SALMON METHODOLOGY REVIEW

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. This review 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, of providing directions for handling any unresolved methodology problems prior to the formulation of salmon management options the following 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.

At its April 2006 meeting, the Council identified a list of potential subjects for the methodology review. Additional topics for review have been suggested in the interim, including Columbia River hatchery coho forecast methodology and updated base period data for Coho FRAM. These subjects are identified in a reminder letter sent out to the responsible agencies in July 2006, which requests agencies be prepared to speak to the status of the subjects in terms of completeness and priority (Agenda Item H.1.a, Attachment 1). In addition, a proposal for genetic stock identification data collection is being developed and has been submitted for consideration (Agenda Item H.1.a, Attachment 2). All materials for review are to be received at the Council office at least three weeks prior to the scheduled review meeting of the SSC Salmon Subcommittee, which is scheduled for October 10, 2006.

Council Action:

1. **Determine if methodologies identified for review will be ready for the SSC Salmon Subcommittee meeting in October.**
2. **Set priorities for SSC review of methodologies**.

Reference Materials:

1. Agenda Item H.1.a, Attachment 1: Email to the agencies from Mr. Chuck Tracy dated July 26, 2006.
2. Agenda Item H.1.a, Attachment 2: Genetic Stock Identification in Pacific Salmon Fisheries Management.
3. Agenda Item H.1.e, Public Comment.

Agenda Order:

a.	Agenda Item Overview	Chuck Tracy
b.	Report of the Model Evaluation Workgroup	Larrie LaVoy
c.	Agency and Tribal Comments	
d.	Reports and Comments of Advisory Bodies	
e.	Public Comment	
f.	**Council Action**: Establish Final Methodology Review Priorities for 2007 Salmon Season	

PFMC
08/22/06

Agenda Item H.1.a
Attachment 1
September 2006

2006 Salmon Methodology Review
1 of 1 8/8/2006 9:22 AM
Subject: 2006 Salmon Methodology Review
From: Chuck Tracy <Chuck.Tracy@noaa.gov>
Date: Wed, 26 Jul 2006 10:22:00 -0700
To: Sandy Zeiner <szeiner@nwifc.org>, Gary Morishima <MORIKOG@aol.com>, Robert Kope <Robert.Kope@noaa.gov>, Dell Simmons <Dell.Simmons@noaa.gov>, DougMilward <milwadam@dfw.wa.gov>, Craig Foster <Craig.A.Foster@state.or.us>, Henry Yuen <henry_yuen@fws.gov>, Allen Grover <AGROVER@dfg.ca.gov>, Michael Mohr<Michael.Mohr@noaa.gov>, Wendy Beeghley <BeeghWLB@dfw.wa.gov>, Melodie Palmer-Zwahlen <mpalmer@dfg.ca.gov>, Eric Schindler <Eric.D.Schindler@state.or.us>,Dell Simmons <Dell.Simmons@noaa.gov>, Allen Grover <AGROVER@dfg.ca.gov>, Larrie LaVoy <LaVoyLWL@dfw.wa.gov>, Jim Packer <PackeJFP@dfw.wa.gov>, EthanClemons <Ethan.R.Clemons@state.or.us>, Andy Rankis <ARankis@nwifc.org>, Rishi Sharma <ShaR@CRITFC.org>, Henry Yuen <henry_yuen@fws.gov>, Bob Conrad<bconrad@nwifc.org>, Shannon Davis <shannon_davis@class.orednet.org>, Angelika Hagen-breaux <hagenafh@dfw.wa.gov>, Joe Dazey <jdazey@pacific.telebyte.com>, PeterLawson <Peter.W.Lawson@noaa.gov>, David Sampson <David.Sampson@oregonstate.edu>, Hans Radtke <hradtke@oregonvos.net>, Alan Byrne <abyrne@idfg.state.id.us>, BobConrad <bconrad@nwifc.org>, Owen Hamel <owen.hamel@noaa.gov>, Kevin Hill <Kevin.Hill@noaa.gov>, Curt MELCHER <Curt.Melcher@STATE.OR.US>, MarijaVojkovich <mvojkovich@dfg.ca.gov>, Phil Anderson <ANDERPMA@dfw.wa.gov>, Sandy Zeiner szeiner@nwifc.org
CC: Jim Tuggle <tugstours@comcast.net>, Jim Olson <jaocto@juno.com>, Duncan MacLean <b-faye@pacbell.net>, Steve Watrous <BRANCHOFIC@aol.com>, Butch Smith<coho@willapabay.org>, Mike Sorenson <missraven@actionnet.net>, Jim Welter <jswltr@verizon.net>, Craig Stone <emvlsport@aol.com>, Bob Strickland<bstrickland@unitedanglers.org>, Jeff Feldner <JFeldner@teleport.com>, Pat Pattillo <pattiplp@dfw.wa.gov>, Ron Boyce <raymond.r.boyce@state.or.us>, Chuck TracyChuck.Tracy@noaa.gov

Greetings All:

This is just a reminder that the Council will be establishing priorities for salmon methodology review by the SSC at the September Council meeting. The review itself is scheduled to occur October 10.

A list of potential subjects was considered at the April Council meeting (see below), and it will be useful to have updates on the priorities and whether some of the projects are suitably complete for review. In addition to the list developed in April, a couple of topics have been suggested for review in the interim.

It is unlikely that the SSC will have time to review all the subjects this year, or that all will be ready for review. Please discuss these projects with appropriate parties and have recommendations ready for the September Council meeting.

Topics from April:

- Chinook and Coho Fishery Regulation Assessment Model (FRAM) documentation (including programmers guide?);
- Columbia River fall Chinook ocean abundance forecast;
- Coweeman tule Chinook exploitation rate estimates;
- Oregon Coast Natural coho ocean abundance prediction methodology;
- Klamath Ocean Harvest Model contact rate and harvest estimates;
- September 1 maturity boundary (birth date) for Klamath River fall Chinook;
- Estimates of sea lion predation on Klamath fall Chinook;
- Experimental design for near-shore commercial salmon test fisheries.

Additional suggestions:

New coho base period for Coho FRAM;
OPI hatchery (Columbia River) coho forecast methodology.

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Chuck Tracy
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GENETIC STOCK IDENTIFICATION IN PACIFIC SALMON FISHERIES MANAGEMENT

Klamath River fall Chinook (KRFC) and Chinook stocks listed as threatened or endangered under the Endangered Species Act have limited salmon fisheries in recent years off the coasts of California, Oregon, and Washington, and will likely continue to limit fisheries in the future. There is hope and a growing expectation that Genetic Stock Identification (GSI) technologies will help alleviate those constraints, and a desire to begin using GSI for management as soon as possible. The purpose of this agenda item is to discuss the goal of developing a plan for evaluating and implementing GSI methods beginning in 2007.

The long-term objective is to increase the information available to managers on the temporal and spatial ocean distribution of specific West Coast salmon stocks, which if proven effective, may allow fishermen to better access relatively abundant stocks of salmon while protecting weak stocks. In addition, these proposals will test the feasibility of new techniques that may allow real-time stock-specific quota management in limited areas and times.

GSI technology for identifying Chinook stocks is developed to the point where it can be useful for fishery management. However, the successful application of this technology to management has many aspects beyond simply the identification of stocks. Considerable preliminary work in 2006 toward implementation of this technology has been done in pilot projects in California, Oregon, and Washington. In addition, GSI has been successfully used in Canadian fisheries, but tracking only one stock in a much more limited geographic scope than will be necessary for Pacific Fishery Management Council (Council) managed salmon fisheries. Proposed work for 2007 would be designed (1) to extend the development of techniques and methodologies based on the 2006 experience, (2) involve fishermen in sampling programs, and (3) learn more about the distribution of Chinook stocks. In addition, we propose consideration of a limited test of a potential management application.

Current projects in Oregon and California are developing techniques for sampling and analysis. For example, the Oregon project has successfully collected data on the specific location, time, and depth of capture of individually identified Chinook salmon in the commercial troll fishery. In 2007, there are plans to apply these techniques more widely in order to gain experience with the methodology and to test its usefulness to answer some basic questions for fisheries management. Restricted fishing opportunities, similar in scope to the 2006 season, are expected in 2007, and this may limit our ability to advance development of GSI applications to fishery management. As a result, it would be useful to consider an exempted fishing permit (EFP) to allow limited commercial and recreational salmon fishing for the purpose of obtaining adequate sample sizes and testing specific fishing patterns in space and time. Impacts may be minimized in some fisheries through catch and release requirements.

There are three components to this proposal:

1) Testing feasibility of real-time quota management -- A small-scale pilot management approach could be designed to determine the actual harvest of KRFC and other species of concern during the season using GSI in one or more limited areas along the coast of northern California and southern Oregon. Existing harvest models would be used to determine an allowable quota for the weak stocks. Fishers would collect GSI samples along with time and location-specific data on their catch. Actual impacts would be determined using near-real-time GSI analysis. This may involve periodic closures (e.g., closed four days per week) to allow time for data analysis and notice of management actions. Cumulative impacts would be tracked with the intent of allowing fishing on healthy stocks to proceed without exceeding predicted impacts on stocks of concern such as KRFC.

2) Testing inside/outside differential in KRFC impacts -- Spatial distribution of catch samples from the fishery could be analyzed to test the hypothesis that KRFC are disproportionately distributed offshore. This has been proposed in the past, but there is insufficient data collected from investigations with a strong experimental design. Current CWT data, aggregated by area of catch, have insufficient spatial resolution to resolve this question. The observation has been that recreational fisheries tend to have lower KRFC impacts than commercial fisheries in the same time and area. This, combined with the observation that recreational fisheries tend to occur closer to shore than commercial fisheries, has led to the distribution hypothesis. It may be necessary to have fishers fish in areas where they would not routinely fish (i.e., commercial trollers in inside areas) to conduct an adequate test. It also may be necessary to employ both recreational and commercial fishers to determine if there is a stock impact differential between the two fishing segments that are independent of spatial distribution. This may need to be repeated over several seasons and/or in several areas before it can be applied to management.

3) Improving information on spatio-temporal distribution of west coast salmonids -- As resources allow, we propose to continue collecting time- and location-specific genetic samples from open-season fisheries, along with scales, otoliths, stomachs, and oceanographic data. The purpose of these collections would be to begin developing a database of stock distributions for comparison with the historical CWT data base. This component would not have a direct impact on 2007 fisheries, but active participation by fishermen would benefit this portion of the study. It would be part of an ongoing process that could inform managers in future years. If funds and fishery impacts are available the sampling could be extended to closed times and areas in order to collect more spatially comprehensive data. It would also be necessary to sample in areas that would not normally be fished, even during open seasons. This component of the project includes development and testing of a statistical sampling design.

Maximizing the benefits of the technology will require consideration of alternative strategies. There will be several constraints that will have to be considered in developing a plan that will likely involve some mix of the above described components. There will be logistical constraints related to collecting and processing samples, there will be cost constraints, and there will be constraints related to available impacts to KRFC or other weak stocks. The latter point will require consideration of how much of the sampling and development work will be integrated with the existing fishery as opposed to that which may need to be implemented through an EFP. Although KFRC may be the primary focus for this effort, the sampling plan will also have to consider the effect on other weak stocks.

Use and implementation of GSI methods in 2007 will likely require Council approval through the salmon methodology review process, with approval scheduled for the November 2007 Council meeting. In order to provide for the necessary review, a complete proposal with sufficient detail would have to be complete for review by the joint Salmon Technical Team/SSC Salmon Subcommittee Panel, which will meet October 10, 2006.

PFMC
08/25/06

Agenda Item H.1.e
Public Comment
September 2006

Subject: coho and ocean models
From: "Cindy LeFleur" <LEFLECML@DFW.WA.GOV>
Date: Mon, 01 May 2006 15:15:09 -0700
To: "Larrie Lavoy" <LAVOYLWL@DFW.WA.GOV>, <Chuck.Tracy@noaa.gov>, <Dell.Simmons@noaa.gov>, <peter.dygert@noaa.gov>, <Curt.Melcher@state.or.us>

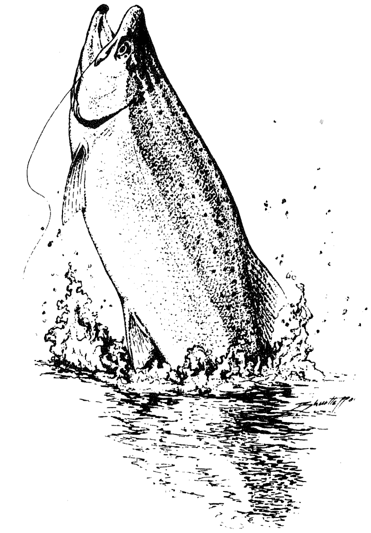
Dell,
I want to officially request that the STT look at the OPI predictor and the relationship to the FRAM, and their relationship to Columbia River wild coho. I am not comfortable with what little I know about how these things work, but I feel like there is a disconnect and the wild impacts are being overestimated. I am sending this now so there is time before next year's fisheries for this to be addressed. Let me know if I need to do more than this email.
thanks

your servant,
Cindy

Oregon
South
Coast
Fishermen

P. O. Box 2709 ■ Harbor, OR 97415

RECEIVED
AUG 2 2006
PFMC



August 17, 2006

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

Dear Mr. Tracy,

Our organization has reviewed the proposed topics for review by the SSC. We request that the following items be given the highest priority for Committee review.

1. Klamath Ocean Harvest Model contact rate and harvest estimates.
2. September 1 boundary for Klamath fall Chinook.
3. Estimate of sea lion predation on Klamath fall Chinook.

Our request is based on our accelerated interest in Klamath management issues because of the affect of the Klamath Management Zone on our local fishing opportunity and, more importantly, because of the impact of the Klamath River on salmon management on the West Coast. The sensationalized press coverage of the Klamath crisis and the elimination of the commercial fishery have implied to the public that salmon populations have collapsed throughout their range. We are hopeful that careful review of the proposed Klamath topics will improve the management parameters for Klamath fall Chinook stocks and help bring stability to the fishery, resulting in a more realistic picture of general salmon abundance.

Sincerely,

Scott Stewart

Scott Stewart, President

Subject: RE: SSC METHODOLOGY REVIEW
From: Roger Thompson <roger@driftwoodrvpark.com>
Date: Tue, 22 Aug 2006 16:51:36 -0700
To: Chuck.Tracy@noaa.gov

SCIENTIFIC & STATISTICAL COMMITTEE OF THE P.F.M.C.

We, the members of both the Klamath Coalition and the Port of Brookings-Harbor Fisheries Committee, would like the SSC to consider making the items listed below a high priority in your methodology review.

1. KOHM Contact Rate & Harvest Estimates

2. The Sept. lst Cutoff Date for Returning Adult Klamath Fall Chinook Salmon from the Ocean

3. How to account for Sea Loin Predation on the Klamath River Fall Chinook Salmon at the mouth of the Klamath river

Thank you for your consideration on these matters.

Roger Thompson
541-469-9089
Vice Chair of the Klamath Coalition
Chairman of the Port of Brookings-Harbor Fisheries Committee.

FISHERY MANAGEMENT PLAN AMENDMENT 15 (*DE MINIMIS* FISHERIES)

At its March 2006 meeting, the Council directed development of Amendment 15 to the Salmon Fishery Management Plan (FMP). The primary focus of Amendment 15 is defining allowable *de minimis* impacts to Klamath River fall Chinook (KRFC) during times when the conservation objective precludes access to more abundant salmon stocks. This action is needed to avoid a level of fishery restrictions that can lead to severe economic consequences while maintaining the long-term productive capacity of KRFC. Currently, this can be addressed only through the emergency regulation process as was done in 2006.

The process and schedule adopted by the Council was intended to reduce the probability of requiring an emergency rule for 2007 fisheries, should circumstances require. This schedule included (1) adopting of a range of reasonable alternatives at the June Council meeting, (2) review of the analyses of alternatives and, if possible, adoption of a preferred alternative for public review at the September Council meeting, (3) final action on an FMP amendment at the November Council meeting, and (4) implementation by NMFS prior to the start of the 2007 Salmon management season on May 1. If the schedule could not be met, a new schedule was to be identified at the September Council meeting.

At its June 2006 meeting, the Council narrowed the scope of the amendment to only consider *de minimis* fisheries related to KRFC stock status during periods when no fishing opportunities would be allowed under the current FMP. The alternatives included:

1. Status quo (no fishing);
2. A sliding scale allowing increasingly lower total ocean and river fishery impacts (catch + incidental mortality) as stock abundance decreases;
3. A 5% age-4 ocean impact rate cap;
4. A 16% age-4 ocean impact rate cap;
5. A rebuilding feature that would limit *de minimis* fisheries to no more than three consecutive years, with a minimum of three consecutive years with escapement above the 35,000 natural spawner floor before additional *de minimis* fisheries could occur; and
6. The prohibition of any fall/winter fisheries (September 1 through March 14) following spring/summer (March 15 to August 31) *de minimis* fisheries.

Alternatives 5 and/or 6 would be in concert with one of the *de minimis* fishery Alternatives (2, 3, or 4) above.

The Document Subcommittee of the Ad Hoc Salmon Amendment Committee (SAC) met in June, July, and August to analyze the alternatives. The full SAC met on August 9, 2006, to review the second draft amendment. The discussions focused on evaluation criteria, and the biological and economic analytical frameworks. The SAC was able to reach consensus on evaluation criteria for the biological analyses but not for the economic analyses.

The regulatory streamlining subcommittee of the SAC met as a separate group at the August 9, 2006 SAC meeting. Their discussions focused on National Environmental Policy Act (NEPA) requirements for an Environmental Assessment (EA)/Environmental Impact Statement (EIS) and compliance with National Standard 1 guidelines. They reviewed the list of questions required for a finding of no significant impact (FONSI), and felt it was reasonable to expect the NEPA analysis of Amendment 15 could result in a FONSI. Likewise, they felt the alternatives would meet the intent of National Standard 1 guidelines, and recommended the analysis continue as an EA rather than an EIS.

The results of the biological and economic analyses were not adequately developed to allow a complete draft of Amendment 15 in time for distribution with the briefing materials. Preliminary results and methodology for the various analyses are included in an executive summary (Agenda Item H.2.a, Attachment 1). However, a thorough comparison of the alternatives was not available. There were also some key elements still under development, including evaluation criteria for the economic analyses and the minimum substock spawning escapement, as well as estimates of economic impact in the river tribal and recreational fisheries.

Because of these shortcomings, staff recommends the Council consider the need for further development of the alternatives and analyses, and possible modification of the amendment schedule. Schedule modifications could include adopting alternatives for public review at the September meeting but delaying adoption of a preferred alternative until final action at the November Council meeting, or delaying adoption for public review of alternatives, including a preferred alternative, until the November meeting with final action at the March 2007 meeting. The former option would require the Council to move ahead with the public hearings tentatively scheduled for October in California, Oregon, and Washington. This would require confirming locations and appointing hearings officers and staff to attend the hearings. Locations currently identified include Santa Rosa, Coos Bay, and Westport. The Council may want to consider omitting the Westport hearing since Amendment 15 does not include stocks that affect fisheries north of Cape Falcon, as was contemplated early in the process. The latter alternative would delay the need for public hearings until after the November Council meeting, and more importantly, delay implementation of the amendment until after the start of the salmon management season on May 1, 2007. Therefore, any *de minimis* fishery considerations for 2007 would require implementation by emergency rule.

Council Action:

1. **Provide direction to the SAC on further analysis of alternatives.**
2. **As appropriate, adopt Alternatives, including Preferred Alternative, for public review.**
3. **Update amendment schedule as necessary.**
4. **Identify locations and staffing for public hearings, as appropriate.**

Reference Materials:

1. Agenda Item H.2.a, Attachment 1: Executive Summary of Preliminary Draft Pacific Coast Salmon Plan Amendment 15: An Initiative to Provide for *De Minimis* Fishing Opportunity for Klamath River Fall-run Chinook Salmon.

Agenda Order:

a. Agenda Item Overview — Chuck Tracy
b. Salmon Amendment Committee Report — LB Boydstun
c. Reports and Comments of Advisory Bodies
d. Public Comment
e. **Council Action**: Adopt Draft Alternatives and Identify Preferred Alternative for Public Review

PFMC
08/25/06

EXECUTIVE SUMMARY OF PRELIMINARY DRAFT PACIFIC COAST SALMON PLAN AMENDMENT 15: AN INITIATIVE TO PROVIDE FOR DE MINIMIS FISHING OPPORTUNITY FOR KLAMATH RIVER FALL-RUN CHINOOK SALMON

This Salmon Fishery Management Plan (FMP) amendment process began in November 2005, for the purpose of initiating an FMP amendment to consider *de minimis* fisheries associated with impacts on Klamath River fall run Chinook salmon (KRFC). The initial interest in the amendment was the result of constraints on the 2005 fishery due to depressed status of KRFC, which precluded access to a record forecast abundance of California Central Valley fall run Chinook salmon. The purpose of this action is to provide for minimal or *de minimis* salmon fishery impacts to KRFC during times when the conservation objective for the stock precludes fishery access to co-mingled Chinook salmon stocks. This action is needed to prevent a level of fishery restrictions that can lead to severe economic consequences to local communities that target more robust salmon stocks, which are typically available for harvest in the Council area, while ensuring the long-term productive capacity of KRFC is not jeopardized. Currently, this can be addressed only through the emergency regulation process as provided in the Magnuson-Stevens Fishery Conservation and Management Act (MSA) and implemented by the National Marine Fisheries Service (NMFS).

The alternatives considered for this amendment address only KRFC, and include:

1. Status quo (no fishing);
2. A sliding scale allowing increasingly lower total ocean and river fishery impacts (catch + incidental mortality) as stock abundance decreases;
3. A 5% age-4 ocean impact rate cap;
4. A 16% age-4 ocean impact rate cap;
5. A rebuilding feature that would limit *de minimis* fisheries to no more than three consecutive years, with a minimum of three consecutive years with escapement above the 35,000 natural spawner floor before additional *de minimis* fisheries could occur; and
6. The prohibition of any fall/winter fisheries (September 1 through March 14) following spring/summer (March 15 to August 31) *de minimis* fisheries.

Alternatives 5 and/or 6 would be in concert with one of the *de minimis* fishery Alternatives (2, 3, or 4) above.

