouth of the Quinault River (47°21'00" N. lat.) may be enacted by the Quinault Nation and/or the State of Washington and will not adversely affect the Secretary of Commerce's management regime.

TABLE 5. Projected key stock escapements (thousands of fish) or management criteria for 2008 ocean fishery options analyzed by the STT.[a/] (Page 1 of 2)

Key Stock/Criteria	Projected Ocean Escapement[b/] or other Criteria (Council Area impacts in parens) Option I	Option II	Option III		Spawner Objective or Other Comparative Standard as Noted
				CHINOOK	
Columbia Upriver Brights	165.9	165.9	165.9	57.3	Minimum ocean escapement to attain 46.0 adults over McNary Dam, with normal distribution and no mainstem harvest.
Mid-Columbia Brights	55.1	55.1	55.1	16.6	Minimum ocean escapement to attain 5.75 adults for Bonneville Hatchery and 2.0 for Little White Salmon Hatchery egg-take, assuming average conversion and no mainstem harvest.
Columbia Lower River Hatchery Tules	55.4	55.4	55.4	31.1	Minimum ocean escapement to attain 14.1 adults for hatchery egg-take, with average conversion and no lower river mainstem or tributary harvest.
Columbia Lower River Natural Tules[c/] (threatened)	36.2%	36.2%	36.2%	≤ 41.0%	ESA guidance met by a total adult equivalent fishery exploitation rate on Coweeman tules (NMFS ESA consultation standard).
Columbia Lower River Wild	8.9%	8.9%	8.9%	≤ 10.0%	AEQ exploitatio rate limit in southern U.S. fisheries (WDFW objective).
(threatened)	**3.8**	**3.8**	**3.8**	5.7	MSY spawner goal for N. Lewis River fall Chinook (NMFS ESA consultation standard).
Spring Creek Hatchery Tules	86.2	86.1	86.1	11.1	Minimum ocean escapement to attain 7.0 adults for Spring Creek Hatchery egg-take, assuming average conversion and no mainstem harvest.
Snake River Fall (threatened) SRFI	48.0%	48.0%	48.0%	≤ 70.0%	Of 1988-1993 base period exploitation rate for all ocean fisheries (NMFS ESA consultation standard).
Klamath River Fall	40.7[e/]	40.7	40.7	40.7	Minimum number of adult spawners to natural spawning areas. 2008 Council guidance.
Federally recognized tribal harvest	50.0%	50.0%	50.0%	50.0%	Equals 27.3, 26.4, and 27.1 (thousand) adult fish for Yurok and Hoopa tribal fisheries.
Spawner Reduction Rate	47.1%	47.1%	47.1%	≤ 66.7%	Equals 36.2, 36.2, and 36.2 (thousand) fewer adult spawners due to fishing.
Adult river mouth return	112.6	112.3	112.4	NA	
Age 4 ocean harvest rate	3.5%	3.7%	3.7%	≤ 16.0%	NMFS ESA consultation standard for threatened California coastal Chinook.
KMZ sport fishery share	13.8%	19.9%	18.7%		Equals 0.9, 1.3, and 1.2 (thousand) adult fish in the KMZ ocean sport fishery.
CA:OR troll fishery share	63:37	63:37	63:37	50:50	2006 KFMC recommendation, no guidance for 2008.
River recreational fishery share	76.3%	74.6%	75.1%	≥ 15%	2008 Council Guidance. Equals 18.6, 21.9, and 22.6 (thousand) adult fish for recreational inriver fisheries.
Sacramento River Winter (endangered)	Met	Met	Met	Recreational seasons: Point Arena to Pigeon Point between the first Saturday in April and the second Sunday in November; Pigeon Point to the U.S./Mexico Border between the first Saturday in April and the first Sunday in October. Minimum size limit ≥ 20 inches total length. Commercial seasons: Point Arena to the U.S./Mexico border between May 1 and September 30, except Point Reyes to Point San Pedro between October 1 and15. Minimum size limit ≥ 26 inches total length. (NMFS ESA consultation standard).	
Sacramento River Fall	**53.7**	**53.9**	**54.2**	122.0-180.0	FMP objective for Sacramento River fall natural and hatchery adult spawners.
Ocean commercial impacts	5.7	5.7	5.7		Includes fall (Sept-Dec) 2007 impacts of 3.1 SRFC.
Ocean recreational impacts	1.5	1.3	1.1		Includes fall 2007 (0.9 SRFC) and Feb-Mar 2008 Fort Bragg (0.01 SRFC) fishery impacts.
River recreational impacts	1.7	1.7	1.7		Includes impacts from catch & release fishery and 1.0 (thousand) SRFC adult harvest.
Hatchery spawner goal	**7.1**	**7.1**	**7.1**	12.0	Coleman Hatchery: number of adults to achieve egg take goal.
	3.1	**3.1**	**3.1**	6.0	Feather River Hatchery: number of adults to achieve egg take goal.
	2.8	**2.8**	**2.8**	4.0	Nimbus Hatchery: number of adults to achieve egg take goal.