The criteria used to evaluate the Alternatives include:

1. The probability of a natural spawning escapement lower than any historically observed (12,000).
2. The probability of any of the major mid-Klamath Basin substock (Shasta, Scott, or Salmon rivers) having a natural spawning escapement of less than 500 adults in any year.
3. The probability of a spawning escapement below the 35,000 natural spawner floor in any year.
4. The probability of three consecutive years of spawning escapement less than the 35,000 floor within a 40-year time period.
5. The probability that hatchery egg collection goals will be met every year.
6. The probability of meeting the terms of the NMFS consultation standard for the California Coastal Chinook evolutionary significant unit, which is an Ocean harvest rate of no more than 16.0% on age-4 KRFC.
7. Annual community and state level personal income impacts generated from Council-area commercial and recreational salmon fisheries, and river tribal and recreational salmon fisheries.

The criteria were evaluated relative to the Status Quo Alternative, which assumed no fisheries that impact KRFC would be allowed if the projected natural spawning escapement was less than the 35,000 floor.

The primary analyses used to evaluate the alternatives included:

1. A hindcast model that applied the alternatives to past season's population structure to estimate compliance with the stock's conservation objectives. This provided an historical perspective of implementation frequency and fishery effect of the *de minimis* fishery alternatives (Appendices D and E).
2. An age structured stochastic stock recruitment model (SSRM) that generates probabilities of population events such as spawning escapement below certain thresholds, which are used to estimate the effects of the alternatives on the KRFC population and to compare results among alternatives (Appendix F).
3. An economic assessment of ocean fisheries using generic season expectations based on the 2006 Klamath Ocean Harvest Model (KOHM) and historical total catch levels (Appendix H).

The methods used in the analyses are included in appendices D, E, F, and H. Appendix F also includes a more detailed examination of the results of the SSRM analysis.

The very brief summary of preliminary results presented in the following tables include an analysis of a 10% ocean impact rate cap to provide additional resolution between the 5% and 16% Cap Alternatives.

The Status Quo Alternative has no fishing in any area except some winter/spring recreational fisheries in Fort Bragg, and Central and Northern Oregon. (Table ES-1) The allowable fishing time provided by the four *de minimis* fishing scenarios appears to decline in a linear manner from several months of troll fishing under the 16% Cap Alternative to less than three weeks of troll fishing under the Sliding Scale Alternative.

The SSRM analysis predicts a higher probability than the hindcast analysis that escapement would be below the 35,000 floor in any one year, or for three consecutive years (Table ES-2). The SSRM uses 40 years*200 iterations (800 possibilities) as opposed to the hindcast method, which has only 16 years to evaluate, so the difference in outcome is not unexpected.

The differences in economic impacts among alternatives are small for the short-term analysis of recreational fisheries, except for Status Quo, because full fishing is allowed under all Alternatives except Status Quo. The difference between Status Quo and the other alternatives would be smaller if revenue from the Fort Bragg and Oregon winter/spring fisheries had been included. The long-term analysis of the troll fishery also indicates little difference among the alternatives, primarily because there is little influence of the few years with *de minimis* fisheries on long-term average revenues. There is, however substantial differences among the alternatives for the short-term troll economic impacts, which appear to decline linearly from the 16% Cap Alternative to the Status Quo Alternative. There has been no analysis of the level at which participants in the troll fishery would begin to drop out, or when infrastructure losses would occur, although this could be potentially important information.

The analyses were not sufficiently complete to estimate values for some of the criteria in time for the September briefing book, including:

1. The probability of Klamath Basin substocks having a natural spawning escapement of less than 500 adults in any year; and
2. Economic analyses of the Klamath River tribal and recreational fisheries.

Table ES-1. Season structure scenarios (January-August only) for individual de minimis fishing alternatives and California Coastal Chinook salmon consultation standard. The Status Quo Alternative is for a Conservation Alert Year. Alternatives are expressed as ocean impact rates.[1/]

Season	Alternative					CCC standard
	Status Quo	2.5%[2/]	5%[3/]	10%	16%	(16% OHR)
Sport Season Outside KMZ	43 days, FB, Feb-March; 47 days, NO/CO, March-April	full	full	full	full	full
KMZ Sport:	closed	45 days, May-June[4/] else closed	22 days, May-June	82 days, May-July	Full season (123 days): May-August plus previous fall fishery	Full season (123 days): May-August plus previous fall fishery
OR Troll	closed	10 days, NO, March	45 days, NO, March-April	98 days, NO, March-June; 30 days, CO, April	61 days, NO and CO, March-April; 92 days NO, May-July	92 days, NO and CO, March-May; 63 days, NO, June-August
CA Troll	closed	17 days, SF & MO, August	7 days, MO, May: 31 days, SF & MO, August	38 days, MO, May-June; 31 days, SF & MO, August	53 days, MO, May-June; 31 days, SF & MO, August	58 days, MO, May-June; 31 days, SF & MO, August

1/ KMZ = Horse Mt., California to Humbug Mt., Oregon
OR = Oregon; CA = California
NO (Northern Oregon) = Florence south jetty to Cape Falcon, Oregon
CO (Coos Bay) = Florence south jetty to Humbug Mt., Oregon
SF (San Francisco) = Point Arena

2/ The 2.5% ocean impact rate is a mid-range point for the Sliding Scale Alternative.

3/ This scenario is somewhat less restrictive than the maximum age-4 impact on the Sliding Scale Alternative.

4/ The extra days, compared to the 5% Cap Alternative, are due to elimination of previous fall KMZ sport catches.

Table ES-2. Comparison of alternatives relative to evaluation criteria, including a 10% cap analysis.

Impact Criterion	Method	Status quo	Sliding Scale	≤5% Cap	≤10% Cap	≤16% Cap	Rebuilding	Precautionary
KRFC Criteria								
Probability of a natural spawning escapement lower than any historically observed (12,000) in any one year.	Hindcast	Low[1]	Low	Low	Low	Low	NA	NA
	SSRM	1.2%	1.2%	1.9%	5.1%	17.7%	NA	
Probability of any of the major mid-Klamath Basin substocks having a natural spawning escapement of less than 500 adults in any year.	SSRM	NA	NA	NA	NA	NA	NA	NA
Probability of a spawning escapement below the 35,000 natural spawner floor in any year.	Hindcast	9.1%	13.6%	13.6%	31.8%	50.0%	NA	Same as Other Alternatives
	SSRM	39.2%	37.7%	40.2%	42.7%	48.8%	NA	
Probability of three consecutive years of spawning escapement less than the 35,000 floor within a 40-year time period.	Hindcast	Low	Low	Low	Low	100%[2]	Yes for 16%	NA
	SSRM	90.5%	88.5%	91.5%	91.0%	93.0%	Same as Other Alternatives	
Probability that hatchery egg collection goals will be me every year.	SSRM	75.7%	75.8%	75.5%	74.3%	71.4%	NA	NA
ESA Consultation Standards								
Probability of exceeding Klamath fall Chinook Age-4 ocean harvest rate CCC ESA standard) of ≤16.0%within a 40 year period.	SSRM	70.8%	70.2%	70.1%	73.7%	81.9%	NA	NA
Socio-Economic Criteria								
Recrational fishery local and state impacts	I/O Model/ Conservation Alert	\$0[3]	\$22.5M	\$21.8M	\$23.9M	\$26.3M	NA	NA
Troll fishery local and state impacts	I/O Model/ Conservation Alert[3]	\$0[3]	\$2.2M	\$5.9M	\$13.9M	\$19.7M	NA	NA
	I/O Model/ Long-term Analysis[4]	\$17.1M	\$17.0M	\$17.7M	\$18.8M	\$19.4M	NA	NA
Tribal fishery impacts	NA	NA	NA	NA	NA	NA	NA	NA
River recreational fishery impacts	NA	NA	NA	NA	NA	NA	NA	NA

1/ Low probibility, but no precise estimate.
2/ Based on 2 events in 16 yrs, which exludes 1985-1988 and 2004-2006.
3/ Some revenue would generated from fisheries with no observed KRFC impacts (e.g.,March-April Oregon Recreational), but was not estimated.
4/ Medium success rate scenario used.

APPENDIX D. Carry-over effect of 16% Cap Alternative.

The hindcast analysis was static in part because the effect of reduced stock size due to *de minimis* fishing was not evaluated relative to impacts on future recruitment. *De minimis* fishing also affects age-3 and age-4 fish that would carry-over in the ocean for one or two more summers. The effect of the 16% Cap Alternative on carry-over of age-3 and age-4 KRFC was analyzed based on the ocean survival probability of the 16% Cap Alternative compared to the Status Quo Alternative.

The 16% Cap Alternative is the most liberal of the Council's *de minimis* fishery alternatives, and the relative impact of the other *de minimis* fishing alternatives on ocean carry-over of age-3 and age-4 KRFC can be inferred from the following results.

Methods

The approach used was to estimate (adjust) ocean abundance levels in years following the implementation of the 16% Cap Alternative, which were analyzed in the text in Section 4.1.2. The formulas were:

$$N(t).4.adj = N(t).4.pre * [1-i(A,t-1*.20)] / [1-i(SQ,t-1*.20)].$$

$$N(t).5.adj = N(t).5.pre. * \{ [1-i(A,t-2*.20)] / [1-i(SQ,t-2*.20)] \} * \{ [1-i(A,t-1)] / 1-i(SQ,t-1)] \}$$

where,

N(t).4.pre and N(t).5.pre are the year t preseason forecasts of record,
i(A,t) is the age-4 ocean impact rate in year t under alternative A (16% Cap in this case), and
i(SQ,t) is the age 4 ocean impact rate in year t under status quo management, which was assumed to be 0.4 x the status quo spawner reduction rate. Both of these harvest rates were reduced by 80% to account for the lower vulnerability and smaller size of age-3 fish compared to age-4 fish. No adjustment was applied for fish carrying over from age-4 to age-5

The above ratios approximate the reduction in ocean survival with the 16% Cap Alternative compared to Status Quo. The Rebuilding Alternative which precludes further *de minimis* fishing after three successive years of failure to meet the natural adult spawner floor was not applied to this analysis.

Results

Implementation of the 16% Cap had a slight ripple effect in the ocean population sizes of age-4 and age-5 fish, which affected 13 (59%) of the 22 years in the series. The differences between unadjusted (static) and adjusted ocean population sizes over the entire series were small: 0.4% reduction in ocean population size of age-4 fish and 1.2% of age-5 fish. Abundance of natural spawners in the absence of fishing for the entire series declined by an average of 200 fish per year (0.2%). Considering only the years affected by *de minimis* fishery carry-over effect, the population size reductions were higher at 1.1% for age-4 fish and 3.9% for age-5 fish. The reduction in natural run size in the absence of fishing in carry-over years was 0.4% (Table D-1).

Table D-1. Ocean abundance and natural spawner projections for hindcast analysis, 1985-2006 (thousands) showing unadjusted (static) and adjusted population levels under the status quo and 16% Cap alternatives.

	Ocean Abundance							No fishing natural spawners (static)	No fishing natural spawners (adjusted)
Season	Age 3	Age 4 (static)	Age 4 (adjusted)	Age 5 (static)	Age 5 (adjusted)	Total (static)	Total (adjusted)		
1985	113.0	56.9	56.9	0.0	0.0	169.9	169.9	38.4	38.4
1986	426.0	66.3	64.6	0.0	0.0	492.3	490.6	81.5	80.8
1987	511.8	206.1	206.1	5.3	5.2	723.2	723.1	154.8	154.7
1988	370.8	186.4	186.4	13.3	13.3	570.4	570.5	133.1	133.2
1989	450.6	215.5	215.5	10.1	10.1	676.2	676.2	153.8	153.8
1990	479.0	50.1	50.1	7.6	7.6	536.8	536.7	85.5	85.5
1991	176.2	44.6	44.6	1.5	1.5	222.3	222.3	41.9	41.9
1992	50.0	44.8	43.9	1.3	1.2	96.0	95.1	26.0	25.6
1993	294.4	39.1	37.8	1.1	0.9	334.6	333.2	54.1	53.5
1994	138.0	86.1	85.8	0.5	0.5	224.6	224.2	54.2	54.1
1995	269.0	47.0	46.8	2.0	2.0	318.0	317.8	54.8	54.7
1996	479.8	268.5	267.6	1.1	1.1	749.4	748.5	175.0	174.6
1997	224.6	53.9	53.9	7.9	7.9	286.4	286.4	55.4	55.4
1998	176.0	46.0	45.9	3.3	3.3	225.3	225.2	43.4	43.4
1999	84.8	78.8	77.5	2.0	1.8	165.6	164.1	45.3	44.6
2000	349.6	38.9	38.4	1.4	1.3	389.9	389.2	61.1	60.8
2001	187.2	247.0	247.0	1.3	1.2	435.5	435.4	129.3	129.3
2002	209.0	143.8	143.8	9.7	9.7	362.5	362.5	94.8	94.8
2003	171.3	132.4	132.4	6.5	6.5	310.2	310.2	87.1	87.1
2004	72.1	134.5	134.5	9.7	9.7	216.3	216.3	72.3	72.3
2005	185.7	48.9	48.9	5.2	5.2	239.8	239.8	43.7	43.7
2006	44.1	63.7	62.7	2.2	2.0	110.0	108.8	32.5	32.0
All yrs (avg):		104.5	104.1	4.2	4.2	357.1	356.6	78.1	77.9
Static/adjusted:			1.004		1.012		1.001		1.002
Carry-over yrs (avg)		77.9	77.1	2.3	2.2			74.4	74.1
Static/adjusted:			1.011		1.039				1.004

The adjusted ocean population sizes did not change the years or frequency of implementation of the 16% Cap Alternative based on the hindcast analysis years of 1985-2006. The average natural escapement projection declined by about 100 fish (0.4%) compared to the unadjusted population projections. The natural escapement declined 200-300 fish (1%) in the very low abundance years of 1992 and 1999 (Table D-2) The spawner reduction rates for the adjusted population projections are shown in Table D-3.

Table D-2. Escapement projections to natural areas under unadjusted and adjusted status quo and 16% Cap alternatives, 1985-2006 (thousands). Seasons with no change in projections are omitted from the table for clarification. The actual SRRs are shown in Table D-3.

	Status quo		16% Cap		
Season	Unadjusted	Adjusted	Unadjusted	Adjusted	Diff
1985	35.0	35.0	22.3	22.3	0.00
1986	35.0	35.0	51.1	50.8	
1987	51.6	51.6	89.4	89.3	
1988	44.4	44.4	72.5	72.6	
1989	51.3	51.3	86.0	86.0	
1990	35.0	35.0	51.7	51.7	
1991	35.0	35.0	24.9	24.9	0.00
1992	26.0	25.6	14.2	14.0	0.01
1993	35.0	35.0	33.8	33.5	0.01
1994	35.0	35.0	30.9	30.9	0.00
1995	35.0	35.0	33.4	33.3	0.00
1996	58.3	58.2	100.7	100.5	
1997	35.0	35.0	30.8	30.8	0.00
1998	35.0	35.0	25.1	25.1	0.00
1999	35.0	35.0	24.7	24.4	0.01
2000	35.0	35.0	38.5	38.3	
2001	43.1	43.1	70.9	71.0	
2002	35.0	35.0	47.9	47.9	
2003	35.0	35.0	45.7	45.6	
2004	35.0	35.0	36.0	36.0	
2005	35.0	35.0	28.3	28.3	0.00
2006	32.5	32.0	17.0	17.0	0.00
avg=	31.1	31.1	23.8	23.7	0.00

Table D-3. Spawner reduction rates for unadjusted and adjusted status quo and 16% Cap alternatives, 1985-2006 seasons.

	Status quo		16% Cap	
Season	Unadjusted	Adjusted	Unadjusted	Adjusted
1985	8.8%	8.8%	41.8%	41.9%
1986	57.1%	56.7%	57.1%	56.7%
1987	66.7%	66.7%	66.7%	66.7%
1988	66.7%	66.7%	66.7%	66.7%
1989	66.7%	66.7%	66.7%	66.7%
1990	59.1%	59.1%	59.1%	59.1%
1991	16.4%	16.4%	40.5%	40.6%
1992	0.0%	0.0%	45.5%	46.1%
1993	35.3%	31.8%	37.5%	38.0%
1994	35.5%	34.4%	43.0%	43.1%
1995	36.1%	35.6%	39.1%	39.2%
1996	66.7%	66.7%	66.7%	66.7%
1997	36.8%	36.8%	44.4%	44.4%
1998	19.4%	18.8%	42.1%	42.2%
1999	22.7%	17.0%	45.4%	46.1%
2000	42.7%	41.4%	42.7%	41.4%
2001	66.7%	66.7%	66.7%	66.7%
2002	63.1%	63.1%	63.1%	63.1%
2003	59.8%	59.8%	59.8%	59.8%
2004	51.6%	51.6%	51.6%	51.6%
2005	19.9%	19.9%	35.3%	35.3%
2006	0.0%	0.0%	47.5%	47.7%

APPENDIX E. Formulas and data used in the hindcast analysis.

Section 1. Escapement goals under the de minimis fishery alternatives

The adult natural (n) area spawning escapement (E_n) goal under the status quo (E_n^{Q}), sliding scale (E_n^{S}), and fixed-cap (E_n^{F}) *de minimis* fishery alternatives are, respectively:

$$E_n^{\mathrm{Q}} = \begin{cases} E_n^0 & \text{, when } E_n^0 \le 35,000 \\ 35,000 & \text{, when } 35,000 < E_n^0 \le 105,000 \\ E_n^0/3 & \text{, when } E_n^0 > 105,000 \end{cases} \tag{0.1}$$

$$E_n^{\mathrm{S}} = \begin{cases} E_n^0(1-0.09(E_n^0/35,000)) & \text{, when } E_n^0 \le 38,889 \\ E_n^{\mathrm{Q}} & \text{, when } E_n^0 > 38,889 \end{cases} \tag{0.2}$$

$$E_n^{\mathrm{F}} = \min(E_n^0 - I_{n\text{-SE}}^{\mathrm{F}}\ , E_n^{\mathrm{Q}}), \tag{0.3}$$

where E_n^0 is the natural area escapement absent fisheries, and $I_{n\text{-SE}}^{\mathrm{F}}$ is the total number of impacts (all fisheries) under the fixed-cap alternative of natural area destined fish in spawner equivalent (SE) units[1] (Table 1 provides a list of notation). The quantity $I_{n\text{-SE}}^{\mathrm{F}} / E_n^0$ is not a fixed fraction under the fixed-cap alternative—not even in a particular year—as it depends on season-structure, age-structure, user-group harvest allocation, etc.

The natural area escapement absent fisheries is

$$E_n^0 = \sum_{a=3}^{5} R_a^0 \times g_a, \tag{0.4}$$

with

$$R_a^0 = N_a \times S_a \times m_a \times (1 - w_a), \tag{0.5}$$

where the subscript *a* denotes age {3,4,5}, R_a^0 is the river run abundance absent fisheries, g_a is the proportion of spawners that are destined for natural areas, N_a is the starting (Sept 1) ocean abundance, S_a is the annual survival rate absent fisheries, m_a is the maturation rate, and w_a is the out-of-basin stray rate.

For the fixed-cap alternatives, the total number of impacts (all fisheries) of natural area destined fish in spawner equivalent units is

[1] SE units are the number of the referred to quantity that would have spawned in the *current year* absent fisheries, as distinguished from adult equivalent (AEQ) units which are the number that would have spawned in the *current or future years* absent fisheries.

$$I_{n\text{-SE}}^{\mathrm{F}} = \sum_{a=3}^{5}((I_{o,a} \times p_{o,a}) + I_{r,a} + I_{t,a}) \times g_a, \tag{0.6}$$

where $I_{o,a}, I_{r,a},$ and $I_{t,a}$ are the impacts of the ocean (*o*), river recreational (*r*), and river tribal (*t*) fishery, respectively, and $p_{o,a}$ is the proportion of the $I_{o,a}$ that would have spawned at age *a* absent fisheries:

$$p_{o,a} = \sum_{\tau=\text{Sept}}^{\text{Aug}} I_{o,a,\tau} \times S_{a,\tau} \times m_a \times (1 - w_a) / I_{o,a}; \tag{0.7}$$

$I_{o,a,\tau}$ is the ocean age *a* impacts in month $\tau = \{\text{Sept, Oct, ..., Aug}\}$, and $S_{a,\tau}$ is the age *a* survival rate absent fisheries from month τ through the end of August (just prior to maturation). Under the fixed-cap alternatives, $I_{o,4}$ is constrained such that $I_{o,4} / N_4 \le i_{o,4}^{\mathrm{F}}$; the ocean age-4 impact rate cap, and the $\{I_{o,a,\tau}\}, \{I_{r,a}\},$ and $\{I_{t,a}\}$ are forecast by the KOHM subject to the $i_{o,4}^{\mathrm{F}}$ constraint and the user group harvest allocations. Note that while the tribal harvest allocation is annually fixed at 50% of the total allowable harvest, the river sport allocation is not determined by the PFMC—it is annually specified by the California Fish and Game Commission.

For each alternative A ={Q,S,F}, the spawner reduction rate (SRR) due to fishing is

$$SRR = 1 - E_n^{\mathrm{A}} / E_n^{0}. \tag{0.8}$$

<u>Section 2. Hindcast analysis of escapement goals and spawner reduction rates under the de minimis fishery alternatives over the 1985-2006 period.</u>

For the purpose of hindcasting, additional formulas consistent with the KOHM are presented below that allow one to approximate the annual escapement goal and spawner reduction rate under each of the *de minimis* fishery alternatives were they in effect during the 1985–2006 period.

For the ocean fishery:

$$I_{o,a} = N_a \times i_{o,4} \times v_{o,a} \quad \text{, where } v_{o,a} = i_{o,a} / i_{o,4}, \tag{0.9}$$

with $v_{o,a}$ denoting the ocean impact rate at age *a* relative to the age-4 rate. The ocean harvest total (H_o) may be expressed in terms of the $\{I_{o,a}\}$ and the age-specific harvest rate / impact rate ratios ($q_{o,a}$) as

$$H_o = \sum_{a=3}^{5} I_{o,a} \times q_{o,a} \quad \text{, where } q_{o,a} = h_{o,a} / i_{o,a}, \tag{0.10}$$

and $h_{o,a} = H_{o,a} / N_a$ is the ocean age *a* harvest rate.

For the river fisheries:

$$H_r = H_o \times \pi_r / (1-\pi_r) \quad , \quad H_t = H_o \times \pi_t / [(1-\pi_t)(1-\pi_r)], \tag{0.11}$$

where π_r is the proportion of the nontribal harvest allocated to the recreational fishery (H_r), and π_t is the proportion of the total harvest allocated to the tribal fishery (H_t). The age-specific river harvests are

$$H_{r,a} = H_r \times u_{r,a} \quad , \quad H_{t,a} = H_t \times u_{t,a}, \tag{0.12}$$

where $\{u_{r,a}\}$ and $\{u_{t,a}\}$ is the age-composition of the respective harvests, which depends on the age-specific abundances of the river run $\{R_a\}$ and on the gear selectivity of the respective fisheries:

$$u_{r,a} = \frac{R_a \times v_{r,a}}{\sum_{a=3}^{5} R_a \times v_{r,a}} \quad , \quad u_{t,a} = \frac{R_a \times v_{t,a}}{\sum_{a=3}^{5} R_a \times v_{t,a}}, \tag{0.13}$$

where the selectivity coefficients $\{v_{r,a}\}$ and $\{v_{t,a}\}$ are relative to the selectivity at age-4, and

$$R_a = R_a^0 - (I_{o,a} \times p_{o,a}). \tag{0.14}$$

Finally, the respective age-specific impacts are

$$I_{r,a} = H_{r,a} / (1-d_r) \quad , \quad I_{t,a} = H_{t,a} / (1-d_t), \tag{0.15}$$

with dropoff mortality rate values of $d_r = 0.02$ and $d_t = 0.08$.

Hindcast Methods:

For each year in the 1985–2006 period, the above formulas were applied to the yearly age-specific pre-season ocean abundance forecasts $\{\hat{N}_a\}$ to determine the yearly escapement goal and spawner reduction rate under each of the de minimis fishery alternatives were they in effect during this period. Values for several of the parameters in these formulas were not readily available for the 1985–2001 period, and for these years the average value of the parameters over the 2002–2006 period (Table 2) was used for the analysis. Harvest allocations of $\pi_r = 0.15$ and $\pi_t = 0.50$ (the norm values) were assumed for all years in the analysis. These simplifications should provide reasonably good approximations for the present purpose. Below, we superscript the formula-derived quantities by a "*".

For the status quo and sliding scale alternatives:

1. E_n^{0*} was calculated according to equations (1.4) and (1.5) using $\{\hat{N}_a\}$ and the Table 2 quantities.
2. E_n^{Q*} and E_n^{S*} were determined by equations (1.1) and (1.2).
3. SRR_n^{Q*} and SRR_n^{S*} were calculated by equation (1.8).

For the fixed-cap alternatives:

1. E_n^{0*} and $\{R_a^{0*}\}$ were calculated according to equations (1.4) and (1.5) using $\{\hat{N}_a\}$ and the Table 2 quantities.
2. $\{I_{o,a}^*\}$ and H_o^* were calculated according to equations (1.9) and (1.10) using $\{\hat{N}_a\}$, the alternative's $i_{o,4}^{F}$ cap, and the Table 2 quantities.
3. $\{I_{r,a}^*\}$ and $\{I_{t,a}^*\}$ were calculated according to equations (1.11–1.15) and using $\{\hat{N}_a\}$, $\{R_a^{0*}\}$, $\{I_{o,a}^*\}$, H_o^*, and the Table 2 quantities.
4. $I_{n\text{-SE}}^{F*}$ was calculated by equation (1.6).
5. E_n^{F*} was determined by equations (1.3) and (1.1).
6. SRR_n^{F*} was calculated by equation (1.8).

For a particular year, $I_{n\text{-SE}}^{F*}$ will be nearly proportional to $i_{o,4}^{F}$ in this analysis owing to the linear nature of equations (1.4-1.15). (The $\{I_{o,a}\}$, I_r, and I_t are proportional to $i_{o,4}^{F}$, but $\{I_{r,a}\}$ and $\{I_{t,a}\}$ are not because of the dependence of $\{u_{r,a}\}$ and $\{u_{t,a}\}$ on $\{R_a\}$ which is not proportional to $i_{o,4}^{F}$.)

It is important to note that this analysis is *static*. It does not account for the reduction in the following year's preseason ocean abundance from the (hypothetical) implementation of de minimis fisheries (i.e. doesn't account for cohort carryover effects). Similarly, it does not account for changes to preseason ocean abundance in future years due to any changes in recruitment associated with the reduced number of spawners under *de minimis* fisheries.

Table 1. Notation used in the hindcast analysis.

Symbol	*Description*
0	Superscript denoting “absent fisheries”
a	Subscript denoting age, $a \in \{3,4,5\}$
A	Superscript denoting de minimis alternative, A $\in$ {F,Q,S}
F	Fixed cap
Q	Status quo
S	Sliding scale
d	Dropoff mortality rate (dropoff mortality / impacts)
E_n	Escapement in natural areas
g	Proportion of spawners destined for natural areas
h	Harvest rate
H	Harvest
i	Impact rate
I	Impacts (harvest, hook-and-release, dropoff)
$I_{n\text{-SE}}$	Impacts of natural area destined fish in spawner equivalent units
k	Subscript denoting fishery sector, $k \in \{o,r,t\}$
o	Ocean
r	River recreational
t	River tribal
m	Maturation rate
N	Preseason ocean abundance
p	Proportion of impacts that would have spawned in current year absent fisheries
π_r	Proportion of nontribal harvest taken by river recreational fishery
π_t	Proportion of total harvest taken by river tribal fishery
q	Ratio: harvest rate / impact rate
R	River run abundance
S_a	Survival rate absent fisheries, age a
$S_{a,t}$	Survival rate absent fisheries, age a, month τ through Aug
SRR	Spawner reduction rate due to fisheries
τ	Subscript denoting month, $\tau \in$ {Sept, Oct, …, Aug}
u	Harvest age composition (proportion at age)
v	Vulnerability relative to age-4
w	Out-of-basin stray rate

Table 2. Parameters values used in hindcast analysis. The 2002–2006 values were taken from the KOHM adopted by the PFMC in those years, respectively.

Quantity	*2002*	*2003*	*2004*	*2005*	*2006*	**Average**
S_3	0.5848	0.5848	0.5848	0.5848	0.5848	0.5848
S_4	0.8	0.8	0.8	0.8	0.8	0.8
S_5	0.8	0.8	0.8	0.8	0.8	0.8
m_3	0.3747	0.3790	0.3806	0.3784	0.3815	0.3788
m_4	0.8809	0.8828	0.8882	0.8814	0.8812	0.8829
m_5	1.0	1.0	1.0	1.0	1.0	1.0
w_3	0.0057	0.0055	0.0052	0.0054	0.0063	0.0056
w_4	0.0038	0.0037	0.0035	0.0035	0.0046	0.0038
w_5	0.0029	0.0090	0.0085	0.0082	0.0090	0.0075
$p_{o,3}$	0.3586	0.3614	0.3637	0.3564	0.3650	0.3610
$p_{o,4}$	0.8249	0.8055	0.8075	0.7715	0.7518	0.7922
$p_{o,5}$	0.9151	0.8932	0.8316	0.8520	0.7951	0.8574
g_3	0.62	0.46	0.55	0.538	0.672	0.568
g_4	0.61	0.71	0.61	0.545	0.552	0.605
g_5	0.65	0.69	0.71	0.717	0.723	0.698
$v_{o,3}$	0. 3796	0.3071	0.2870	0.1957	0.1664	0.2672
$v_{o,4}$	1.0	1.0	1.0	1.0	1.0	1.0
$v_{o,5}$	1.1641	1.1562	2.2598	1.3770	6.6171	1.3770*
$q_{o,3}$	0.9110	0.8883	0.8637	0.8411	0.8442	0.8697
$q_{o,4}$	0.9437	0.9270	0.9099	0.8582	0.8305	0.8939
$q_{o,5}$	0.9511	0.9509	0.9432	0.9356	0.9225	0.9407
$v_{r,3}$	1.4	1.4	1.35	1.359	1.406	1.383
$v_{r,4}$	1.0	1.0	1.0	1.0	1.0	1.0
$v_{r,5}$	1.0	1.0	0.93	0.929	0.914	0.955
$v_{t,3}$	0.5	0.5	0.49	0.481	0.489	0.492
$v_{t,4}$	1.0	1.0	1.0	1.0	1.0	1.0
$v_{t,5}$	1.7	1.7	1.63	1.626	1.570	1.645

* Median.

APPENDIX F. Preliminary Assessment of Risk Associated with the Harvest Management Regime of the Fifteenth Amendment to the Pacific Coast Salmon Plan.

4.1.4 POPULATION VIABILITY ANALYSIS (PVA)

Summary

The biological analysis projected the effects of *de minimis* fishery implementation at various levels on future population size and fishery harvest. The key question is whether the effects low fishing rates in low run years on spawning escapement significantly affects future numbers. Projections were based on a Population Viability Analysis (PVA) using a stochastic, age-structured, stock-recruitment population model (SSRM). A population viability analysis is conceptually the same approach that has been applied to the identification of take limitations based on impact levels deemed to pose no jeopardy to future viability for listed salmon stocks under the ESA. The model is an adaption of the model previously used by Prager and Mohr (2001) to evaluate the effects of fishery alternatives.

The model estimates annual fish numbers, harvest, and fishery impacts based on fishery strategies including the historic management plan, the status quo, and alternative *de minimis* fishing rates. The fish population portion of the model estimates age-specific numbers of natural and hatchery-produced fish in the ocean, returning to the river, and escaping fisheries to return to natural spawning areas or hatcheries. The fishery portion of the model estimates encounter, harvest, and impact numbers and rates for ocean troll, ocean recreational, river net, and river recreational fisheries. The model is configured using historical Klamath Fall Chinook data on natural and hatchery production, survival, and maturation rates. Variability in fish population and fishery dynamics is incorporated into stochastic simulations with multiple iterations (e.g. 200) of a 40 year period beginning with current conditions. The model is built in Excel using Visual Basic. The current calibration of the model produces outputs that closely match historical averages and ranges of fish numbers and harvest in the ocean and the river.

The modeling confirms future effects of low fishing rates on escapement and harvest are lost in the normal real world variability in the system. Conclusions are the same as those previously reported by Prager and Mohr (2001) using a similar modeling approach. The model estimates a 39% frequency of escapements of less than 35,000 under current management (35,000 spawner floor and a 16% ESA limit on ocean fishery harvest rates of age 4 fish). Escapements regularly fall under the floor due to uncertain fishery forecasts and catchability. *De minimis* fishing rates of 2.5%, 5%, 10%, and 16% increase the absolute value of low run size risks by 0.4%, 1%, 3%, and 10% respectively. Frequencies of 2 or 3 consecutive years of escapements less than 35,000 are little affected by *de minimis* fisheries of 10% or less. *De minimis* fisheries would occur in 10-12% of years at rates of 5% or less and up to 17% of years at an impact rate of 16%. Average harvest and escapement of Klamath fall Chinook are little affected by the implementation of *de minimis* fisheries of 16% or less.

Concerns for effects of substock structure within the aggregate Klamath fall Chinook return were addressed with simulations examining the sensitivity of results to pessimistic assumptions of stock productivity, a negative trend in production, highly autocorrelated ocean survival patterns, and a depensatory stock-recruitment relationship at low spawner numbers. Sensitivity analyses to different combinations of input parameters confirm that the relative effects of *de minimis* fishing rates are consistent among different parameterizations of the model. This biological analysis evaluates the effects of fishing on the KRFC population and fishery, but does not directly consider the effects of the effects of KRFC harvest constraints on the much larger catches of other California and Oregon chinook stocks in ocean fisheries. These results will inform policy decisions on appropriate fishing strategies. Acceptable levels of effect and risk will remain a policy decision.

Methods

Model Description

The model estimates annual fish numbers, harvest, and fishery impacts based on various fishery strategies including the historic management plan, the status quo, and alternative *de minimis* fishing rates. The fish population portion of the model estimates age-specific numbers of natural and hatchery-produced fish in the ocean, returning to the river, and escaping fisheries to return to natural spawning areas or hatcheries. The fishery portion of the model represents represents fisheries in the Klamath Management Zone of the ocean and in the Klamath River system (ocean troll, ocean recreational, river tribal, and river recreational). Fishery variables include encounter, harvest, and impact numbers and rates. The model is configured using historical Klamath Fall Chinook data on natural and hatchery production, survival, and maturation rates. Fishery parameters include age and fishery-specific vulnerabilities, legal fractions, catch-release mortality rate, and drop-off mortality rate as well as the prescribed allocation of harvest among fisheries.

The model couples fishery dynamics with a Ricker stock-recruitment function in a stochastic framework. A stochastic approach allows explicit analysis of conservation and future fishery risks associated with fishing at low population levels. The model includes uncertainty and variability in both fish population and fishery dynamics. Stochastic simulations involve multiple iterations (e.g. 500) of a 40 year time interval beginning with current conditions. The 40 year period was based on the spawning escapement policy for Klamath River Fall Chinook (KRTT 1986). Results are expressed in terms of averages, variances, ranges, and frequeny distributions. Risks were expressed based on probabilities of various outcomes (e.g. probability of future spawning escapement of less than 35,000 fish).

The essential formulation of the model is depicted in Figure 1. The model is built in Excel using Visual Basic. A simple interface page facilitates model use and review. Fishery alternatives and inputs are configured to allow for simulation of different combinations and easy examination of results in statistical and graphical format. A more detailed description and discussion of the model formulation and results may be found in the appendix.

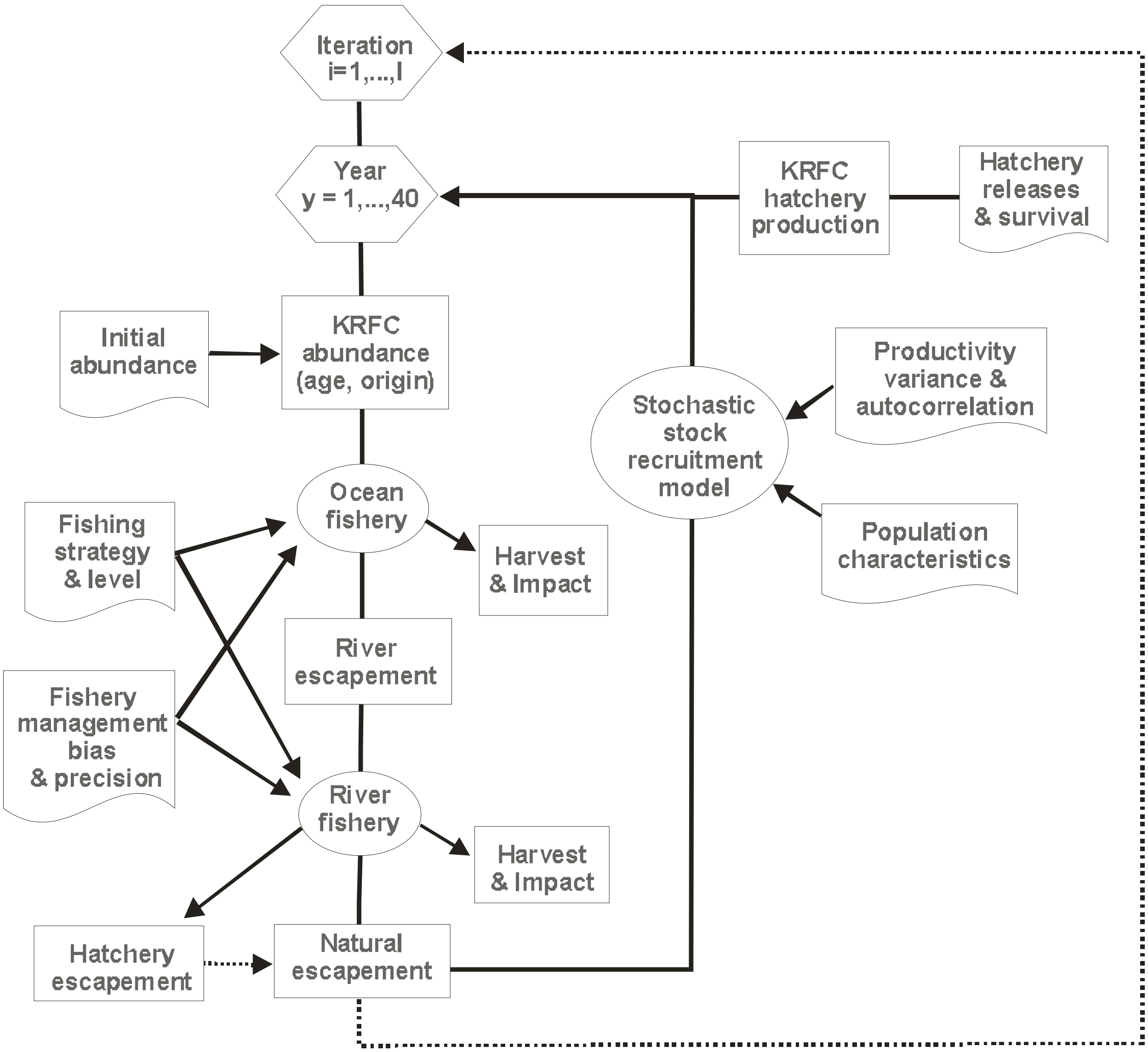


Figure 1. **Model algorthim.**

Fishery Alternatives

The model simulates the effects of fishery strategies identified as inputs by the user. Strategies are defined primarily based on the ocean fishery. Fishing rates consistent with each strategy are input as an ocean age 4 fishery impact rate unless otherwise identified. Fishery impacts include direct and indirect fishery mortalities from harvest, catch and release, and dropoff. Inriver fisheries are scaled to match ocean fisheries according to current legal requirements for tribal:non-tribal shares and Council policies or actions relative to non-tribal shares. Alternatives include:

<u>Fixed rate</u>.– A simple fixed fishing rate is included as a model option. This rate applies in all years regardless of fish abundance. This strategy was primarily used for model development and calibration purposes and does not represent a fihery alternative under consideration in the plan amendment.

<u>Fishery Management Plan</u>.– The historical fisheries management plan provides a baseline point of comparison representative of historical fishing patterns. For this option, the model calculates a fishing rate that takes all fish in excess of a prescribed natural spawning escapement floor (35,000) unless the spawner reduction rate is projected to exceed 67%, whereupon a fishing rate is selected to produce a 67% spawner reduction rate. Spawner reduction rate is defined as the proportional reduction in escapement relative to that projected in the absence of fishing. Under the fishery management plan alternative, no fisheries would occur in years of projected spawner escapements less than the spawner floor.

<u>*De minimis* fishing rate</u>.– A *de minimis* fishing rate strategy operates the same as the fishery management plan except that no fisheries occur in years of projected spawner escapements less than the spawner floor at a prescribed fishing rate (e.g. 5%, 10%, 16%). Fishing rate inputs for this option are defined as an ocean age 4 fishery impact rate.

<u>Sliding scale</u>.– The sliding scale is an alternative to a fixed *de minimis* ocean age-4 impact rate where the rate is reduced linearly from 4% to 0% at spawner projections between 39,000 and 0.

<u>ESA constraint</u>.– The ESA constraint may be used to cap the ocean fishery impact at a prescribed rate (e.g. 16% ocean age-4 harvest rate). This input works independent of other model fishery alternatives so that it can be used in combination with other alternatives. As per management practice, KRFC inputs foregone by ocean fisheries are transferred to the river sport fishery up to a harvest level limit based on the maximum observed in the historical dataset.

<u>Recovery strategy</u>.– The recovery strategy is another optional input that may be used in concert with *de minimis* fishery alternatives to limit implementation of *de minimis* fisheries following successive years of poor escapements. Like the ESA constraint, this option works independent of other fishery options so that it can be used in combination with other alternatives. Under this constraint, no *de minimis* fishery for KRFC may be prosecuted for more than three consecutive seasons, and if during all three of those years the spawner floor was not met, *de minimis* fishing could not occur until the stock met the floor for at least three consecutive seasons.

Model Variables and Parameters

A full list of model inputs may be found in Table 1. Descriptions of derivation and application of model variables and inputs are as follows:

Table 1. Model input parameters (from model input page).

Population

Iterations	200	
print all (0= no, 1 = yes)	0	
Initial population size (spnrs)		
2 years ago	24,100	
1 year ago	27,300	
Yr 1 ocean recruits	total #	p Hatch
age 3	44,100	0.67
age 4	63,700	0.55
age 5	2,200	0.72
Stock Recruitment Function		
alpha	14.87	
beta	1.787E-05	
spawners @ max constraint	162,000	
max recruits constraint	777,000	
Depensation (0=no, 1=yes)	1	
theshold escapement	35000	
Recr variation (ocean)	2	
0 = deterministic		
1 = random (log) normal	MSE :	0.91
2 = random autocorrelated	coef:	0.5
Freshwater production trend	0	
Age-specific maturity rate		
Age 3	0.379	
Age 4	0.883	
Age 5	1.000	
Ocean winter survival rate		
age 3	0.58	
age 4	0.8	
age 5	0.8	
Hatchery fish		
Annual releases (millions)	8.9	
SAR	0.007	
p natural spawning	0.05	
egg take goal (millions)	16	
eggs/spawner	1,250	

Fishery

Fishing strategy	2	ref rate	ref esc	other
1 = fixed rate		0.00		
2 = Fish Management Plan		0.67	35000	
3 = de min (sliding scale)		0.10	39000	0
4 = de min (fixed)		0		
ESA Limit active? (0 or 1)	0			
max impact		0.17		
transfer harv?		0		
River sport max harv rate		0.12		
Rebuilding strategy	0	0 = no, 1 = yes		
Fishery uncertainty (CV)	0.5			
Bias	1.4			
Fishery allocation				
ocean troll	0.3400			
ocean recreational	0.0850			
river tribal	0.5000			
river recreational	0.0750			
Ocean troll	**vulner**	**legal**	**C&R**	
age 3	0.25	0.80	0.26	
age 4	1.00	0.95	0.26	
age 5	2.00	1.00	0.26	
dropoff mort rate	0.05			
Ocean recreational	**vulner**	**legal**	**C&R**	
age 3	0.50	0.99	0.14	
age 4	1.00	1	0.14	
age 5	2.00	1	0.14	
dropoff mort rate	0.05			
RiverTribal	**vulner**	**retain**	**C&R**	
age 3	0.50	1	0	
age 4	1.00	1	0	
age 5	1.60	1	0	
dropoff mort rate	0.08			
River recreational	**vulner**	**retain**	**C&R**	
age 3	1.40	1	0	
age 4	1	1	0	
age 5	0.95	1	0	
dropoff mort rate	0.02			

Fishing rates.– Annual fishing rates were estimated in the model based on the designated fishing strategy and annual numbers of fish available as described above. The model uses different routines to identify a target fishing rate in each year for each fishery depending on the fishing strategy. The model uses ocean age 4 impact rates as a key metric for describing and scaling fisheries consistent with current management practice. Input fishing rates are typically entered as the ocean age 4 impact rate. Impacts include harvest, catch-release, and drop-off mortalities. The model scales fishery contact rates, harvest rates, and impact rates for each fishery to produce the desired impact or spawner reduction rate based on fishery allocation goals, age-specific fishery parameters, and age-specific fish numbers. Fishery allocations among ocean troll, ocean recreational, river tribal, and river recreational fisheries are a user input. Fishery parameters include vulnerability, proportion of catch that is retained, catch-and-release mortality rate, and drop-off mortality rate. The fishery formulations are similar to those in the KOHM annual fishery management model although parameters in the SSRM are annual rather than by month or area numbers. Fishery parameters are described in greater detail in Mohr et al. (2001) and Prager and Mohr (1999, 2001).