TABLE 5. Projected key stock escapements (thousands of fish) or management criteria for 2008 ocean fishery options analyzed by the STT.[a/] (Page 2 of 2)

Key Stock/Criteria	Projected Ocean Escapement[b/] or other Criteria (Council Area impacts in parens) Option I	Option II	Option III	Spawner Objective or Other Comparative Standard as Noted	
				COHO	
Interior Fraser (Thompson River)	8.3%(3.1%)	8.3%(3.1%)	8.3%(3.1%)	≤ 10.0%	Total exploitation rate for all U.S. fisheries south of the U.S./Canada border based on 2002 PSC coho agreement.
Skagit	30.4%(2.9%)	30.4%(2.9%)	30.4%(2.9%)	≤ 35.0%	2008 total exploitation rate ceiling based on 2002 PSC coho agreement[c/]
	51.4	51.4	51.4	30.0	MSP level of adult spawners Identified in FMP.
Stillaguamish	37.8%(1.9%)	37.8%(1.9%)	37.8%(1.9%)	≤ 50.0%	2008 total exploitation rate ceiling based on 2002 PSC coho agreement[c/]
	25.5	25.5	25.5	17.0	MSP level of adult spawners Identified in FMP.
Snohomish	34.5%(1.9%)	34.5%(1.9%)	34.5%(1.9%)	≤ 40.0%	2008 total exploitation rate ceiling based on 2002 PSC coho agreement[c/]
	79.6	79.6	79.6	70.0	MSP level of adult spawners Identified in FMP.
Hood Canal	**46.0%**(3.0%)	**46.0%**(3.0%)	**46.0%**(3.0%)	≤ 45.0%	2008 total exploitation rate ceiling based on 2002 PSC coho agreement[c/]
	21.2	**21.2**	**21.2**	21.5	MSP level of adult spawners Identified in FMP.
Strait of Juan de Fuca	11.0%(2.2%)	11.0%(2.2%)	11.0%(2.2%)	≤ 40.0%	2008 total exploitation rate ceiling based on 2002 PSC coho agreement[c/]
	22.0	22.0	22.0	12.8	MSP level of adult spawners Identified in FMP.
Quillayute Fall	10.0	10.0	10.0	6.3-15.8	FMP objective MSY adult spawner range (not annual target). Annual
Hoh	3.9	3.9	3.9	2.0-5.0	management objectives may be different and are subject to agreement between
Queets Wild	8.9	8.9	8.9	5.8-14.5	WDFW and the Washington coastal treaty tribes under U.S. District Court
Grays Harbor	41.4	41.4	41.4	35.4	orders.
Lower Columbia River Natural (threatened)	**6.2%**	**6.2%**	**6.2%**	≤ 8.0%	Council area marine and mainstem Columbia River fishery exploitation rate (NMFS ESA consultation standard). Value depicted is Council area marine fishery exploitation rate only.
Upper Columbia[g/]	≥ 50%	≥ 50%	≥ 50%	≥ 50%	Minimum percentage of the run to Bonneville Dam.
Columbia River Hatchery Early	92.1	92.1	92.1	38.7	Minimum ocean escapement to attain hatchery egg-take goal of 16.0 early adult coho, with average conversion and no mainstem or tributary fisheries.
Columbia River Hatchery Late	67.9	67.9	68.0	15.2	Minimum ocean escapement to attain hatchery egg-take goal of 9.7 late adult coho, with average conversion and no mainstem or tributary fisheries.
Oregon Coastal Natural	7.9%	8.0%	7.8%	≤ 8.0%	Marine and freshwater fishery exploitation rate.
Northern California (threatened)	3.5%	3.9%	3.4%	≤ 13.0%	Marine fishery exploitation rate for R/K hatchery coho (NMFS ESA consultation standard).

a/ Projections for coho assume fishery harvest rate scalar values derived from the 2007 post-season Coho FRAM, which employs post-season observed fishery impact levels and 2007 pre-season abundance forecasts. Assumptions for Canadian and Southeast Alaska chinook fisheries operating under aggregate abundance based management regimes are based on allowable catch levels determined under the 1999 PST chinook agreement and the 2008 calibration of the PSC Chinook Model. The allowable catch levels are for an Alaska all-gear catch of 170,000, a Northern BC troll and Queen Charolette Islands catch of 124,800, and a WCVI troll and outside sport catch of 162,600.