Fishery Variance.– The model included a fishery variance term to capture the effects of forecast error and variable fishing success on fishing rates. Fishery management variance results from the effects of uncertain forecasts, effort, and catch rates which are reflected in differences between in-season target and post season actual fishing rates (Figure 2). Thus, target fishing rates were randomly varied to produce a pattern equivalent to that observed in comparisons of target and actual fishing rates in post season analyses. The fishery variance input was expressed as a coefficient of variation consistent with observed heteroscedasticity of the error variance. Error variance in fishery impact rate is not constant over the range of rates but rather increases with increasing rate. Fishery variance was estimated from relative values of postseason versus preseason estimates of age 4 ocean harvest rate. This variance was propagated through all fisheries as a result of contact, harvest, and impact rates being scaled according to the fishery allocation formula. All fisheries are constrained not to exceed an 80% contact rate of the available fish to avoid unrealistic extremes generated from a random distribution.

Historical comparisons of postseason harvest rate estimates and preseason harvest rate forecasts also revealed a significant negative bias in forecast harvest rates by ocean fisheries. Actual rates averaged 40% greater than forecast rates for 1986-2006 (Figure 3). The model included a bias parameter in ocean harvest rates to reflect this historical pattern. In actual practice, this consistent underestimation of ocean harvest rates has not been matched by the in-river tribal fishery due to the effort versus quota based management structure of the fisheries. As a result, tribal harvest shares have regularly fallen below the 50% target. However, for future modeling purposes we elected to maintain the tribal harvest allocation at 50% to reflect the management intent. In the model, the only times when the tribal harvest share falls below 50% occur when very high ocean harvest rates result in too few fish in the river to meet the tribal allocation goal consistent with the escapement rules identified in the modeled fishing strategy.

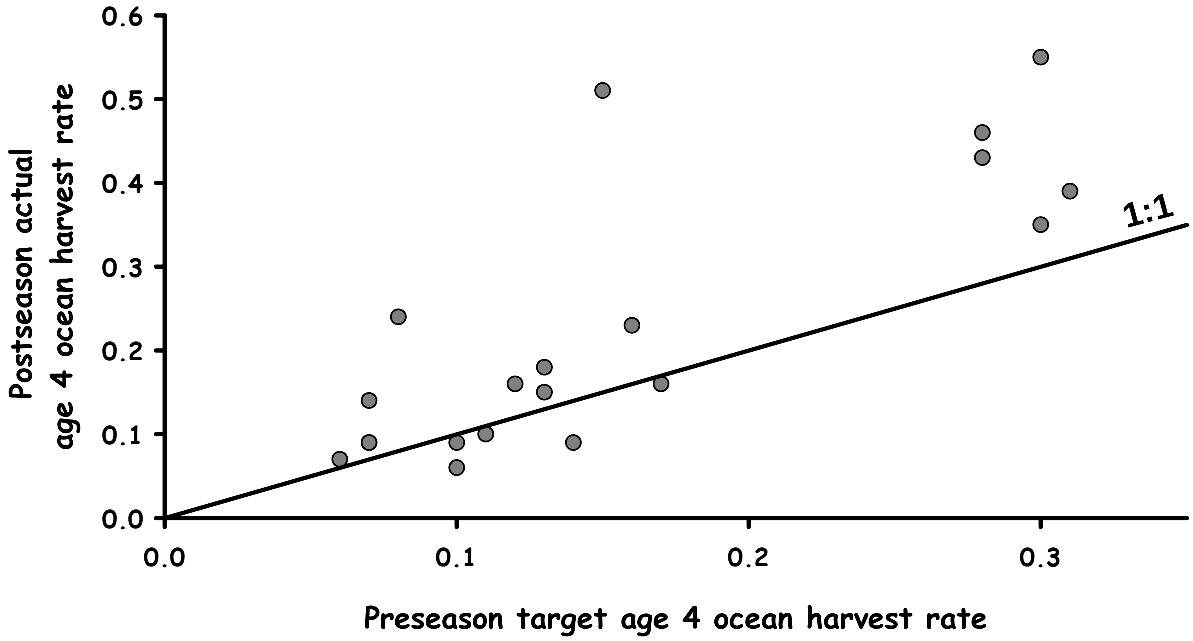


Figure 2. Examples of fishery implementation error based on preseason target and post-season actual estimates of age 4 ocean fishery harvest rates of Klamath fall Chinook for 1986-2006 (data from PFMC 2006).

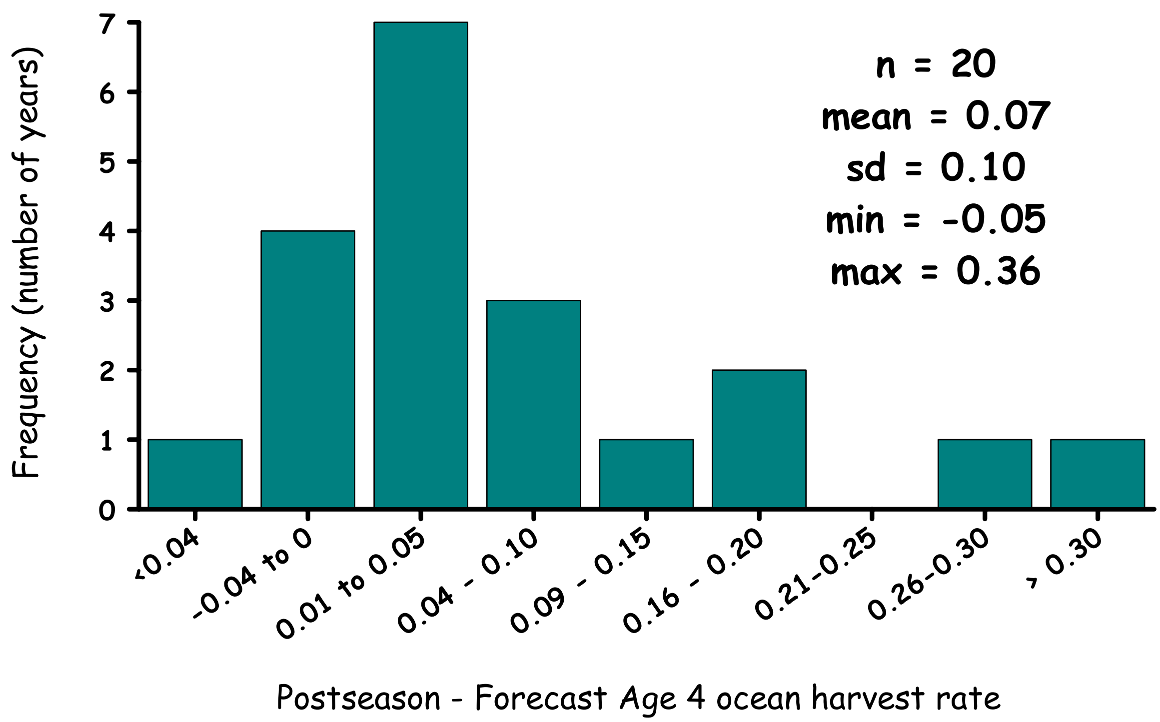


Figure 3. Error distribution of postseason estimates versus preseason forecasts of ocean age 4 harvest rates of Klamath fall Chinook for 1986-2006.

Initial Population Size.– Model runs are initiated with a starting population size (recent age-specific returns for partial cohorts rather than spawners). Near term numbers and risks are typically quite sensitive to this number while long term numbers and risks are not. The starting population size was based on forecast ocean numbers by age for 2006 and spawning recruits during the two previous years.

Stock-Recruitment Function.– Annual ocean recruitment of age-3 fish (Sept. 1) is estimated in the model from spawner numbers using a Ricker stock-recruitment function. Natural spawners include both naturally-produced fish and hatchery-origin fish that do not return to the hatchery. Stock-recruitment function productivity and capacity parameters were derived from 1979-2000 brood year data based on a 2-stage survival formulation (model 2) as developed by the STT (2005). For modeling purposes, the function was refit to ocean age 4 recruits rather than spawner equivalent recruits as reported by the STT. Corresponding reference points were a stock size at sustainable equilibrium production (SEQ) of 112,300, a maximum sustainable production (SMSP) of 56,900, and maximum sustainable yield (SMSY) of 40,700. For Klamath fall Chinook, the Ricker stock-recruitment function accounts for about half of the density-independent model residual variation (STT 2005). The stochastic simulation model incorporated variability about the stock-recruitment function to describe annual variation in fish numbers and productivity due to the effects of variable freshwater and marine survival patterns. The model assumed this variance to be lognormally distributed and highly autocorrelated. While stock-recruitment function parameters were derived using the 2-stage formulation, prospective simulations were based on the equivalent one-stage function, variance, and autocorrelation coefficients to avoid potential problems of covariance in error terms of the 2-stage model. Predicted future recruitment patterns were equivalent. The model also included limits on recruitment to prevent unrealistically large or small random numbers. Recruitment was limited to a maximum of 777,000 age 3 fish in the ocean corresponding to the maximum observed. Model escapements exceeding the maximum observed value of 162,000 were constrained to produce recruits equal to the model predicted-value for 162,000 spawners.

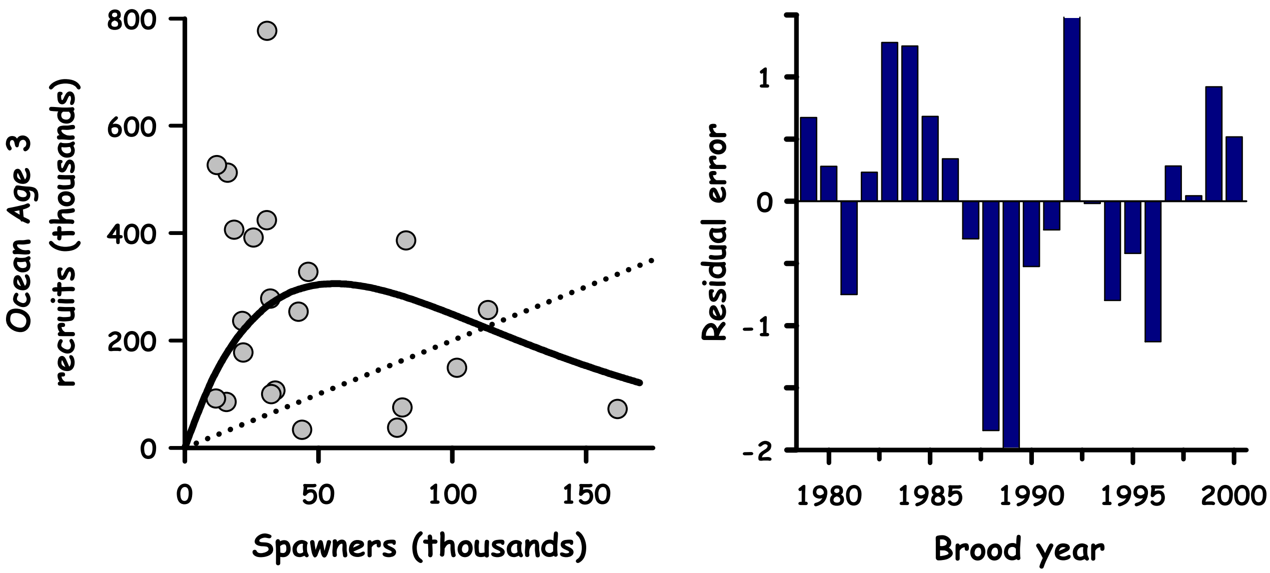


Figure 4. Stock-recruitment relationship and annual pattern of residual error for 1979-2000 brood year data for Klamath fall chinook.

Depensation.– The model provided an option to limit recruitment at low spawner numbers consistent with depensatory effects of stock substructure and small population processes. Depensation was used to simulate population level effects of underseeding of all spawning areas if significant substock structure exists for Klamath Fall Chinook. Because we lack data on substock structure and population dynamics at low escapements, model simulations assumed a depensatory response at escapements below 35,000 (corresponding to the management floor).

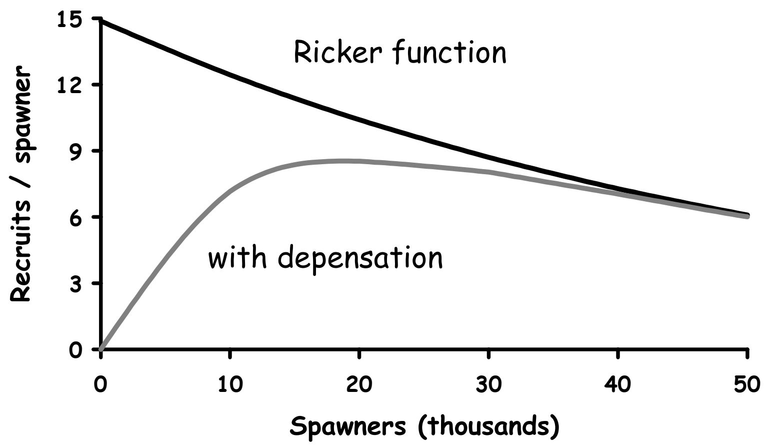


Figure 5. Effect of depensation function on recruits per spawner at low spawner numbers.

Freshwater Production Trend.– An input parameter was included to allow the stock-recruitment productivity pattern to be annually incremented upward or downward so that effects of trends in habitat conditions might be considered. An annual decrement of 1% was used in sensitivity analysis of the effects of *de minimis* fishery alternatives under pessimistic conditions.

Maturation and Survival Rates.– Numbers of fish were returning to the river or remaining in the ocean and surviving natural mortality were calculated by the model from ocean numbers using average annual natural mortality and maturation rates input as constant model parameters. Values were equivalent to those used in the Klamath Ocean Harvest Model (KOHM). The KOHM is a fishery management model that provides detailed estimates of catch by ocean fishery and month, fishery impact levels, and escapement for a given run size and fishing configuration in one year. Monthly natural survival rates used by KOHM were translated into an annual equivalent for use in the SSRM.

Hatchery production.– Hatchery and natural populations are modeled separately. Hatchery numbers recruiting to the age 3 population in the ocean are estimated from the current production goal for Klamath Fall Chinook and a juvenile to adult survival rate calibrated with the model to produce average hatchery escapements and hatchery:natural fractions comparable to those observed in the historical dataset. Release numbers and survival rates represent combined subyearling and yearling release numbers. Hatchery stray rates are an explicit model input and were a personal communication from LB Boydstun based on a review of the limited available data. Normal variation in hatchery survival rates among release cohorts was captured in the model using a scalar based on natural productivity derived from stock-recruitment function residual error. Thus, hatchery and natural numbers varied in strict tandem. The driving assumption was that variation in hatchery and wild production was highly correlated due to common effects of freshwater and marine factors. This is obviously an oversimplification of hatchery stock dynamics but appears to represent numbers and variation on a scale consistent with the historical data. Future modifications of this analysis might consider a more explicit representation of natural and hatchery covariation patterns.

Model Calibration

A series of model calibration runs were made to test the model function and determine whether model inputs consistent with fishery patterns (see Table 12) produced fishery and population dynamics like those observed in the historical dataset. Figure 6 illustrates example model results for one iteration of a 40 year simulation of the calibration conditions. This example illustrates the normal variation in ocean population size, harvest in combined ocean and inriver fisheries, and natural spawning escapement. Of course, annual patterns vary from iteration to iteration in a random fashion consistent with population and fishery variance inputs into the model.

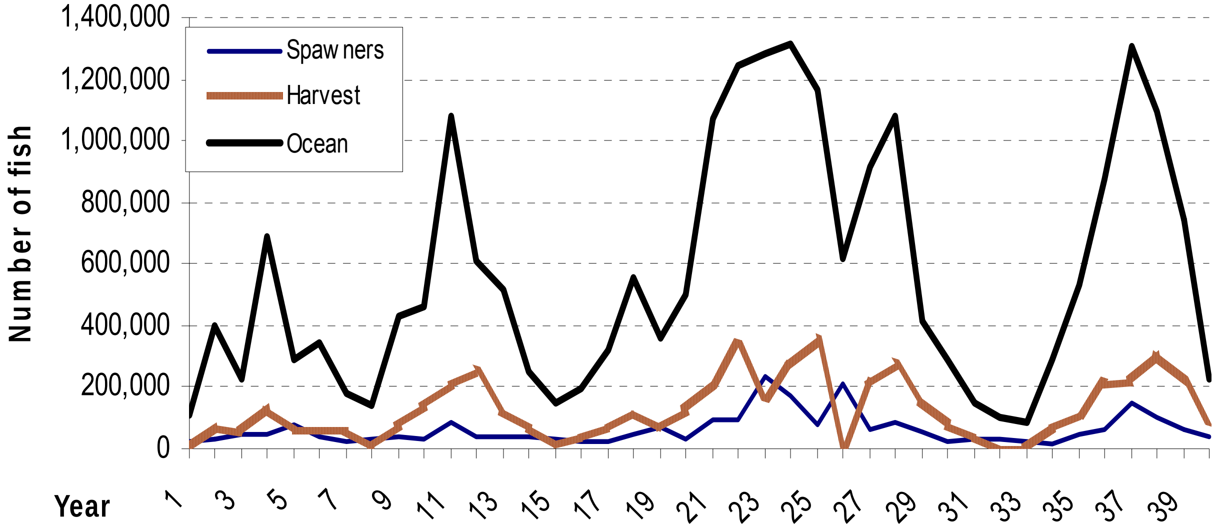


Figure 6. Example results of a stochastic 40-year simulation under the historical fisheries management plan with fisheries operating with a 35,000 escapement floor with a maximum 67% spawner reduction rate and random normal variation in recruits per spawner and fishing rates relative to annual targets.

The current calibration of the model produces outputs that closely match historical averages and ranges of fish numbers and harvest in the ocean and the river (Table 2). Frequency distributions of ocean and spawning escapement numbers are closely comparable (Figure 7). The model generally harvests fewer fish in the ocean than the historical average (63,000 vs 80,000) and substantially more fish in the river than the historical average (60,000 vs. 30,000). In part this reflects the harvest rate calculations built into the model that allocate 50% of the annual harvest to the river net fishery although the tribal harvest share has often fallen short of 50% as previously discussed. Lower estimates of average ocean harvest by the model might partly reflect the model parameterization that closes fisheries in years of low escapement. In contrast, at least some ocean harvest of Klamath fall Chinook occurred in all years from 1981-2005. Optimistic estimates by the model of the Klamath river runs relative to the 1981-2005 averages and maximums might also reflect poorer than average production conditions represented in the recent historical record as well as changes in hatchery contributions over the last two decades. Despite modest departures from the historical patterns in some model calibration results, the model produce very similar results for key variables of interest in evaluations of de minimis fishery alternatives including ocean harvest rates and spawning escapement. For instance, the model-predicted frequency of spawning escapements less than 35,000 (0.48) was very close to the estimated frequency from 1981-2005.

Table 2. Model results relative to actual historic numbers (based on fishery management according to the Fish Management Plan, 35,000 escapement floor with a maximum 67% spawner reduction rate). Results are based on long term average results (model years 6-40) in 500 iterations of the model.

		Mean	CV	Minimum	Max
Ocean abundance [a]	1981-2005	490,000	70%	70,000	1,450,000
	Model	520,000	67%	11,000	1,700,000
Ocean harvest	1981-2005	80,000	130%	3,000	300,000
	Model	63,000	83%	0	370,000
Ocean harvest rate	1981-2005	27%	66%	6%	60%
(age 4)	Model	27%		0%	78%
River run	1981-2005	110,000	61%	27,000	223,000
	Model	130,000	63%	6,000	480,000
River harvest	1981-2005	30,000	70%	7,000	74,000
	Model	60,000	75%	0	230,000
Spawners (natural)	1981-2005	50,000	74%	12,000	160,000
	Model	50,000	77%	5,000	360,000
Spawners < 35,000	1981-2005	0.56	--	--	--
(frequency)	Model	0.48	--	--	--
Hatchery return	1981-2005	26,000	80%	4,400	98,000
	Model	27,000		1,000	330,000
Hatchery fraction	1981-2005	35%	32%	12%	54%
(in escapement	Model	37%			

[a] *combined hatchery and wild fish, age 3 and 4 only.*

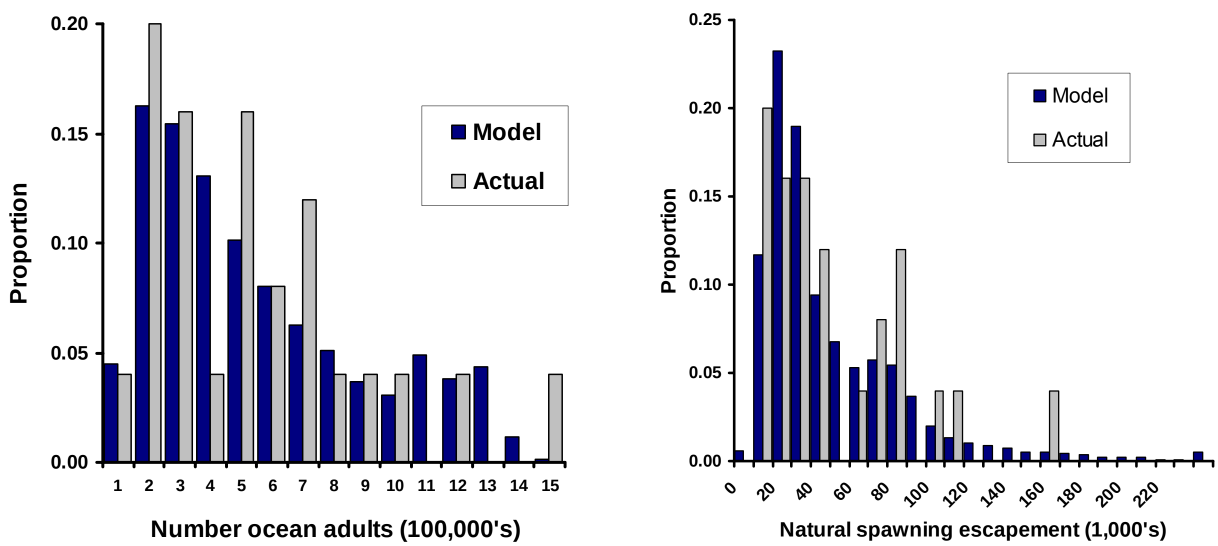


Figure 7. Frequency distribution of ocean hatchery and natural adult abundance (left) and natural spawning escapement (right) of Klamath fall Chinook in 500 iterations of a 40 year simulation with the stochastic stock recruitment model relative to observed distribution estimated for 1981-2005.

Results

Fishery Alternatives.– Status quo management is best represented by simulations of the fishery management plan with a 16% ESA limit on ocean fishery harvest rates of age 4 fish (Figure 8, Table 3). The model estimates a 39% frequency of escapements of less than 35,000 under this management strategy. The 16% limit on ocean harvest rates has reduced the model frequency of low escapements by an absolute value of 10% relative to the fisheries management plan with only a 67% SRR cap.

Analyses of fishery alternatives confirm that *de minimis* fishing rates of 10% or less have a very small effect on the incidence of spawning escapements of less than 35,000 (Figure 8, Table 3). *De minimis* rates of 2.5%, 5%, 10%, and 16% increase the absolute value of low run size risks by 0.4%, 1%, 3%, and 10% respectively. The sliding scale alternative actually reduces low run size risks by a very small amount relative to the current fishery strategy because it begins to limit fishery impacts at projected spawner escapments greater than 35,000.

Frequencies of 2 or 3 consecutive years of escapements less than 35,000 are likewise little affected by *de minimis* fisheries of 10% or less.

De minimis fisheries would occur in 10-12% of years at rates of 5% or less and up to 17% of years at an impact rate of 16% (Table 3). The increased frequency is due to a greater number of years where the rate is applicable rather than a long term effect of fishing on fish numbers.

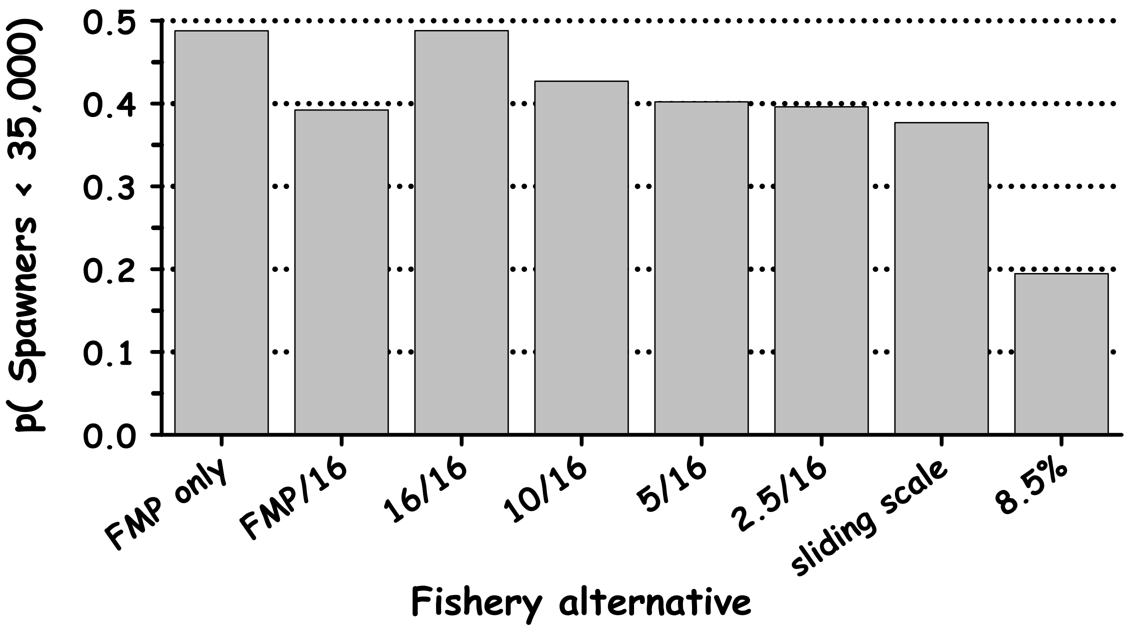


Figure 8. Effects of fishing levels on the incidence of natural spawning escapements of less than 35,000. Format of labels is *de minimis* ocean fishery impact rate / maximum ocean fishery harvest rate (age 4 fish). FMP refers to KRFC conservation objective in the Salmon fishery management plan.

Table 3. Key results from Klamath stochastic stock recruitment model for *de minimis* fishing and other alternatives (using 200 iterations of 40 year time series.

Key Factors:	FMP only[2]	All with 16% ocean harvest rate limitation[1] FMP[3]	16%[4]	10%[5]	5%[6]	2.5%[7]	Sliding Scale[8]	8.5% OIR for 80%p>35K[9]
yrs(E < 35,000)[10]	0.488	0.392	0.488	0.427	0.402	0.396	0.377	0.1945
yrs(E < 21.000)[11]	0.148	0.108	0.315	0.201	0.141	0.114	0.108	0.0839
yrs(E < 12,000)[12]	0.014	0.012	0.177	0.051	0.019	0.015	0.012	0.0196
yrs(egg take goal)[13]	0.732	0.757	0.714	0.743	0.755	0.756	0.758	0.8306
yrs(de min fishery)[14]	0.000	0.000	0.300	0.173	0.116	0.101	0.108	0.0000
yrs(ocn 4 IR <= 0.05)[15]	0.128	0.126	0.020	0.026	0.059	0.128	0.136	0.0839
Iter (3yrs<35,000 in 40)[16]	0.980	0.905	0.930	0.910	0.915	0.905	0.885	0.5900
freq (2yrs<35000 in 40)[17]	13	10	14	11	10	10	9	5
freq (3yrs<35000 in 40)[18]	9	5	10	7	6	6	5	2
Ocean Harvest[19]	60,574	47,611	44,143	46,565	47,338	47,518	47,230	24,926
River Harvest[20]	59,975	57,252	52,817	56,033	56,953	57,155	56,776	32,652
Natural Escapement[21]	50,725	62,621	51,929	58,754	61,290	62,042	63,045	94,786

[1] *Ocean harvest rate (landed catch only) limitation based on California coastal chinook ESA standard (~17% ocean fishery impact rate).*
[2] *Fishery management plan with no fishing below 35,000 floor and the spawner reduction rate not to exceed 67%.*
[3] *Fishery management plan with 16% (~17% ocean fishery impact rate including nonlanded mortality). Status quo management*
[4] *16% de minimis ocean fishery impact rate on age 4 fish and a maximum harvest rate of 16% (~17% ocean fishery impact rate).*
[5] *10% de minimis ocean fishery impact rate on age 4 fish and a maximum harvest rate of 16% (~17% ocean fishery impact rate).*
[6] *5% de minimis ocean fishery impact rate on age 4 fish and a maximum harvest rate of 16% (~17% ocean fishery impact rate).*
[7] *5% de minimis ocean fishery impact rate on age 4 fish and a maximum harvest rate of 16% (~17% ocean fishery impact rate).*
[8] *Sliding scale de minimis ocean fishery strategy based on a linear reduction in ocean fishery impact rate from 4% to 0 at projected escapements from 39,000 to zero (approximately equivalent to a spawner reduction rate range of 10% to 0%.*
[9] *Ocean fishery impact rate (8.5%) that produces an 80% probability of spawning excapements greater than 35,000.*
[10] *Annual frequency of escapements of less than 35,000 natural spawners (n= 200 iterations x 40 years).*
[11] *Annual frequency of escapements of less than 21,000 natural spawners (n= 200 iterations x 40 years). 21,000 is an arbitrary reference point representing a more conservatrive risk level than the spawner floor.*
[12] *Annual frequency of escapements of less than 12,000 natural spawners (n= 200 iterations x 40 years). 12,000 is an reference point representing the lowest number of spawners historically observed.*
[13] *Annual frequency of hatchery escapements that provide the egg take needed to meet hatchery production goals (n= 200 iterations x 40 years).*
[14] *Annual frequency of de minimis fishery implementation (n= 200 iterations x 40 years).*
[15] *Annual frequency of years in which ocean fishery impact rates on age 4 fish are 5% or less (n= 200 iterations x 40 years).*
[16] *Proportion of 40-year iterations in which spawning escapement falls below 35,000 in three consecutive years (n= 200 iterations).*
[17] *Average number of years in 200 iterations where spawning escapement falls below 35,000 in 2 consecutive years.*
[18] *Average number of years in 200 iterations where spawning escapement falls below 35,000 in 3 consecutive years.*
[19] *Average annual ocean harvest in combined troll and recreational fisheries (n= 200 iterations x 40 years).*
[20] *Average annual river harvest in combined net and recreational fisheries (n= 200 iterations x 40 years).*
[21] *Average annual spawning natural escapement of natural and hatchery produced fish (n= 200 iterations x 40 years).*

Average harvest and escapement of Klamath fall Chinook are little affected by the implementation of *de minimis* fisheries of 16% less (Table 3). The small numbers of fish affected during fishery implementation in low run years do not contribute significantly to total averages. Harvest benefits of small fisheries in years are also partically offset by tradeoffs in future production due to escapement effects. However, tradeoffs between current and future harvests are practically a wash at *de minimis* fishery rates of 10% or less when considered solely based on KRFC.

In contrast, the institution of a 16% fishery cap has reduced the average ocean harvest of Klamath fall Chinook by about 20% from the fishery management plan alternative. For a relatively productive stock like Klamath fall chinook, any production benefits of increased escapements at low run sizes are more than offset by foregone harvest in large run years. The 16% cap produces long term average escapements of approximately 60,000 that are substantially greater than the 40,700 spawners estimate by the STT to produce maximum sustained yield.

<u>Near-term vs. long term risks</u>.– The model tracks results separate in years 1 to 5 and years 6-40 in order to assess near term and long term risks. Because of recent low numbers of spawners, near term risks of low escapements are greater than long term risks and near term harvest levels are less than long term expectations.

Table 4. Near-term (1-5 year) and long-term (6-40 year) risks of natural spawning escapements of less than 35,000 Klamath fall Chinook and average ocean harvests under selected fishery strategies (labels as per Table 3). Rates are of *de minimis* fisheries. All alternatives except for FMP-only include a 16% maximum ocean harvest rate target limitation.

	FMP only	FMP	5%	10%	16%
<u>P (E < 35,000)</u>					
Years 1-5	0.617	0.539	0.553	0.588	0.644
Years 6-40	0.469	0.371	0.381	0.404	0.465
<u>Ocean harvest</u>					
Years 1-5	43,225	32,611	32,689	32,456	32,774
Years 6-40	63,053	49,754	49,431	48,580	45,767

<u>Recovery strategy</u>.– The recovery strategy allows no *de minimis* fishery for Klamath River fall Chinook to be prosecuted for more than three consecutive seasons, and if during all three of those years the spawner floor was not met, *de minimis* fishing could not occur until the stock met the floor for at least three consecutive seasons. The recovery strategy reduced low escapement risks by absolute values of 0.3% to 7.3% for de minimis fishery rates from 5% to 16%.

Table 5. Effect of recovery strategy implementation on risks of natural spawning escapements of less than 35,000 Klamath fall Chinook and average ocean harvests under selected fishery strategies (labels as per Table 3). Rates are of *deminimis* fisheries. All alternatives except for FMP-only include a 16% maximum ocean harvest rate target limitation.

	FMP only	FMP	5%	10%	16%
No recovery strategy	0.488	0.392	0.402	0.427	0.488
With recovery strategy	--	--	0.399	0.405	0.415

Pessimistic Analysis.– To test sensitivity of conclusions regarding the risks associated with use of de minimis fishing rates, we conduced analyses of implementation under a pessimistic suite of modeling assumptions. Pessimistic assumptions included a stock-recruitment productivity of only half the empirical value, a negative trend in stock productivity of 1% per year, an increase in autocorrelation of recruitment variation from 0.5 to 0.99 and an increase in the fishery uncertainty CV from 0.5 to 0.7. These arbitrarily-selected values are not related to any expectation of future conditions and were selected merely to explore model behavior. While pessimistic assumptions substantially increased the incidence of low run sizes and decreased average numbers of fish harvested, the pattern of de minimis fishery effect was similar to that observed under likely future based on empirical data. In both cases, the absolute value of changes in low run size risk varied approximately 10-12% across the range of alternatives considered (Table 6).

Table 6. Effects or pessimistic assumptions of future conditions on long term (year 6-40) risks of natural spawning escapements of less than 35,000 Klamath fall Chinook and average ocean harvests under selected fishery strategies (labels as per Table 3). Rates are of *de minimis* fisheries. All alternatives except for FMP-only include a 16% maximum ocean harvest rate target limitation.

	FMP only	FMP	5%	10%	16%
P (E < 35,000)					
Likely	0.469	0.371	0.381	0.404	0.465
Pessimistic	0.893	0.855	0.879	0.929	0.973
Ocean harvest					
Likely	63,053	49,754	49,431	48,580	45,767
Pessimistic	13,623	12,575	13,041	12,085	12,144

Discussion

The modeling confirms that at low fishing rates, future effects on escapement and harvest are lost in the normal real world variability in the system. Conclusions are the same as those previously reported by Prager and Mohr (2001) using a similar modeling approach.

Comparisons of the relative effects of alternative fishing strategies on population and fishery performance are a relatively robust application of the modeling tool. Sensitivity analyses to different combinations of input parameters confirm that the relative effects of de minimis fishing rates are consistent among different parameterizations of the model. (Relative changes in escapement and harvest due to changes in de minimis fishing rates are similar for different combinations of population and fishery parameters.)

The modeling necessarily relies on some simplifying assumptions that warrant additional evaluation in order to qualify results. One assumption of particular concern concerns the effects of substock structure within the aggregate Klamath fall Chinook return. An aggregate stock-recruitment relationship may not adequately reflect the conservation risks associated low spawning escapements where substock structure exists (due to potential underseeding of some areas and possible low population genetic or demographic risks). Corresponding risks were examined in this analysis with population simulations examining the sensitivity of results to alternative assumptions using the least productive substock, a depensatory stock-recruitment relationship at low spawner numbers.

Model analyses were focused on Klamath fall Chinook. Fishery effects will be highly dependent on the productivity of the subject stock –highly productive stocks tend to be much less sensitive to fishing at low escapements than less productive stocks that are less likely to bounce back quickly and seem to be more prone to large swings in survival. Thus, fishing strategies appropriate for Klamath fall Chinook may not be specifically transferable to other stocks of interest. Sensitivity analyses of the effects of fishing strategies and rates at a range of inherent stock productivities to would provide a basis for consideration of other applications as appropriate.

These results will inform policy decisions on appropriate fishing strategies. Acceptable levels of effect and risk will remain a policy decision. Thus, the modeling answers the effect questions (what are the effects of the fishery alternatives?) but still requires policy answers to the corresponding goal question (what effects are acceptable?). e.g. Is a 1% increase in the frequency of escapements of less than 35,000 an acceptable risk in exchange for increased management flexibility in low run years? One approach to considering how much risk is too much would be to ask how many years of data would be required to detect a difference caused by implementation of an alternative fishery strategy. Future analyses will include this evaluation.

This biological analysis evaluates the effects of fishing on the Klamath Fall chinook population and fishery but does not directly consider the effects of the effects of Klamath fall Chinook harvest constraints on the much larger catches of other California and Oregon chinook stocks in ocean fisheries. Companion economic analyses will paint a much more complete picture of the broader effects of Klamath fishing levels.

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APPENDIX H. Formula Used to Estimate Long-Term Landed Catch and Data on Effect of Ex-Vessel Price on Troll Fishery Revenues for Each *De Minimis* Fishing Alternative.

Long-term catch formula

The SRSM model was used to estimate long-term (40-yr time frame) average annual landed catch for each *de minimis* fishing alternative, as follows:

$LC_{i,\,s} = \sum (P_{r,\,i,\,s} * C_{r,\,i.\,s})$
and
$C_{r,\,i,\,s} + V_{i,\,a} * CE_{a,\,s}$

where:

$LC_{i,s}$=average annual landed catch for a de minimis alternative over a 40 year time frame
$P_{r,i,s}$=proportion of the 40 year time period in six ocean impact rate categories
$C_{r,i,s}$=landed catch at ocean impact rate category (0.0%, 2.5%, 5%, 10%, 16%, 16% OHR)
$V_{i,a}$=vessel-days by area from KOHM at ocean impact rate category
$CE_{a,s}$=average catch per vessel-day by ocean troll area

r=ocean impact rate category
1=0-2%
2=3-4%
3=5-8%
4=9-12%
5=13-16%
6=>16%
i=de minimis alternatives
s=low, medium, high fishing success

Data on ex-vessel price effects on Troll Fishery Revenues

Since price along with landings determines revenue and price is hard to predict because many factors determine price, such as local supply and demand, import supply and demand, and input prices to name a few, four different price constraints were used to show possible ex-vessel revenues.

Year 2005 average prices by State is the first price constraint used. Oregon tracks historical prices by salmon size. Oregon's average price per pound for salmon greater than 11 pounds was used, because the average size of salmon caught in the past five years is about 12 pounds. There are also revenue projections based on $6.00 per pound because this is about the average price fishermen obtained in the first half of 2006's season (calculated from preliminary data). Since year 2006 had extremely restricted management measures for commercial fishermen and therefore salmon supply is very low from OR (South of Cape Falcon) and CA fishermen, $6.00 per pound may represent a de minimis year's price.
Table 4-11-2 shows revenue estimates based on historical (1991-2005) prices for the low and high years by State. Oregon's lowest price per pound was in 2002 at $1.66 and the high was in 2004 at $3.54. California's lowest price per pound was in 1997 at $1.62 and the high was in 1992 at $3.55.

Table H-1: Estimated Oregon and California troll fishery revenues ($ 000s) under the Council's *de minimis* fishery alternatives in a hypothetical Conservation Alert year for KRFC based on three levels of troll fishery success rate and using 2005 and 2006 ex-vessel prices.

	Revenue based on 2005 per pound price ($3.10 for OR & $2.97 for CA)					Revenue Based on 2006 per pound price ($6.00)				
AREA and Relative Success Rate[1/]	Status Quo[2/]	2.50%	5%	10%	16%	Status Quo[2/]	2.50%	5%	10%	16%
OREGON:										
Tillamook-Newport										
low	$0	$116	$421	$1,049	$1,877	$0	$224	$816	$2,030	$3,634
medium	$0	$241	$877	$2,183	$3,907	$0	$466	$1,698	$4,225	$7,561
high	$0	$391	$1,425	$3,547	$6,349	$0	$756	$2,759	$6,866	$12,287
Coos Bay										
low	$0	$0	$0	$93	$240	$0	$0	$0	$181	$464
medium	$0	$0	$0	$255	$654	$0	$0	$0	$494	$1,267
high	$0	$0	$0	$370	$949	$0	$0	$0	$716	$1,838
TOTAL										
low	$0	$116	$421	$1,142	$2,117	$0	$224	$816	$2,211	$4,097
medium	$0	$241	$877	$2,438	$4,561	$0	$466	$1,698	$4,719	$8,828
high	$0	$391	$1,425	$3,917	$7,298	$0	$756	$2,759	$7,582	$14,125
CALIFORNIA:										
San Francisco										
low	$0	$524	$956	$956	$956	$0	$1,059	$1,931	$1,931	$1,931
medium	$0	$820	$1,496	$1,496	$1,496	$0	$1,657	$3,021	$3,021	$3,021
high	$0	$1,310	$2,389	$2,389	$2,389	$0	$2,647	$4,825	$4,825	$4,825
Monterey										
low	$0	$95	$557	$2,232	$3,008	$0	$192	$1,125	$4,510	$6,077
medium	$0	$174	$1,016	$4,074	$5,489	$0	$351	$2,052	$8,229	$11,089
high	$0	$298	$1,745	$6,998	$9,430	$0	$603	$3,525	$14,137	$19,050
TOTAL										
low	$0	$620	$1,513	$3,188	$3,964	$0	$1,252	$3,056	$6,441	$8,009
medium	$0	$994	$2,511	$5,569	$6,985	$0	$2,008	$5,074	$11,251	$14,111
high	$0	$1,608	$4,134	$9,387	$11,818	$0	$3,249	$8,351	$18,963	$23,875

1/ Low, medium and high refer to years of low, medium and high troll fishery success rate during 1991-2004 measured as Chinook salmon catch per troll fishing day.

2/ Assumed to be a year when the projected natural escapement of KRFC is < 35,000 adult fish in the absence of fishing. The *de minimis* fishery thresholds vary between the alternatives, thus some level of fishing would be allowed when stock sizes were in the range of 35,000 to about 54,000 natural spawners in the absence of fishing depending on the alternative.

Comparing options and being conservative, let's assume, for example that there will be a low catch level. If so, and the west coast fishermen were obtaining year 2005 prices, the West Coast would earn approximately $735,000 at the 2.5% option, $1,935,000 at the 5% option, $4,330,000 at the 10% option and $6,080,000 at the 16% level.

Looking at how catch levels affect revenue, on average, the West Coast high catch level is about twice as large in revenue as the medium catch level and the medium catch level is about 1.5 times greater than the low catch level.

Comparing across options, in the Tillamook/Newport area, the 16% option produces about twice the revenue of the 10% option. The 10% option is about 2.5 times the revenue of the 5% option and the 5% option is about 3.5 times the revenue of the 2.5% option. In the Coos Bay area, the 16% option is about 2.5 times the revenue of the 10% option and there is no 5% or 2.5% option. In San Francisco, options 16%, 10% and 5% produce identical revenues and are all about double that of the 2.5% option. In Monterey, the 16% option is about 1.5 times that of the 10% option. The 10% option is about four times that of the 5% option and the 5% option is about 6 times that of the 2.5% option. This data shows that as the option levels increase, the revenues increases at a decreasing rate.