b/ Ocean escapement is the number of salmon escaping ocean fisheries and entering freshwater with the following clarifications. Ocean escapement for Puget Sound stocks is the estimated number of salmon entering Area 4B that are available to U.S. net fisheries in Puget Sound and spawner escapement after impacts from the Canadian, U.S. ocean, and Puget Sound troll and recreational fisheries have been deducted. Numbers in parentheses represent Council area exploitation rates for Puget sound coho stocks. For Columbia River early and late coho stocks, ocean escapement represents the number of coho after the Buoy 10 fishery. Exploitation rates for OCN coho include impacts of freshwater

c/ Annual management objectives may be different than FMP goals, and are subject to agreement between WDFW and the treaty tribes under U.S. District Court orders. Total exploitation rate includes Alaskan, Canadian, Council area, Puget Sound, and freshwater fisheries and is calculated as total fishing mortality divided by total fishing mortality plus spawning escapement.

d/ Includes minor contributions from East Fork Lewis River and Sandy River.

e/ If the management expectation was for 35.0 (thousand) natural area spawners, the tribal harvest would be 30.7 and river recreational harvest would be 24.4 (thousands).

TABLE 7. Expected coastwide lower Columbia Natural (LCN) Oregon coastal natural (OCN) and Rogue/Klamath (RK) coho, and Sacramento River fall Chinook (SRFC) exploitation rates by fishery for 2008 ocean fisheries management options analyzed by the STT (Page 1 of 1)

	Exploitation Rate (Percent)											
	LCN Coho			OCN Coho			RK Coho			LCR Tule		
Fishery	I	II	III	I	II	III	I	II	III	I	II	III
SOUTHEAST ALASKA	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	2.1%	2.1%	2.1%
BRITISH COLUMBIA	0.1%	0.1%	0.1%	0.4%	0.4%	0.4%	0.2%	0.2%	0.2%	16.4%	16.4%	16.4%
PUGET SOUND/STRAIT	1.0%	0.2%	0.2%	0.2%	0.2%	0.2%	0.0%	0.0%	0.0%	0.4%	0.4%	0.4%
NORTH OF CAPE FALCON												
Treaty Indian Ocean Troll	1.5%	1.5%	1.5%	1.0%	1.0%	1.0%	0.0%	0.0%	0.0%	4.2%	4.2%	4.2%
Recreational	2.5%	2.6%	2.6%	0.7%	0.7%	0.7%	0.0%	0.0%	0.0%	2.5%	2.5%	2.5%
Non-Indian Troll	0.9%	0.9%	0.9%	0.4%	0.4%	0.5%	0.0%	0.0%	0.0%	3.0%	3.0%	3.0%
SOUTH OF CAPE FALCON												
Recreational:	1.1%	1.1%	1.1%									
Cape Falcon to Humbug Mt.				2.5%	2.5%	2.5%	0.2%	0.2%	0.2%	0.0%	0.0%	0.0%
Humbug Mt. OR/CA border (KMZ)				0.3%	0.3%	0.3%	0.5%	0.5%	0.5%			
OR/CA border to Horse Mt. (KMZ)				0.1%	0.2%	0.1%	0.5%	1.1%	0.7%			
Fort Bragg				0.1%	0.1%	0.0%	0.2%	1.0%	0.0%			
South of Pt. Arena				0.1%	0.0%	0.0%	0.1%	0.1%	0.0%			
Troll:	0.1%	0.1%	0.1%									
Cape Falcon to Humbug Mt.				0.1%	0.1%	0.1%	0.0%	0.0%	0.0%	0.6%	0.6%	0.6%
Humbug Mt. OR/CA border (KMZ)				0.1%	0.1%	0.1%	0.1%	0.1%	0.1%			
OR/CA border to Horse Mt. (KMZ)				0.3%	0.3%	0.3%	0.9%	0.9%	0.9%			
Fort Bragg				0.2%	0.2%	0.2%	0.4%	0.4%	0.4%			
South of Pt. Arena				0.1%	0.1%	0.1%	0.0%	0.0%	0.0%			
BUOY 10	0.6%	0.6%	0.6%	0.1%	0.1%	0.1%	0.0%	0.0%	0.0%	7.1%	7.1%	7.1%
ESTUARY/FRESHWATER	NA	NA	NA	1.2%	1.2%	1.2%	0.3%	0.3%	0.3%			
TOTAL[a/]	6.2%[a/]	6.2%[a/]	6.2%[a/]	7.9%	8.0%	7.8%	3.5%	3.9%	3.4%	36.2%	36.2%	36.2%

a/ Total does not include Southeast Alaska, British Columbia, Puget Sound/Strait of Juan de Fuca, or Buoy 10 fisheries for LCN coho; total does not include estuary/freshwater for RK coho.