The following table shows the same affect as described above and is shown here to provide a range of total revenues that may be achieved from a de minimis fishing season. Note that due to a small catch in a de minimis year, it is more likely that prices would be closer to the historical high prices than low prices.

Table H-2: Estimated Oregon and California troll fishery revenues ($ 000s) under the Council's *de minimis* fishery alternatives in a hypothetical Conservation Alert year for KRFC based on three levels of troll fishery success rate and using low and high ex-vessel prices.

	Revenue based on low year price per pound ($1.66 for OR & $1.62 for CA)					Revenue Based on high year price per pound ($3.28 for OR and $3.55 for CA)				
AREA and Relative Success Rate[1/]	Status Quo[2/]	2.50%	5%	10%	16%	Status Quo[2/]	2.50%	5%	10%	16%
OREGON:										
Tillamook-Newport										
low	$0	$62	$226	$562	$1,005	$0	$122	$446	$1,110	$1,986
medium	$0	$129	$470	$1,169	$2,092	$0	$254	$928	$2,310	$4,133
high	$0	$209	$763	$1,900	$3,400	$0	$414	$1,508	$3,753	$6,717
Coos Bay										
low	$0	$0	$0	$50	$128	$0	$0	$0	$99	$254
medium	$0	$0	$0	$137	$350	$0	$0	$0	$270	$692
high	$0	$0	$0	$198	$508	$0	$0	$0	$392	$1,005
TOTAL										
low	$0	$62	$226	$612	$1,134	$0	$122	$446	$1,209	$2,240
medium	$0	$129	$470	$1,306	$2,442	$0	$254	$928	$2,580	$4,826
high	$0	$209	$763	$2,098	$3,908	$0	$414	$1,508	$4,145	$7,722
CALIFORNIA:										
San Francisco										
low	$0	$286	$521	$521	$521	$0	$627	$1,143	$1,143	$1,143
medium	$0	$447	$816	$816	$816	$0	$981	$1,788	$1,788	$1,788
high	$0	$715	$1,303	$1,303	$1,303	$0	$1,566	$2,855	$2,855	$2,855
Monterey										
low	$0	$52	$304	$1,218	$1,641	$0	$114	$665	$2,668	$3,596
medium	$0	$95	$554	$2,222	$2,994	$0	$208	$1,214	$4,869	$6,561
high	$0	$163	$952	$3,817	$5,144	$0	$357	$2,086	$8,365	$11,271
TOTAL										
low	$0	$338	$825	$1,739	$2,162	$0	$741	$1,808	$3,811	$4,738
medium	$0	$542	$1,370	$3,038	$3,810	$0	$1,188	$3,002	$6,657	$8,349
high	$0	$877	$2,255	$5,120	$6,446	$0	$1,923	$4,941	$11,220	$14,126

1/ Low, medium and high refer to years of low, medium and high troll fishery success rate during 1991-2004 measured as Chinook salmon catch per troll fishing day.

2/ Assumed to be a year when the projected natural escapement of KRFC is < 35,000 adult fish in the absence of fishing. The *de minimis* fishery thresholds vary between the alternatives, thus some level of fishing would be allowed when stock sizes were in the range of 35,000 to about 54,000 natural spawners in the absence of fishing depending on the alternative.

The following two tables show average revenue over a 40 year time period. There is an FMP option shown here, because over a 40 year time period, there would be de minimis and non-de minimis fishing seasons.

Table H-3: Projected long-term 3/ average annual Oregon and California troll fishery revenues ($ 000s) under the Council's *de minimis* fishery alternatives for KRFC based on three levels of troll fishery success rate and using 2005 and 2006 ex-vessel prices.

	Revenue based on 2005 per pound price ($3.10 for OR & $2.97 for CA)					Revenue Based on 2006 per pound price ($6.00)				
AREA and Relative Success Rate 1/	Status Quo 2/	4% Sliding Scale	5%	10%	16%	Status Quo 2/	4% Sliding Scale	5%	10%	16%
OREGON:										
Tillamook-Newport										
low	$1,457	$1,444	$1,498	$1,609	$1,655	$2,821	$2,794	$2,898	$3,114	$3,203
medium	$3,033	$3,004	$3,116	$3,348	$3,444	$5,870	$5,814	$6,031	$6,480	$6,665
high	$4,929	$4,882	$5,064	$5,441	$5,596	$9,539	$9,449	$9,801	$10,530	$10,831
Coos Bay										
low	$269	$267	$268	$289	$309	$520	$516	$519	$559	$598
medium	$734	$728	$733	$789	$843	$1,420	$1,409	$1,418	$1,528	$1,632
high	$1,064	$1,056	$1,063	$1,145	$1,223	$2,060	$2,044	$2,057	$2,216	$2,368
TOTAL										
low	$1,726	$1,710	$1,766	$1,898	$1,964	$3,341	$3,310	$3,418	$3,673	$3,800
medium	$3,767	$3,732	$3,849	$4,137	$4,287	$7,290	$7,223	$7,449	$8,008	$8,297
high	$5,993	$5,938	$6,127	$6,586	$6,819	$11,599	$11,493	$11,859	$12,746	$13,198
CALIFORNIA:										
San Francisco										
low	$851	$836	$933	$943	$945	$1,720	$1,689	$1,885	$1,905	$1,910
medium	$1,332	$1,308	$1,460	$1,476	$1,479	$2,690	$2,643	$2,949	$2,981	$2,988
high	$2,127	$2,089	$2,331	$2,357	$2,362	$4,297	$4,221	$4,709	$4,761	$4,772
Monterey										
low	$2,679	$2,655	$2,743	$2,946	$3,045	$5,413	$5,364	$5,542	$5,952	$6,152
medium	$4,889	$4,845	$5,006	$5,376	$5,557	$9,877	$9,788	$10,112	$10,861	$11,226
high	$8,399	$8,323	$8,599	$9,235	$9,546	$16,967	$16,815	$17,372	$18,657	$19,285
TOTAL										
low	$3,531	$3,492	$3,676	$3,889	$3,991	$7,132	$7,054	$7,427	$7,858	$8,062
medium	$6,221	$6,153	$6,465	$6,852	$7,036	$12,567	$12,431	$13,061	$13,842	$14,214
high	$10,525	$10,413	$10,930	$11,592	$11,908	$21,263	$21,036	$22,081	$23,418	$24,057

1/ Low, medium and high refer to years of low, medium and high troll fishery success rate during 1991-2004 measured as Chinook salmon catch per troll fishing day.

2/ Assumed to be a year when the projected natural escapement of KRFC is < 35,000 adult fish in the absence of fishing.

3/ Based on the stochastic stock recruitment model (SSRM).

Table H-4: Projected long-term[3/] average annual Oregon and California troll fishery revenues ($ 000s) under the Council's *de minimis* fishery alternatives for KRFC based on three levels of troll fishery success rate and using low and high ex-vessel prices.

	Revenue based on low year price per pound ($1.66 for OR & $1.62 for CA)					Revenue Based on high year price per pound ($3.28 for OR and $3.55 for CA)				
AREA and Relative Success Rate[1/]	Status Quo[2/]	4% Sliding Scale	5%	10%	16%	Status Quo[2/]	4% Sliding Scale	5%	10%	16%
OREGON:										
Tillamook-Newport										
low	$780	$773	$802	$862	$886	$1,553	$1,555	$1,572	$1,624	$1,685
medium	$1,624	$1,609	$1,669	$1,793	$1,844	$3,232	$3,235	$3,272	$3,379	$3,506
high	$2,639	$2,614	$2,712	$2,913	$2,997	$5,253	$5,257	$5,317	$5,490	$5,697
Coos Bay										
low	$144	$143	$144	$155	$165	$251	$251	$251	$257	$273
medium	$393	$390	$392	$423	$452	$685	$685	$685	$702	$745
high	$570	$565	$569	$613	$655	$994	$994	$993	$1,019	$1,081
TOTAL										
low	$924	$916	$946	$1,016	$1,051	$1,804	$1,805	$1,823	$1,881	$1,958
medium	$2,017	$1,998	$2,061	$2,215	$2,295	$3,918	$3,920	$3,957	$4,081	$4,251
high	$3,209	$3,180	$3,281	$3,526	$3,652	$6,247	$6,251	$6,310	$6,509	$6,778
CALIFORNIA:										
San Francisco										
low	$464	$456	$509	$514	$516	$1,018	$1,000	$1,115	$1,127	$1,130
medium	$726	$714	$796	$805	$807	$1,592	$1,564	$1,745	$1,764	$1,768
high	$1,160	$1,140	$1,272	$1,285	$1,288	$2,542	$2,497	$2,786	$2,817	$2,823
Monterey										
low	$1,461	$1,448	$1,496	$1,607	$1,661	$3,203	$3,174	$3,279	$3,522	$3,640
medium	$2,667	$2,643	$2,730	$2,932	$3,031	$5,844	$5,791	$5,983	$6,426	$6,642
high	$4,581	$4,540	$4,690	$5,038	$5,207	$10,039	$9,949	$10,279	$11,039	$11,410
TOTAL										
low	$1,926	$1,904	$2,005	$2,122	$2,177	$4,220	$4,173	$4,394	$4,649	$4,770
medium	$3,393	$3,356	$3,527	$3,737	$3,838	$7,435	$7,355	$7,728	$8,190	$8,410
high	$5,741	$5,680	$5,962	$6,323	$6,495	$12,581	$12,446	$13,065	$13,856	$14,234

1/ Low, medium and high refer to years of low, medium and high troll fishery success rate during 1991-2004 measured as Chinook salmon catch per troll fishing day.

2/ This is a year when the projected natural escapement of KRFC is < 35,000 adult fish in the absence of fishing.

3/ based on the stock recruitment simulation model

Comparing options and being conservative again, let's assume, for example that there will be a low catch level. If so, and the west coast fishermen were obtaining year 2005 prices, the West Coast would earn approximately $5,257,000 under the FMP Option, $5,202,000 for the sliding scale option, $5,442,000 at the 5% option, $5,442,000 at the 10% option and $5,954,000 at the 16% option.
Looking at catch levels, on average, the West Coast high catch level is about twice as large in revenue as the medium catch level and the medium catch level is about 1.5 times greater than the low catch level.

Comparing across options and looking at the differences between the FMP Option compared to the 16% Option, which would be the maximum difference in revenue across all options, in the Tillamook/Newport area, $124,141 is the difference between revenue at the low catch level, $258,332 at the medium catch level and $419,802 at the high catch level. In the Coos Bay area, $20,757 is the difference at the low catch level, $56,692 at the medium catch level and $82,244 at the high catch level.
In San Francisco, $63,933 is the difference at the low catch level, $100,019 at the medium level, $159,730 at the high level. In Monterey, $223,137 is the difference at the low catch level, $407,157 at the medium level and $699,451 at the high level.

Therefore the difference of revenue between options increases at the catch level increases. Monterey produces the largest revenue difference of $699,451 assuming a high catch level.

SALMON AMENDMENT 15 PRELIMINARY SCHEDULE

May 11 2006	Document Subcommittee (DS) meet informally in Portland to initiate development of the amendment alternatives and work tasks to prepare a presentation to the SAC and Council at the June Council meeting.
May 24	Preliminary outline of potential range of amendment alternatives and possible analytical approaches due for inclusion in the Council June briefing book.
June 14	Salmon Amendment Committee (SAC) meets in Foster City, California to review work products of the DS and provide proposed recommendations to the Council.
June 16	Presentation of the SAC report to the Council in Foster City, California for review and direction for further development and refinement.
Wk of June 19 or June 26	DS meets in Portland to review Council action and assign work tasks for development of the amendment and analysis for review by the SAC prior to the September Council meeting.
Second Wk in August	SAC meets in Portland to review DS work products and provide comments and direction for presentation of Draft Amendment 15 at the September Council meeting.
August 23	Preliminary Draft Amendment 15 due for collation into September briefing book.
Wk of September 11	Council reviews Preliminary Draft Amendment 15 and adopts for Public Review at meeting in Foster City, CA. (If schedule cannot be met, a new schedule is identified at this point).
Wk of September 18	DS meets in Portland to review Council action and assign work tasks to complete Draft Amendment 15 for hearings and presentation at November Council meeting.
Wk of October 16	Hearings on Amendment 15 at Santa Rosa, Coos Bay, and Westport
October 25	Draft Amendment due for inclusion in November Council meeting briefing book.
Wk of November 13	Council reviews Draft Amendment 15 at meeting in Del Mar, California and adopts preferred alternative for implementation by NMFS.
December ?	DS completes Amendment 15 and EA and submits to NMFS HQ.
No later than May 1, 2007	Amendment 15 implemented by Final Rule.

PFMC
09/05/06

MODEL EVALUATION WORKGROUP REPORT ON SALMON METHODOLOGY REVIEW

The Model Evaluation Workgroup (MEW) has continued to work on several methodology related tasks from previous Council assignments. A draft User's Manual for the Fishery Regulation Assessment Model (FRAM) has been sent to the Salmon Subcommittee of Scientific and Statistical Committee (SSC). Also, a Programmer's Guide for FRAM will be submitted to the Salmon Subcommittee in time for a discussion on the overall status of the FRAM documentation task at the Salmon Methodology Review. The SSC and the Salmon Technical Team reviewed draft FRAM documentation reports in November 2005 and June 2006. The MEW was expecting to hear comments this summer following a more thorough review from the Salmon Subcommittee regarding the June 2006 documentation reports. The Salmon Methodology Review would provide another opportunity to discuss with the MEW all documentation reports and their utility towards assessing the suitability of FRAM for modeling adipose mark selective fisheries.

A report describing several methods for deriving forecasts for the ocean abundance of Columbia River fall Chinook was discussed at the October 2005 Salmon Methodology Review. Suggestions and comments from this meeting have been incorporated into the different methods. They are now under review by technical staff from the Columbia River who develop Columbia River forecasts for the number of fall Chinook expected to return to the river mouth. The MEW is preparing a progress report for the Salmon Methodology Review regarding further developments on these methods.

PFMC
09/15/06

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Northwest Fisheries Science Center
2725 Montlake Boulevard East
SEATTLE, WASHINGTON 98112-2097

F/NWC1

September 11, 2006

Roger Thomas
PFMC Council Member At-Large
Golden Gate Fishermen's Association
PO Box 40
Sausalito, CA 94966-0040

Dear Mr. Thomas,

I am writing to thank you for your assistance in collecting coho salmon samples from California fisheries and to provide you with our initial results. The enclosed report contains preliminary results and conclusions based on the 55 samples that we received from you in July. The preliminary results indicate that the samples originated primarily from Oregon Coastal populations, with smaller contributions from the Columbia River and Washington Coastal populations. These results will be reanalyzed by the NMFS science centers on the west coast in developing improved coho salmon population baselines in the future (please see the joint report for details).

If you have questions regarding this report, please direct them to Michael Ford (206 860 5612).

Sincerely,

John E. Stein

John Stein
Deputy Director

cc. Bill Hogarth
Bob Lohn
Don McIsaac (for distribution to PFMC members)
Marija Vojkovich, CDFG
Randy Fisher, PSMFC
Rod Mcinnis

Preliminary genetic analyses of San Francisco area coho salmon samples

NOAA National Marine Fisheries Service
Northwest and Southwest Fisheries Science Centers[1]

September 12, 2006

This report presents the preliminary results of a genetic analysis of coho salmon that were caught in a Chinook salmon fishery in marine areas near San Francisco, California. Dried fin tissue samples that had been removed from the fish were provided to us for the analysis. We analyzed 55 coho salmon samples for variation at 11 microsatellite DNA loci. The observed genotypes were compared to a database of allele frequencies to estimate the stock composition of the mixture, and to estimate the region of origin for each of the samples. The baseline database consisted of microsatellite allele frequencies for 84 coho salmon populations ranging from Southern British Columbia to Northern California. The populations were grouped into 6 major geographic regions - south British Columbia, Puget Sound, Washington coast, Columbia River, north/central Oregon coast, and south Oregon/north California coast. Detailed information on the microsatellite DNA loci, baseline dataset, and genetic stock identification methods are available in Van Doornik et al. (in press).

Our initial analysis revealed that one of the samples was a Chinook salmon, so it was excluded from further analyses. The mixture proportion estimates show that a majority of the coho salmon originated from the north/central Oregon coast (Table 1). Other contributing regions included the Columbia River, the Washington coast and south British Columbia, but note that the south British Columbia estimate is within one standard deviation of zero.

Individual assignment estimates indicate that 38 of the fish originated from the north/central Oregon coast, 10 from the Columbia River, 5 from the Washington coast, and 1 from south British Columbia (Table 2). The one fish that did assign to south British Columbia had a low *P* value associated with the assignment (0.466).

These results provide evidence that the samples are largely comprised of coho salmon from Oregon coastal and Columbia River Basin sources. Evidence of the southern movements from these stocks have been shown previously for both juvenile (Brodeur et al. 2004) and adult coho salmon (Weitkamp and Neely 2002). Weitkamp and Neely (2002) analyzed coded-wire tagged recoveries from coastal fisheries and reported that fish from nearly all of the Oregon coast and Columbia River populations they examined were caught in the southern-most marine locations they studied, including San Francisco Bay.

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[1] This report was primarily authored by David Teel and Don Van Doornik of the NWFSC's Conservation Biology Division. Questions regarding the report should be directed to the Conservation Biology Division Director, Michael Ford (mike.ford@noaa.gov).

The coho salmon encountered in the San Francisco area fisheries where these samples originated are generally a mixture of adipose clipped and unclipped fish. In 2005, nearly 12.5 million ad-clipped juveniles were released from Columbia River hatcheries and another 420,000 from Oregon coastal facilities[2]. In contrast, only 26,000 ad-clipped coho salmon were reported released in California, all from the Warm Springs Hatchery. Therefore, most clipped fish presumably originate from Coastal Oregon and Columbia River hatchery populations. The adipose status of the individual fish we analyzed was not provided, and the samples we analyzed may not have been a random sample of the coho salmon encountered (Roger Thomas, personal communication). In future analyses, it will be useful to record the adipose fin status of all genetic samples.

An important limitation of the present analysis is that the baseline data included only four populations from the southern Oregon/northern California coast group and none from sources immediately adjacent to the area of the fishery. If there are fish in the sample from geographic areas not represented in the baseline, these fish would be erroneously assigned to one of the populations in the baseline. The west coast NMFS Science Centers are currently working to develop a more complete microsatellite baseline for coho salmon which will allow an improved re-analysis of these and any additional fishery samples. Until then, the results presented here are preliminary and may not accurately portray the true composition of coho salmon in the area sampled.

Acknowledgements

We thank Roger Thomas for collection of the fishery tissue samples.

References

Brodeur, R. D., J. P. Fisher, D. J. Teel, R. L. Emmett, E. Casillas, and T. W. Miller. 2004. Juvenile salmonid distribution, growth, condition, origin, and environmental and species associations in the Northern California current. Fishery Bulletin 102:25-46.

Van Doornik, D.M., D.J. Teel, D.R. Kuligowski, C.A. Morgan, and E. Casillas. In press. Genetic analyses provide insight into the early ocean stock distribution and survival of juvenile coho salmon (*Oncorhynchus kisutch*) off the coasts of Washington and Oregon. North American Journal of Fisheries Management.

Weitkamp, L., and K. Neely. 2002. Coho salmon (*Oncorhynchus kisutch*) ocean migration patterns: insight from marine coded-wire tag recoveries. Canadian Journal of Fisheries and Aquatic Sciences 59:1100-1115.

[2] Source: the Pacific States Marine Fisheries Commission Regional Mark Processing Center: http://www.rmpc.org, accessed 8/11/2006

Table 1. Mixture proportion estimates and standard deviations of a sample of 54 coho salmon.

Region	Proportion	SD
South British Columbia	0.012	0.017
Puget Sound	0.000	0.019
WA Coast	0.091	0.047
Columbia River	0.195	0.047
North/Central OR Coast	0.702	0.060
South OR/North CA Coast	0.000	0.000

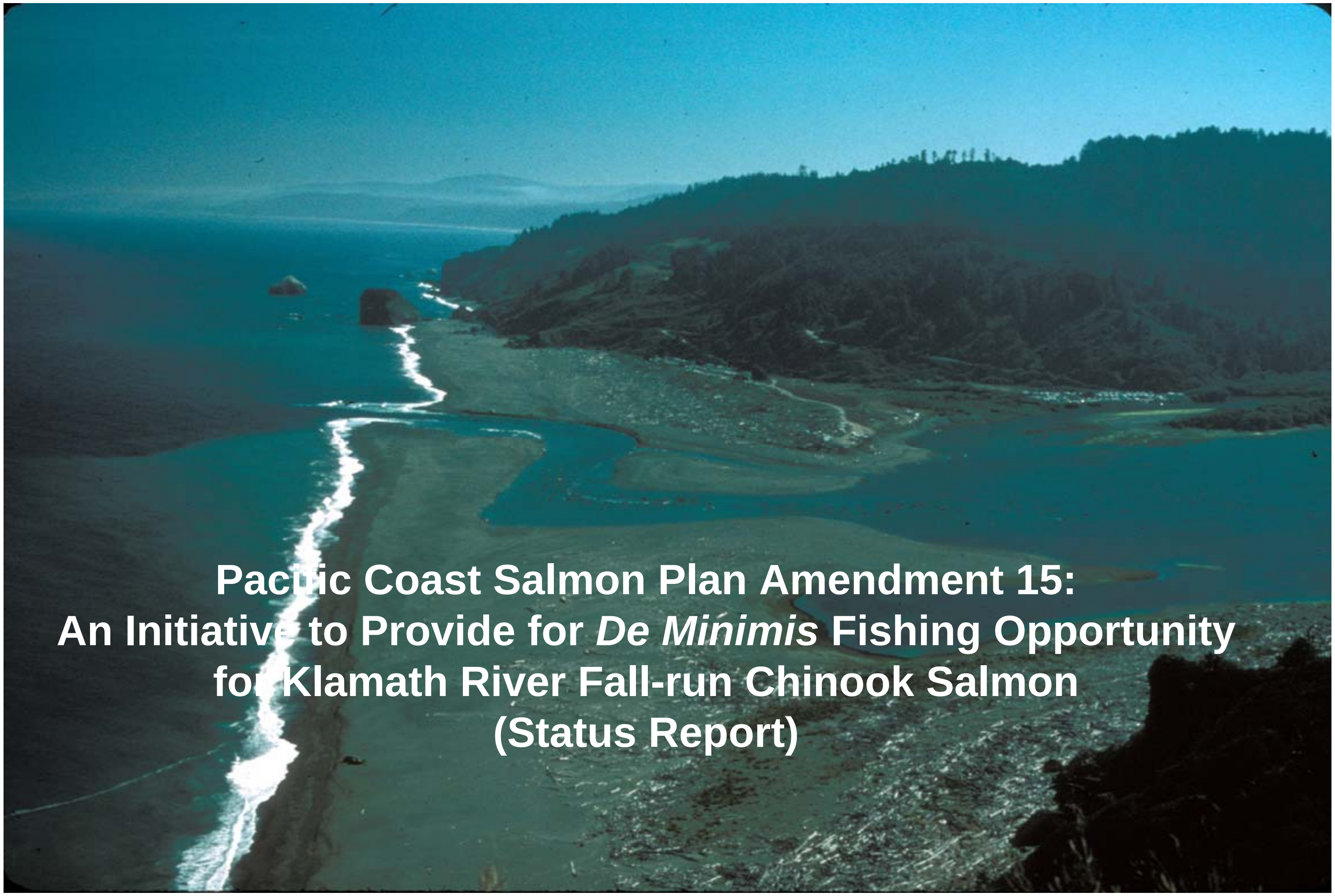
Table 2. Individual assignment estimates and probabilities for 54 coho salmon samples.

Fish ID	Region of Origin	*P*
51	South British Columbia	0.466
28	WA Coast	0.994
46	WA Coast	0.958
52	WA Coast	0.834
19	WA Coast	0.806
30	WA Coast	0.513
09	Columbia River	1.000
14	Columbia River	1.000
34	Columbia River	1.000
26	Columbia River	0.999
47	Columbia River	0.999
23	Columbia River	0.990
35	Columbia River	0.990
10	Columbia River	0.978
54	Columbia River	0.858
39	Columbia River	0.478
04	North/Central OR Coast	1.000
05	North/Central OR Coast	1.000
06	North/Central OR Coast	1.000
08	North/Central OR Coast	1.000
15	North/Central OR Coast	1.000
16	North/Central OR Coast	1.000
18	North/Central OR Coast	1.000
21	North/Central OR Coast	1.000
22	North/Central OR Coast	1.000
25	North/Central OR Coast	1.000
29	North/Central OR Coast	1.000
32	North/Central OR Coast	1.000
33	North/Central OR Coast	1.000
40	North/Central OR Coast	1.000
48	North/Central OR Coast	1.000
49	North/Central OR Coast	1.000
02	North/Central OR Coast	0.999
01	North/Central OR Coast	0.998
27	North/Central OR Coast	0.998

42	North/Central OR Coast	0.998
44	North/Central OR Coast	0.994
53	North/Central OR Coast	0.994
07	North/Central OR Coast	0.991
24	North/Central OR Coast	0.991
45	North/Central OR Coast	0.991
12	North/Central OR Coast	0.987
50	North/Central OR Coast	0.980
37	North/Central OR Coast	0.974
41	North/Central OR Coast	0.968
31	North/Central OR Coast	0.967
55	North/Central OR Coast	0.901
36	North/Central OR Coast	0.900
38	North/Central OR Coast	0.896
03	North/Central OR Coast	0.841
13	North/Central OR Coast	0.782
20	North/Central OR Coast	0.774
43	North/Central OR Coast	0.702
11	North/Central OR Coast	0.689

Agenda Item H.2.b
Supplemental SAC PowerPoint Presentation
September 2006

Plan Status Report



The Plan

Report outline and informational sections have been fairly well developed; additional clarification and context will be added to the Purpose and Needs section; further Council guidance is needed at this meeting on the alternatives, bio/economic analyses, and the Plan implementation schedule

Definition
(to be added to the Introduction)

- *De minimis* is Latin for "of minimum importance" or "trifling." Essentially it refers to something or a difference that is so little, small, minuscule, or tiny that effects need not be considered.

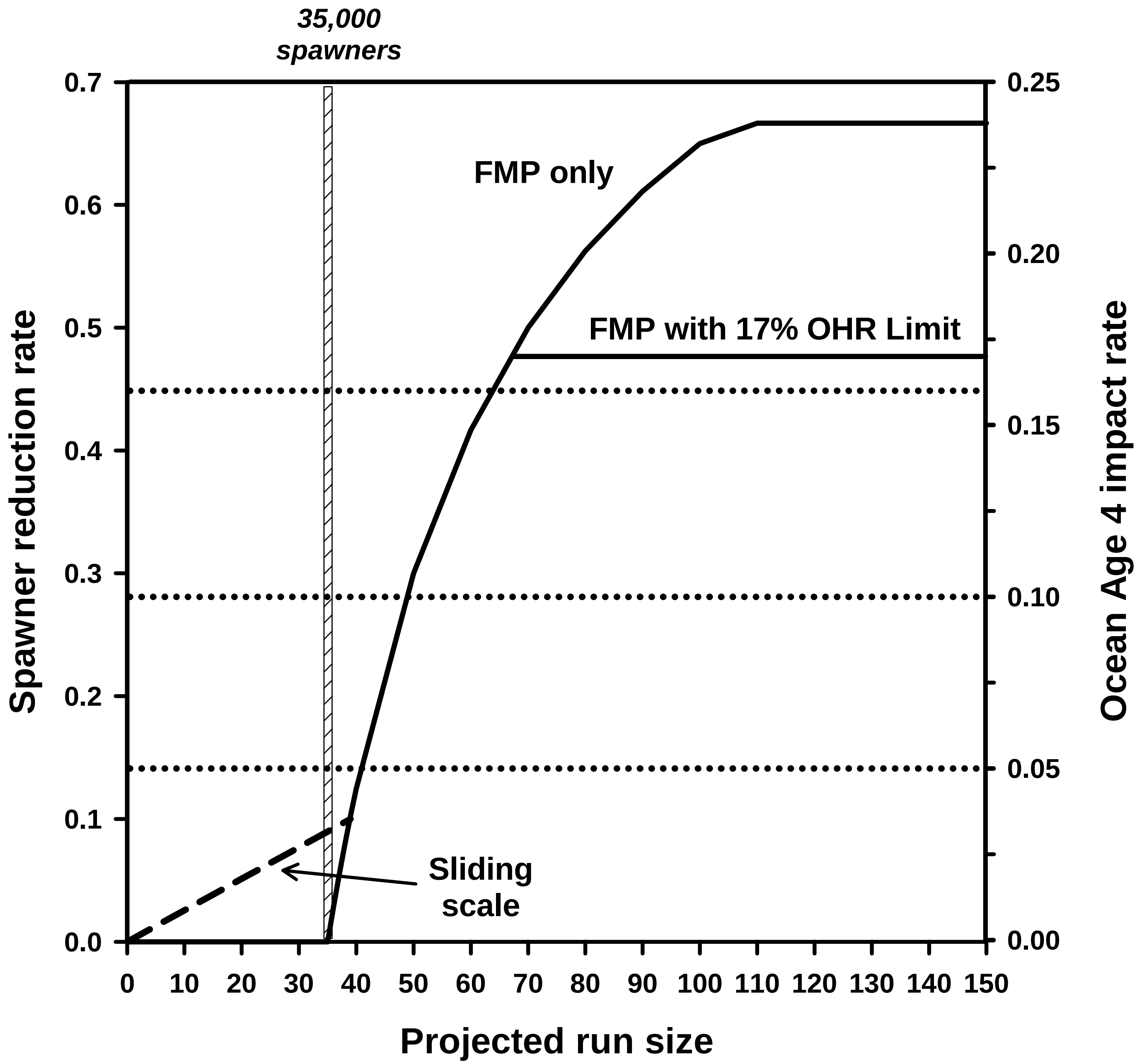
Alternatives

(briefing book clarifications in underline)

1. Status quo (no fishing in Conservation Alert Years).
2. A 4% to 0% age-4 ocean impact rate scaled linearly to the projected range of 39K to zero natural adult spawners absent fishing (sliding scale-equivalent to KFMC recommendation).
3. A 5% age-4 ocean impact rate cap.
4. A 16% age-4 ocean impact rate cap.
5. A rebuilding feature that would 1) prohibit *de minimis* fishing in the fourth year commencing March 15 following three consecutive years of *de minimis* fishing in which the escapement floor was not met, and 2) prohibit *de minimis* fishing thereafter until the escapement floor was met for three consecutive years.
6. The prohibition of any fall/winter fisheries (September 1 [current biological year start] through March 14) following spring/summer *de minimis* fisheries in the area between Cape Falcon, Oregon and Pt. Sur, California.

Alternatives 5 and/or 6 could be coupled with one of the *de minimis* fishery Alternatives (2, 3, or 4) above.

Graph of Alternatives



Discussion of Alternatives 5 & 6

Alternative 5: the rebuilding feature:

- may be inconsistent with the *de minimis* fishing concept (i.e., has minimal or trifling impact on KRFC, therefore should not require further restriction);
- is highly prescriptive and complicated because of the many possible combinations of *de minimis* and non-*de minimis* fishing events and whether the natural escapement floor is met in those same years; and
- specifies outcomes for future years that will superseded by recommendations from overfishing reviews. This a particular concern with the second clause of this alternative.

Alternative 6: the fall/winter fishing prohibition in *de minimis* fishing years should take into account the *significance* of fishery impacts in fall/winter fisheries by time and area. The STT has assessed relative impacts of Feb-November fisheries since the early 1980s on KRFC (STT March 2006 report, see table below). This information is important because some fall/winter fisheries have lower impact on KRFC and probably higher economic importance than some spring/summer fisheries. It will also be important to continually update and apply this data base in the event of future stock distribution or fishery effort shifts.

KRFC Feb-Aug Impacts

Sector	Area	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
Commercial	NO		X	X							
	CO		X	X							
	KO		X	X							
	KC										
	FB		X	X							
	SF										
	MO										
Recreational	NO		X	X							
	CO		X	X							
	KO										
	KC										
	FB	X	X	X							
	SF			X							
	MO			X							

Sector	Area	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
Commercial	NO		7320 (323)	8141 (516)					30103 (1053)	23969 (765)	
	CO		7470 (363)	17217(754)					18994 (618)	8500 (441)	
	KO		25 (3)	63 (8)					1211 (84)	554 (110)	
	KC		---	---					6399 (305)	0 (2)	
	FB		---	---					27219 (1029)	---	
	SF		---	---					11997 (1222)	1860 (284)	
	MO		---	---					488 (118)	---	
Recreational	NO		6 (39)	28 (112)					2627(1053)	1314 (765)	
	CO		1 (24)	19 (57)					1458 (618)	24 (441)	
	KO		---	---					1510 (84)	469 (110)	
	KC		---	---					1990 (2108)	---	
	FB		426 (878)	746 (1310)					396 (996)	28 (75)	0 (8)
	SF		---	5536 (6248)					6266 (8790)	2207 (4057)	390 (1128)
	MO		2235 (2946)	15947 (20473)					81 (320)	0 (0)	

X = fisheries authorized for 2006 (as of 2 Mar 2006)

impact
no impact
potential impact (open historical fisheries w / no impact but minimal effort)
no information

Lower table is total Chinook catch (and effort) averages for 2001-2005.

Evaluation Criteria for Each Alternative

1. The probability of a natural spawning escapement lower than any historically observed (12,000).
2. The probability of any of the major mid-Klamath Basin substock (Shasta, Scott, or Salmon rivers) having a natural spawning escapement of less than 500 adults in any year (a first cut methodology was developed at this meeting).
3. The probability of a spawning escapement below the 35,000 natural spawner floor in any year.
4. The probability of three consecutive years of spawning escapement less than the 35,000 floor within a 40-year time period.
5. The probability that hatchery egg collection goals will be met every year.
6. The probability of meeting the terms of the NMFS consultation standard in any year for the California Coastal Chinook evolutionary significant unit, which is an ocean harvest rate of no more than 16.0% on age-4 KRFC.
7. Annual community and state level personal income impacts generated from Council-area commercial and recreational salmon fisheries, and river tribal and recreational salmon fisheries.

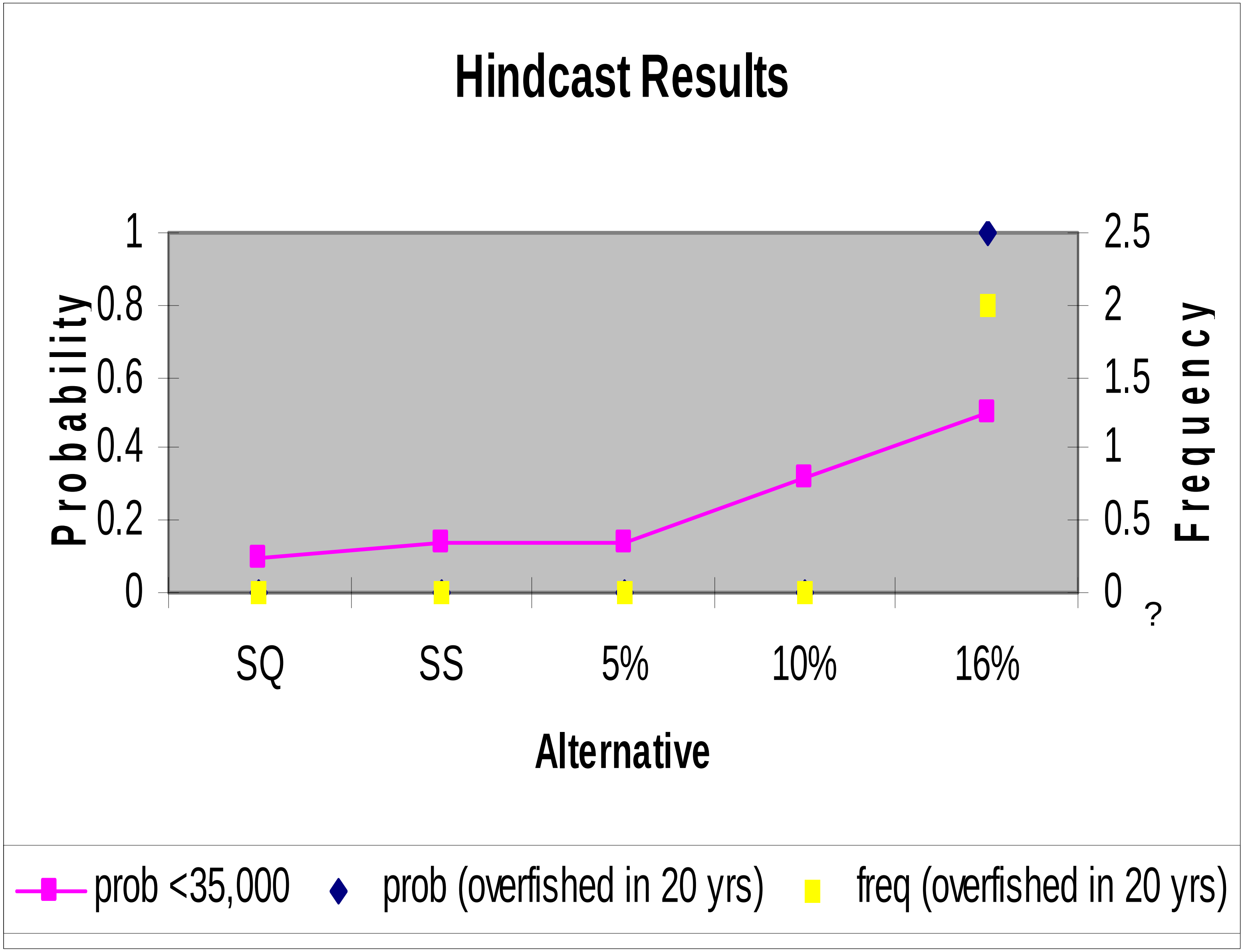
All criteria will be evaluated in relative terms compared to status quo.

NEPA

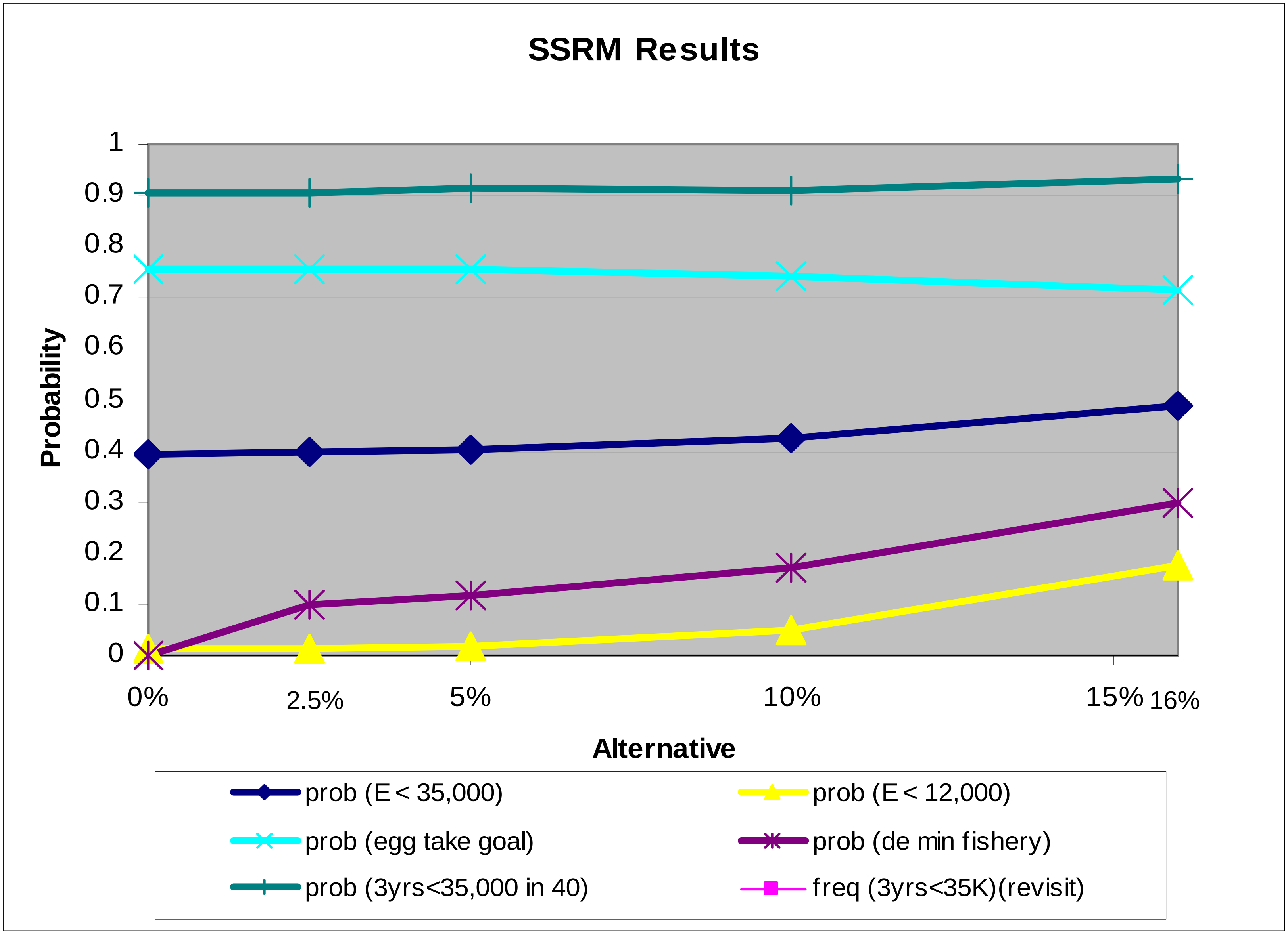
An Environmental Assessment appears to be appropriate at this point in the process

Biological Methods

- *Hindcast Analysis* using1985-2006 pre-season age compositions
- *Stochastic Stock Recruitment Model (SSRM)* using S/R data, KOHM fishery parameters, and traditional allocations

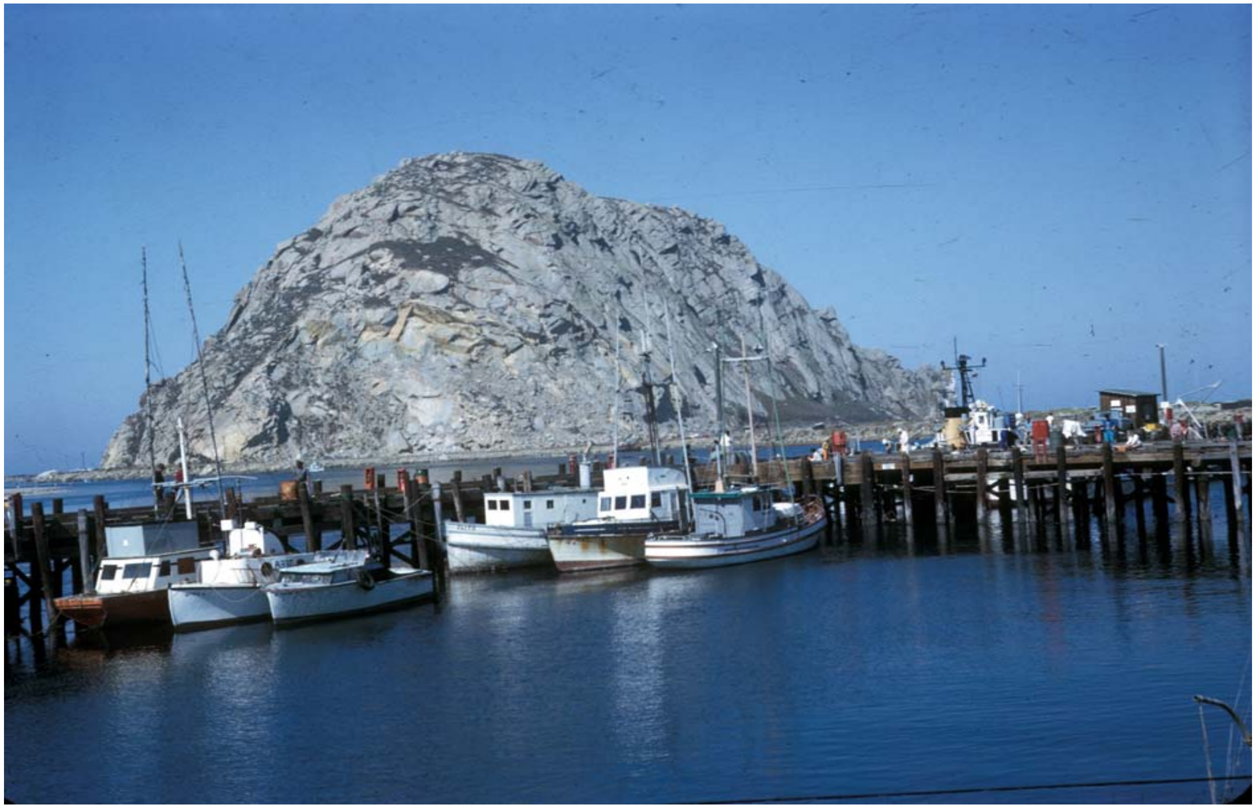


Hindcast Results
Probability
Frequency
1
0.8
0.6
0.4
0.2
0
2.5
2
1.5
1
0.5
0
?
SQ
SS
5%
10%
16%
Alternative
prob <35,000
prob (overfished in 20 yrs)
freq (overfished in 20 yrs)



SSRM Results
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
Probability
0%
2.5%
5%
10%
15%
16%
Alternative
prob (E < 35,000)
prob (E < 12,000)
prob (egg take goal)
prob (de min fishery)
prob (3yrs<35,000 in 40)
freq (3yrs<35K)(revisit)

Economics



Time frames for analysis were: 1) a Conservation Alert Year and 2) a 40-year projection average. Additional information on community and vessel dependence on the salmon fishery presented at this meeting is proposed to be added to the economic section.