TABLE 8. Sacramento River fall Chinook ocean impacts for 2008 ocean fisheries management options analyzed by the STT. Sacramento River fall Chinook impacts were estimated for the fall of 2007 and projected for the proposed fishing seasons. The impacts are displayed by fishery, port area, and month. (Page 1 of 1)

Commercial

Option I

Port Area	Fall '07 Sep	Fall '07 Oct	Summer '08 Apr	Summer '08 May	Summer '08 Jun	Summer '08 Jul	Summer '08 Aug	Summer Total	Year Total
NO	0	0	-	720	32	28	24	804	804
CO	0	0	-	230	31	24	19	304	304
KO	0	0	-	26	20	29	18	93	93
KC	712	-	-	8	9	28	9	54	766
FB	-	-	-	55	34	34	38	161	161
SF	1,906	394	-	134	113	117	150	514	2,814
MO	100	-	-	157	158	143	175	633	733
Total	2,718	394	0	1,331	397	402	433	2,563	5,675

Option II

Port Area	Fall '07 Sep	Fall '07 Oct	Summer '08 Apr	Summer '08 May	Summer '08 Jun	Summer '08 Jul	Summer '08 Aug	Summer Total	Year Total
NO	0	0	-	720	32	28	24	804	804
CO	0	0	-	230	31	24	19	304	304
KO	0	0	-	26	20	29	18	93	93
KC	712	-	-	8	9	28	9	54	766
FB	-	-	-	55	34	34	38	161	161
SF	1,906	394	-	134	113	117	150	514	2,814
MO	100	-	-	157	158	143	175	633	733
Total	2,718	394	0	1,331	397	402	433	2,563	5,675

Option III

Port Area	Fall '07 Sep	Fall '07 Oct	Summer '08 Apr	Summer '08 May	Summer '08 Jun	Summer '08 Jul	Summer '08 Aug	Summer Total	Year Total
NO	0	0	-	720	32	28	24	804	804
CO	0	0	-	230	31	24	19	304	304
KO	0	0	-	26	20	29	18	93	93
KC	712	-	-	8	9	28	9	54	766
FB	-	-	-	55	34	34	38	161	161
SF	1,906	394	-	134	113	117	150	514	2,814
MO	100	-	-	157	158	143	175	633	733
Total	2,718	394	0	1,331	397	402	433	2,563	5,675

Recreational

Option I

Port Area	Fall '07 Sep	Fall '07 Oct	Fall '07 Nov	Summer '08 Feb	Summer '08 Mar	Summer '08 Apr	Summer '08 May	Summer '08 Jun	Summer '08 Jul	Summer '08 Aug	Summer Total	Year Total
NO	0	0	-	-	-	-	1	2	7	6	16	16
CO	0	0	0	-	-	-	1	7	13	6	27	27
KO	0	0	-	-	-	-	4	2	18	11	35	35
KC	0	0	-	-	-	-	17	-	20	11	48	48
FB	0	0	0	4	8	-	9	-	32	16	69	69
SF	286	334	224	-	-	-	51	-	158	91	300	1,144
MO	92	0	0	-	-	-	83	-	-	-	83	175
Total	378	334	224	4	8	0	166	11	248	141	578	1,514

Option II

Port Area	Fall '07 Sep	Fall '07 Oct	Fall '07 Nov	Summer '08 Feb	Summer '08 Mar	Summer '08 Apr	Summer '08 May	Summer '08 Jun	Summer '08 Jul	Summer '08 Aug	Summer Total	Year Total
NO	0	0	-	-	-	-	1	2	7	6	16	16
CO	0	0	0	-	-	-	1	7	13	6	27	27
KO	0	0	-	-	-	-	4	2	18	25	49	49
KC	0	0	-	-	-	-	17	-	20	45	82	82
FB	0	0	0	4	8	-	-	-	32	-	44	44
SF	286	334	224	-	-	-	-	-	158	-	158	1,002
MO	92	0	0	-	-	-	28	-	-	-	28	120
Total	378	334	224	4	8	0	51	11	248	82	404	1,340

Option III

Port Area	Fall '07 Sep	Fall '07 Oct	Fall '07 Nov	Summer '08 Feb	Summer '08 Mar	Summer '08 Apr	Summer '08 May	Summer '08 Jun	Summer '08 Jul	Summer '08 Aug	Summer Total	Year Total
NO	0	0	-	-	-	-	1	2	7	6	16	16
CO	0	0	0	-	-	-	1	7	13	6	27	27
KO	0	0	-	-	-	-	-	2	11	25	38	38
KC	0	0	-	-	-	-	-	-	-	45	45	45
FB	0	0	0	4	8	-	-	-	-	-	12	12
SF	286	334	224	-	-	-	-	-	-	-	0	844
MO	92	0	0	-	-	-	-	-	-	-	0	92
Total	378	334	224	4	8	0	2	11	31	82	138	1,074

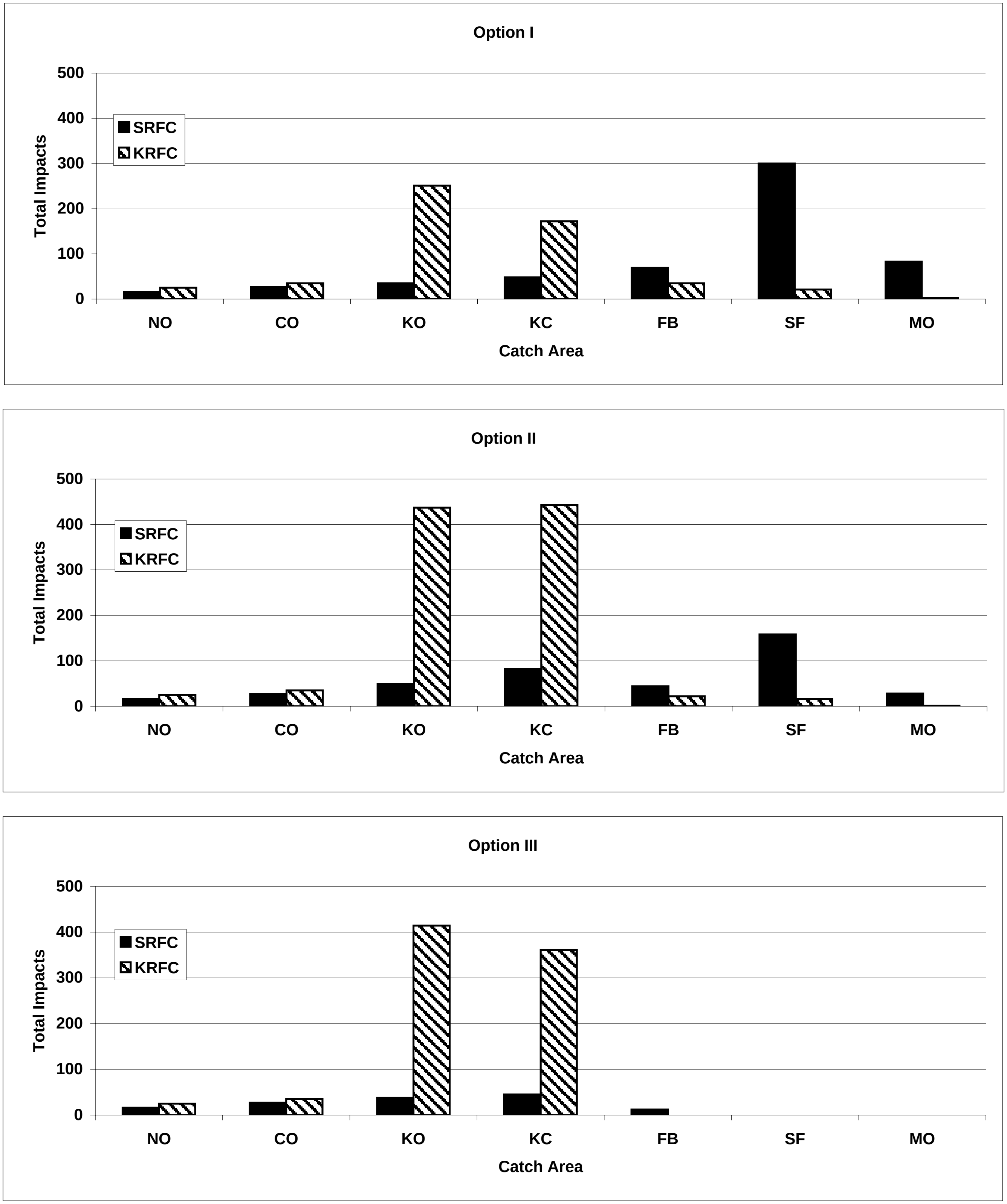

Figure 1. Total impacts to SRFC and KRFC during February through August 2008 recreational fishery options analyzed by the STT.

HOOPA VALLEY TRIBAL COMMENTS ON CRITERIA FOR ENDING OVERFISHING CONCERN FOR KLAMATH RIVER FALL CHINOOK

The Hoopa Valley Tribe is submitting these comments relative to PFMC's preliminary action to define the criterion for ending an overfishing concern for Klamath River Fall Chinook (KRFC). KRFC failed to meet minimum conservation escapement levels (35,000 adult natural area spawners) in 2004, 2005, and 2006. The Salmon Technical Team (STT) recently completed its report titled "Factors Affecting the Natural Area Escapement Shortfall of Klamath River Fall Chinook Salmon in 2004-2006" which included technical representation by the Hoopa Valley Tribe.

1. Hoopa Valley Tribal representatives have advocated for the criterion for ending an overfishing concern as recommended by STT's Recommendation 1, in which the 35,000 natural escapement floor would need to be exceeded for three of four consecutive years. Such a criterion would provide assurance that periods of prolonged low stock recruitment had been transited.
2. PFMC's alternative and preliminary criterion offered on 11 March 2008 in Sacramento could rely on only two consecutive years with escapements in excess of 40,700 natural adults (MSY escapement level identified by STT). With credit for the 2007 adult natural escapement, the overfishing concern would potentially be ended in 2008 on the strength of a single brood (Brood Year 2004). Meanwhile, evidence shows that the 2003 brood was depressed and the 2005 brood returned record low jacks in 2007. Hence, reliance upon a single brood to end the overfishing concern, would ignore a significant signal indicating the stock is suffering from low recruitment.
3. The Hoopa Valley Tribe has been supportive of the 35,000 escapement floor since its inception in the late 1980s. This standard has been recently confirmed by the STT as a reasonable threshold for conservation to ensure against prolonged periods of low productivity of the Klamath fall Chinook, while a more appropriate management target in every year would be the MSY escapement level of 40,700 adults.
4. The Hoopa Valley Tribe had recommended increasing the escapement floor in the early-mid 1990's when KRFC underwent a stock-depression. The issue was elevated to an FMP amendment issue which was ultimately rejected by PFMC after considerable engagement with the Tribe. However, in the present case, the PFMC is contemplating elevation of the escapement level by unilateral action, to the exclusion of substantive engagement with the Hoopa Valley Tribe. Together with the Yurok Tribe, the Hoopa Valley Tribe shares a property right to the anadromous fish of Klamath Basin (50% of the harvestable surplus of KRFC).
5. Concern over the PFMC's preliminary criterion is particularly heightened as 2008 ocean management is profoundly constrained by the depressed abundance of Central Valley Chinook. This presents the PFMC with the appealing opportunity to end the concern over Klamath fall Chinook while managing for Central Valley Chinook constraints. However, in the event that the overfishing concern for Klamath were lifted by this criterion, PFMC would likely pursue harvest flexibility under Amendment 15 for 2009 management assuming Central Valley Chinook are no longer constraining.

6. The Hoopa Valley Tribe was opposed to Amendment 15 as it threatened to undermine the 35,000 floor in years of low abundance leading to heightened concerns for natural stock productivity and in particular the probability for falling below minimum viable threshold escapement levels for sub-basin stocks.
7. In summary, the Hoopa Valley Tribe opposes the PFMC's preliminary criterion for ending the overfishing concern for KRFC. The criterion was generated by the PFMC in the absence of substantive consultation with Klamath-Trinity Basin Co-managers. Moreover, the criterion falls short of a meaningful protective measure to ensure recovery of KRFC while hastening implementation of Amendment 15 to KRFC's further detriment.

HOOPA VALLEY TRIBAL COMMENTS FOR
FINAL ACTION ON 2008 SALMON MANAGEMENT MEASURES

My Name is Michael Orcutt and I am the director for the Hoopa Valley Tribe's Fisheries Department.

(1) The Hoopa Valley Tribe is greatly concerned that the Council's proposed criterion for ending the Klamath River Fall Chinook Overfishing Concern is an inadequate conservation standard. We have provided previous testimony detailing our concerns.

(2) In the event that the Council fails to adopt Recommendation 1, as written in Salmon Technical Team's (STT's) March 2008 Klamath River Fall Chinook Overfishing Review (35,000 natural escapement floor would need to be exceeded for **three** consecutive years in four), the Tribe will manage its fishery to clear the 35,000 floor.

(3) In the event that Council adopts Recommendation 1 today without exception as specified in the STT Report. The Hoopa Valley Tribe will manage its fishery consistent with meeting the 40,700 adult fall Chinook maximum sustainable yield escapement level.

(4) Postponing a decision on this matter may not provide adequate time for Klamath tribal fisheries to adjust their management process.

(5) Questions were raised earlier in week about conservation rationale by Tribes advocating a lowered escapement level than that contemplated in the present options. Tribes need to maximize harvest opportunities when abundance allows. Lacking adoption of Recommendation 1 by the Council would shift the conservation burden on Tribes in 2008, with no commitment by other fisheries to share this burden in 2009.

PFMC
04/10/08

THE 2008 OCEAN TREATY TROLL FISHERY
Thursday, April 10, 2008

At the appropriate time, I will offer a Motion for Treaty troll Chinook and coho quotas. I would like to offer a few comments first.

As I indicated in my previous statements, the tribes have been working on a package of fisheries that meets resource constraints of this year's forecasted abundances and fairly distributes the burden of conservation.

- The fisheries that the tribes have proposed are consistent with this year's resource conditions and take into account the need for each tribe to have some fishing opportunity in their area.

- The Treaty troll quotas represent a balance of the Treaty rights of the Coastal Tribes, as well as the four Columbia River Tribes and the Puget Sound Tribes given the conservation constraints of the many salmon stocks of concern in 2008.

- The proposed quotas for the ocean Treaty Indian troll fishery meets the ESA considerations for Columbia Lower River natural tules, Snake River Chinook, Lower Columbia River natural coho, concerns for low abundance of North Coast and Puget Sound Chinook.

- The proposed quotas also meet the commitments made under the Pacific Salmon Treaty.

- The ocean Treaty troll fishery presents an opportunity to exercise our Treaty rights in the ocean this year. One must remember; the Treaty tribes must exercise their Treaty rights in their established Usual & Accustomed (U&A) fishing areas, so the Treaty troll tribes cannot simply move their fisheries to alternative locations in order to reduce impacts.

YUROK TRIBE

190 Klamath Boulevard • Post Office Box 1027 • Klamath, CA 95548

April 2, 2008

Mr. Donald K. Hansen, Chairman
Pacific Fishery Management Council
7700 NE Ambassador Place, Suite 200
Portland, Oregon 97220-1384

Re: Criteria for ending the "Overfishing Concern" and 2008 management objectives

Dear Mr. Hansen:

In light of recommendations contained within the Salmon Technical Team's (STT) Report titled *Factors Affecting the Natural Area Escapement Shortfall of Klamath River Fall Chinook Salmon in 2004-2006*, and the Pacific Fishery Management Council's potential modification of these recommendations, the Yurok Tribe is in a bit of a quandary regarding the natural spawning escapement target, harvestable surplus, and resultant allocation that we will target during the coming year. We support the recommendations of the Salmon Technical Team's (STT) Report titled *Factors Affecting the Natural Area Escapement Shortfall of Klamath River Fall Chinook Salmon in 2004-2006*; in particular the criterion that recommends the overfishing concern end when Klamath fall Chinook have met the minimum spawning escapement objective of 35,000 natural spawners during three of four years. We are opposed to the modified criterion that was proposed at the March PFMC meeting, which would consider the overfishing concern as ended when Klamath fall Chinook abundance has exceeded 40,700 natural spawners during two consecutive years. Therefore, I would like to clarify that if the criterion recommended in the Report (i.e. the overfishing concern is ended when a natural spawning escapement of at least 35,000 adults is achieved in three out of four consecutive years) is not adopted, then we will manage our fishery to target the 35,000 natural spawning escapement objective during 2008.

The Yurok Tribe has always managed our fishery resource in a conservative manner, especially during times of low abundance. We believe that the criterion requiring fall Chinook to achieve the minimum spawning escapement objective during three of four years is in-line with this management philosophy. Targeting MSY (40,700) during this overfishing concern period also seems to be a conservative management approach. However, modifying the criterion to consider the overfishing concern as ended after MSY (40,700 natural spawners) has been met in two consecutive years is not protective enough because it could be achieved by the presence of only one relatively strong cohort; the 2004 brood. We are also concerned that the modified criterion could result in our fishery being the only fishery constrained as a result of the overfishing concern.

During 2007 the Klamath fall Chinook run was dominated by age-3 fish (2004 brood year), with relatively low abundance of age-4 fish (brood year 2003) and extremely low abundance of age-2 fish (brood year 2005 fish). Hence, the relatively strong 2004 brood is surrounded by the weak broods of 2003 and 2005. Given that the 2007 run exceeded the 40,700 target, if this abundance is exceeded again during 2008, then we will have ended the overfishing concern based primarily upon the strength of a single brood (2004). This does not seem reflective of the Magnuson-Stevens Act intent that fishery management plans contain conservation and management measures to prevent overfishing, end overfishing, and rebuild the fishery.

The proposed modified criterion of meeting MSY two years in a row could result in the Yurok Tribal fishery being solely impacted by targeting 40,700 during the overfishing concern period. Ocean sport and commercial fisheries will not be affected by Klamath impacts during 2008 because of constraints they are unfortunately faced with from the low abundance of Sacramento fall Chinook. Klamath fall Chinook impacts that typically would be harvested in the ocean will be rolled into the inriver recreational fishery, resulting in an allocation near or above the upper limit of that fishery's harvest capacity. However if the Yurok Tribe was to target 40,700 fish during 2008, instead of our typical target of the 35,000 minimum conservation objective, our allocation would be reduced from approximately 25,000 to 21,000 fish; both well within the harvest capacity of the Yurok Tribe. Therefore, given that the 40,700 target was already met during 2007 without any affect to fisheries, a natural escapement of more than 40,700 during 2008 would end the overfishing concern with no Klamath impact constraints being placed upon fisheries other than the Yurok Tribe; this is not acceptable nor equitable from our perspective.

In summary, I request that the PFMC adopt the criterion for ending the overfishing concern period as recommended by the STT's Report (i.e. the overfishing concern is ended when a natural spawning escapement of at least 35,000 adults is achieved in three out of four consecutive years). If the PFMC adopts the modified criterion as suggested at the March PFMC meeting, or if other Fisheries are managed to target 35,000 natural spawners, then the Yurok Tribe will manage its 2008 fall Chinook fishery to target the 35,000 natural spawning escapement objective.

Sincerely,

Bonnie Green

Maria Tripp, Chair

SALMON ADVISORY SUBPANEL REPORT ON THE KLAMATH RIVER FALL CHINOOK REBUILDING STRATEGY

In regard to Recommendation 4, which states "During periods of stock rebuilding fall fishing opportunity in areas impacting Klamath River fall Chinook (KRFC) abundance should be restricted," the Salmon Advisory Subpanel recommends it be modified to recommend that fall fishing impacts be modeled preseason with consideration for a revision to the birth date for KRFC. If it is not possible to model harvest impacts in all fall fisheries, then we recommend that the word "restricted" be changed to "use a precautionary approach."

We also suggest adding a recommendation to develop a workgroup to investigate the mitigation needs and develop a propagation and release strategy that strives to optimize natural production as well as hatchery mitigation, rather than continually targeting minimum spawning escapement objectives. More progressive hatchery practices would address concerns regarding genetic integrity and expedite recovery of KRFC at a level in substantial excess of the floor. Failure to consider the downstream degraded conditions generated by the dams as a component of the mitigation responsibility results in all associated mortality becoming the burden of parties not responsible for the shortfall caused by these dams. This results in the fisheries being held accountable fore the decline of the stock of concern when restricting harvest results in no tangible benefit toward rebuilding the stock.

PFMC
4/10/08

MOTION
For The Ocean Treaty Troll Fishery
Thursday, April 10, 2008

For the 2008 salmon fishery in the area from the U.S./Canada border to Cape Falcon, Oregon, I move the following management structure be adopted by the Council for the Treaty Indian ocean salmon troll fisheries:

The Treaty Indian ocean troll fishery would have a quota of

- 37,500 Chinook and
- 20,000 coho.

The overall chinook quota would be divided into a 20,000-Chinook sub-quota for the May 1 through June 30 chinook only fishery and a 17,500-Chinook sub-quota for the all species fishery in the time period of July 1 through September 15.

The Treaty troll fishery would close upon the projected attainment of either of the Chinook or coho quota. Other applicable regulations are shown in Table 3 of STT Report Preliminary Analysis of Tentative 2008 Ocean Salmon Fishery Management Measures (April 10, 2008) – Agenda Item F.5.b.

THE 2008 OCEAN TREATY TROLL FISHERY
Thursday, April 10, 2008

At the appropriate time, I will offer a Motion for Treaty troll Chinook and coho quotas. I would like to offer a few comments first.

As I indicated in my previous statements, the tribes have been working on a package of fisheries that meets resource constraints of this year's forecasted abundances and fairly distributes the burden of conservation.

- The fisheries that the tribes have proposed are consistent with this year's resource conditions and take into account the need for each tribe to have some fishing opportunity in their area.

- The Treaty troll quotas represent a balance of the Treaty rights of the Coastal Tribes, as well as the four Columbia River Tribes and the Puget Sound Tribes given the conservation constraints of the many salmon stocks of concern in 2008.

- The proposed quotas for the ocean Treaty Indian troll fishery meets the ESA considerations for Columbia Lower River natural tules, Snake River Chinook, Lower Columbia River natural coho, concerns for low abundance of North Coast and Puget Sound Chinook.

- The proposed quotas also meet the commitments made under the Pacific Salmon Treaty.

- The ocean Treaty troll fishery presents an opportunity to exercise our Treaty rights in the ocean this year. One must remember; the Treaty tribes must exercise their Treaty rights in their established Usual & Accustomed (U&A) fishing areas, so the Treaty troll tribes cannot simply move their fisheries to alternative locations in order to reduce impacts.

Agenda Item F.6
Situation Summary
April 2008

CLARIFY FINAL ACTION ON 2008 MANAGEMENT MEASURES (IF NECESSARY)

If the Salmon Technical Team (STT) needs clarification of the final management measures before completing its analysis, the STT Chairman will address the Council in this agenda item.

Council Action:

If necessary, provide clarification to assist the STT in its analysis of the final management measures.

Reference Materials:

None.

Agenda Order:

a. Agenda Item Overview — Chuck Tracy
b. Reports and Comments of Advisory Bodies
c. Public Comment
d. **Council Action:** Clarify Final Management Measures (if Needed)

PFMC
03/17/08