Regulation Scenarios

Klamath Fall Chinook
Harvest Management Areas

NO – Cape Falcon to Heceta Head

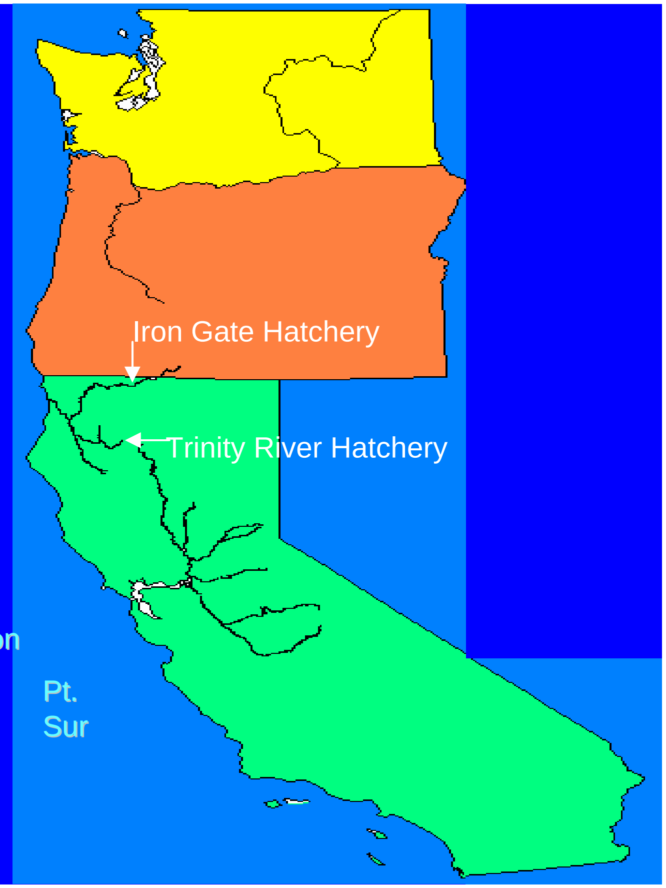
CO – Heceta Head to Humbug Mt.

KO – Humbug Mt. to CA/OR Border

KC – CA/OR Border to Horse Mt.

FB – Horse Mt. To Pt. Arena

SF – Pt. Arena to Pigeon Point



MO – Pigeon Point to Pt. Sur

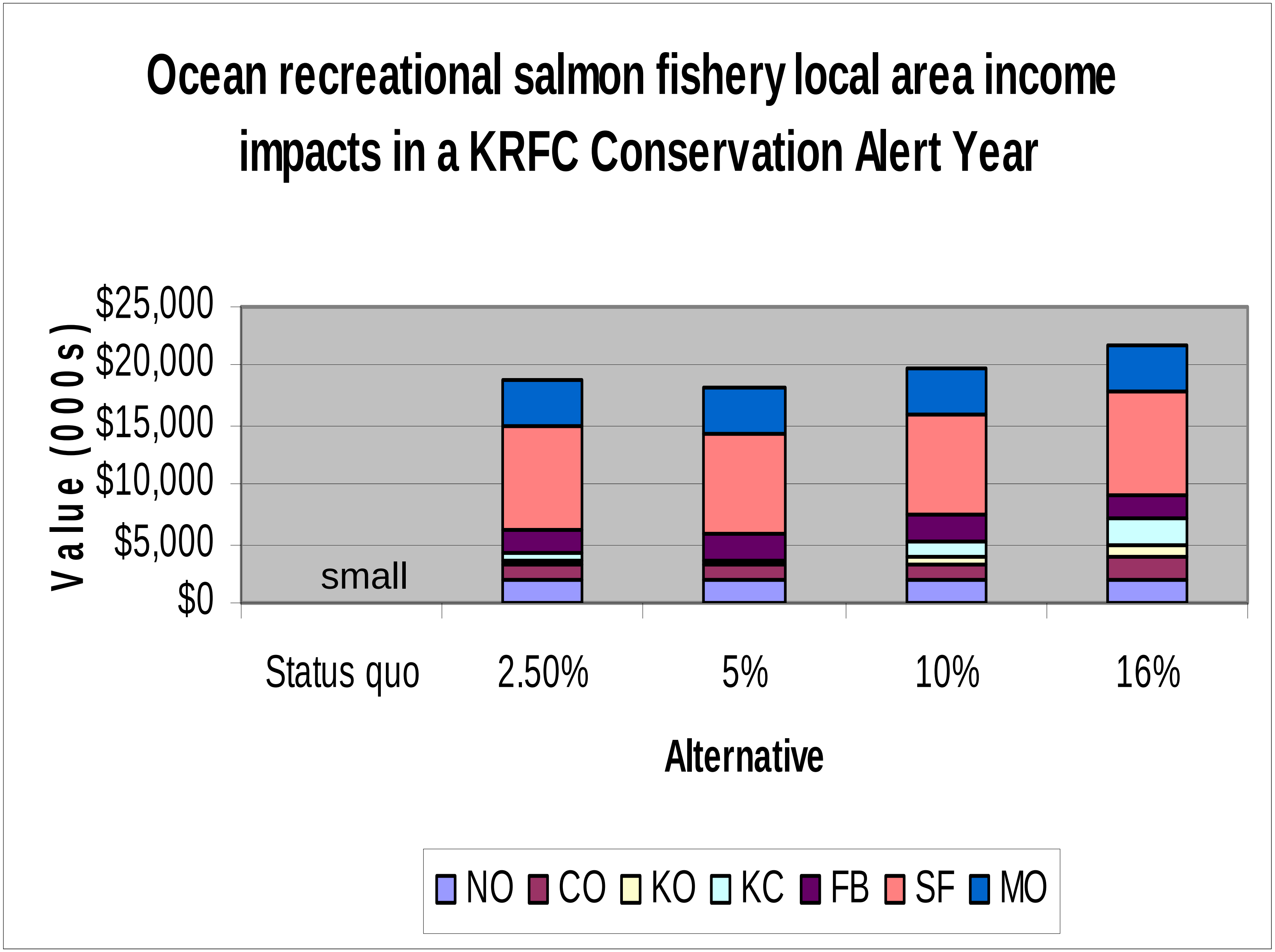
Regulation scenarios are needed to assess economic impacts of the alternatives.

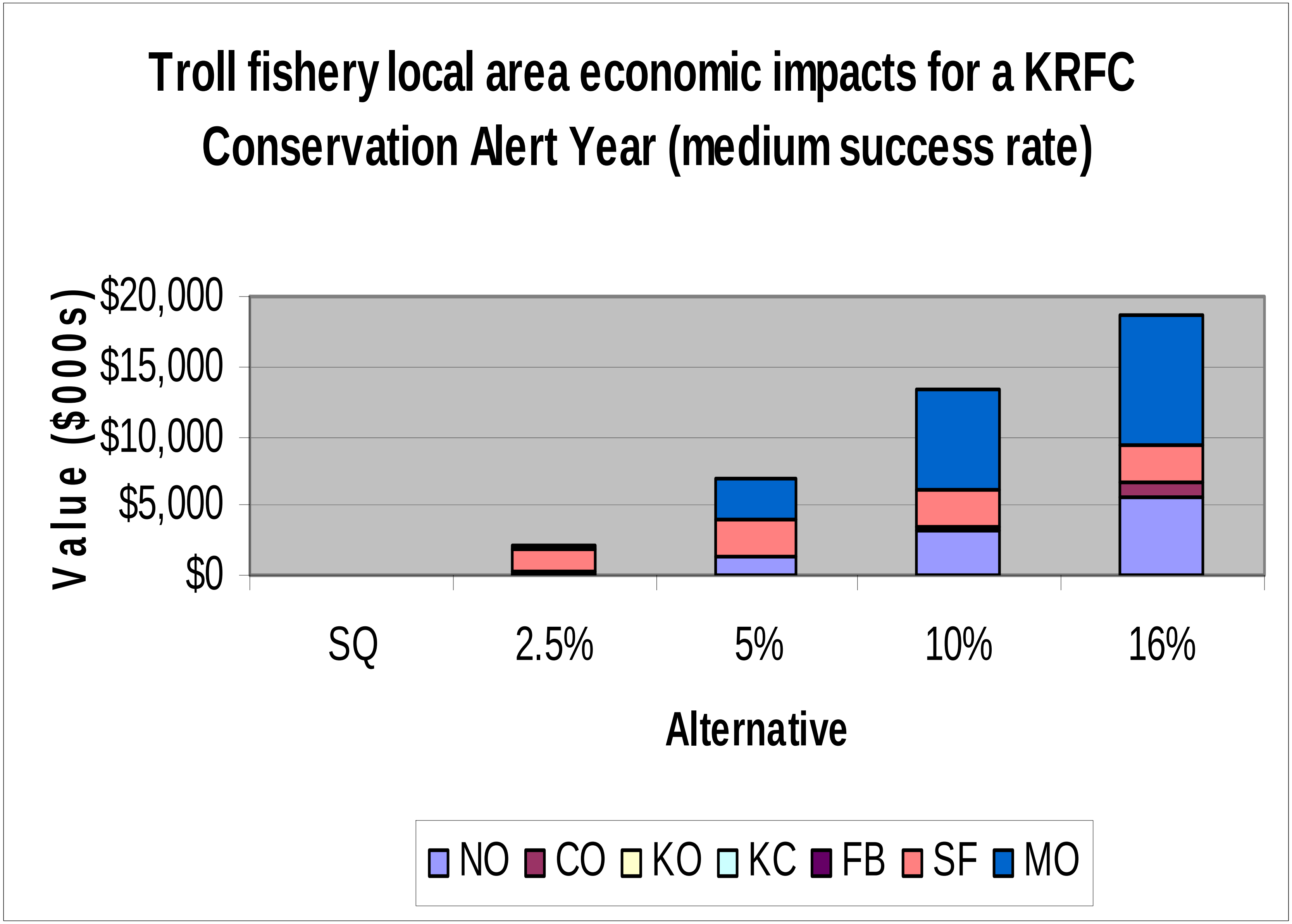
Troll Fishery Alternatives

See SAC report. This table is too large to display on the screen.

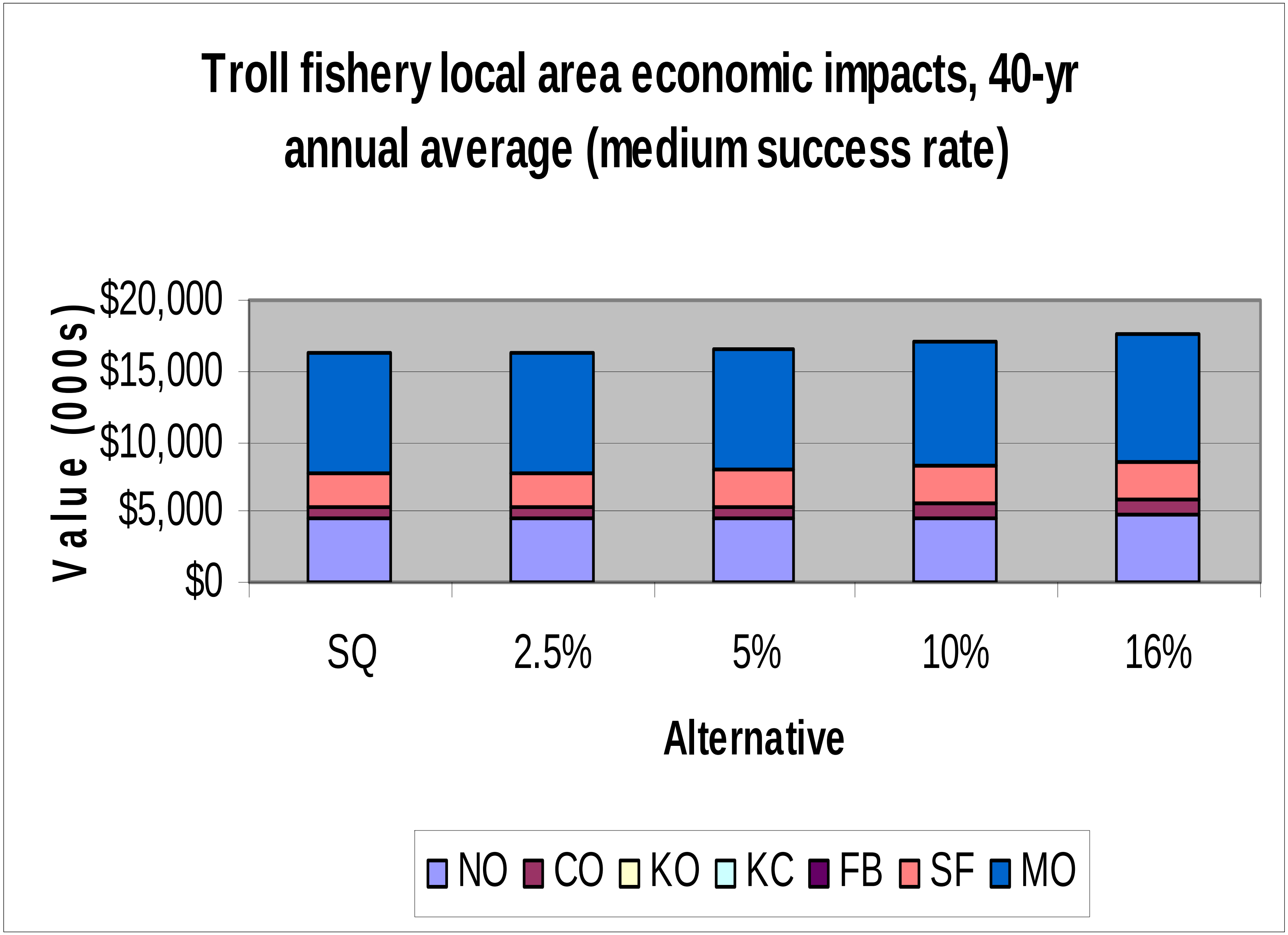
The table shows fishing effort concentrated in the NO and MO cells where KRFC stock composition in lowest in the KOHM. The regulations are similar to recent years' actual troll fishing regulations.

The recreational fisheries have full seasons, except for the KMZ (KO and KC), which are structured to meet the traditional fishery allocation.


Ocean recreational salmon fishery local area income impacts in a KRFC Conservation Alert Year
Value (000s)
$25,000
$20,000
$15,000
$10,000
$5,000
$0
small
Status quo
2.50%
5%
10%
16%
Alternative
NO
CO
KO
KC
FB
SF
MO



Troll fishery local area economic impacts for a KRFC Conservation Alert Year (medium success rate)
Value ($000s)
$20,000
$15,000
$10,000
$5,000
$0
SQ
2.5%
5%
10%
16%
Alternative
NO
CO
KO
KC
FB
SF
MO


Troll fishery local area economic impacts, 40-yr annual average (medium success rate)
Value (000s)
$20,000
$15,000
$10,000
$5,000
$0
SQ
2.5%
5%
10%
16%
Alternative
NO
CO
KO
KC
FB
SF
MO

To Do List

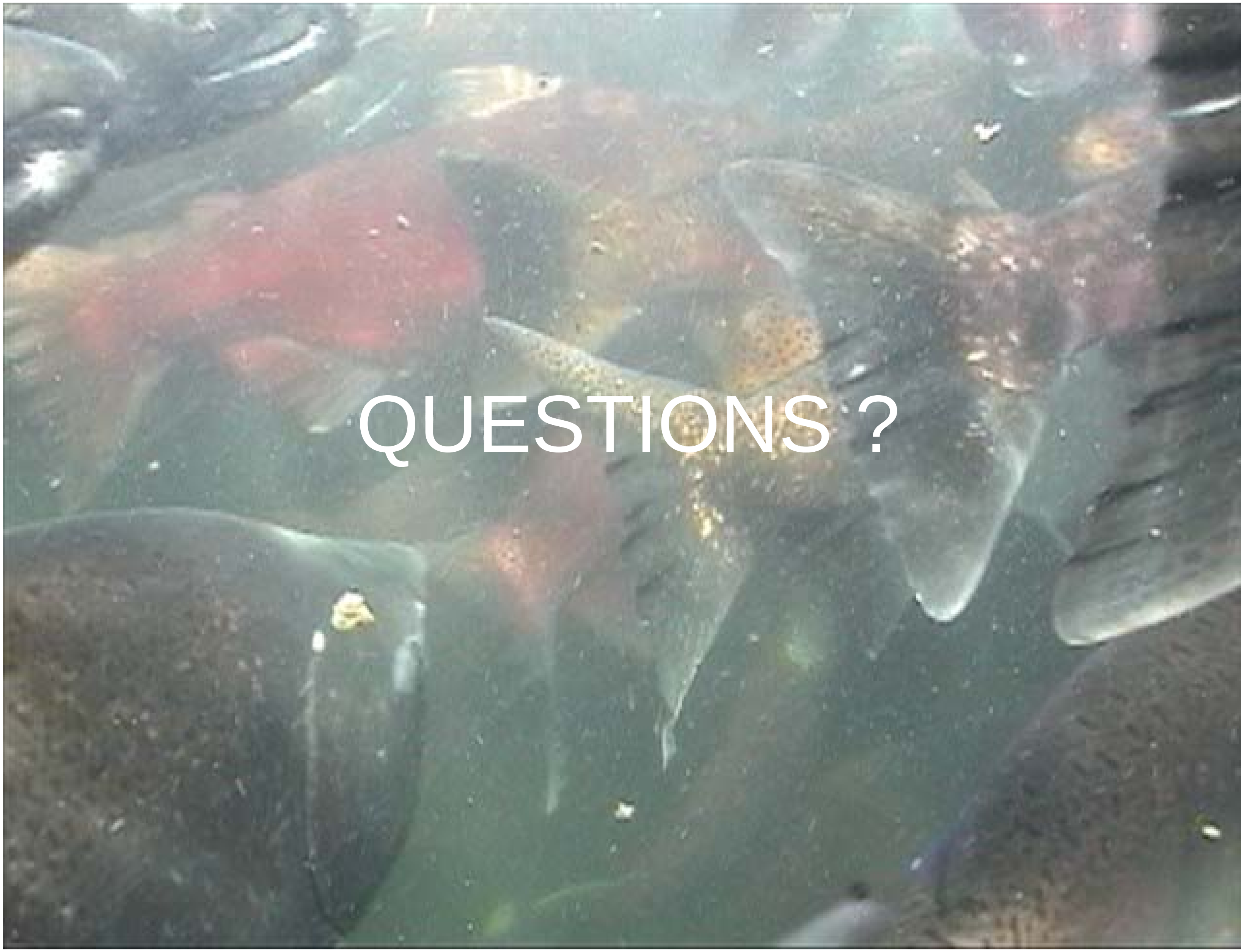
1. Incorporate sub-stock analysis in the report.
2. Confirm KOHM regulation scenarios and effort level outputs.
3. Complete tribal/river sport economic analyses (tribes and CDFG are working on SAC request).
4. Modify/check SSRM.
5. Modify/expand A-15 alternatives and analyses as directed by Council.

Recommendations

1. Add 10% age-4 ocean impact rate cap to alternatives.
2. Remove the second clause from Alternative 5: "<u>, and 2) prohibit *de minimis* fishing thereafter until the escapement floor was met for three consecutive years</u>."
3. Add "significant" to Alternative 6 re: fall/winter fisheries in *de minimis* years and associated data analysis, Council action, and future data management and input needs.
4. Limit public hearings to Oregon and California.
5. Consider delaying decision meeting until March 2007.

Proposed Schedule

Wk of September 11	SAC meets in conjunction with Council in Foster City, CA. Council reviews Preliminary Draft Amendment 15 and adopts preliminary preferred alternative for Public Review at meeting. (If schedule cannot be met, a new schedule is identified at this point). The SAC does not recommend selection of a preferred alternative until the sub-stock analysis can be completed. However, a range of alternatives might be considered based on the available information.
Wk of September 18	DS meets in Portland to review Council action and assign work tasks to complete Draft Amendment 15 for hearings and presentation at November Council meeting.
Wk of October 16	Hearings on Amendment 15 in Santa Rosa, Coos Bay, and Westport This will be very difficult to do; the SAC suggests having hearings after the briefing book deadline of October 25, 2006..
October 25	Draft Amendment due for inclusion in November Council meeting briefing book. **It is problematic that all of the analyses can be completed and the document updated by this date. The To Do List is just too long and labor intensive to ensure meeting an October 25 mailing date.**
Wk of November 13	Council reviews Draft Amendment 15 at meeting in Del Mar, California and adopts preferred alternative for implementation by NMFS. See previous comments. A March 2007 decision date would better ensure a defensible document.
December ?	DS completes Amendment 15 and EA and submits to NMFS. A March decision date would delay the document submittal date to May 2007.
Not later than May 1, 2007	Amendment 15 implemented by Final Rule. A March decision date would require an emergency rule in 2007 if the KRFC natural spawning escapement absent fishing is projected to be <35,000 adult fish. However, a decision framework would have been established in the draft document that the Council and NMFS could use in developing fishing regulations effective May 1, 2007.


QUESTIONS ?

Peter Dygert will discuss NMFS schedule

Current Schedule for MSA/APA Process for Salmon FMP Amendment 15, *De Minimis* Fisheries assuming November 2006 Council decision

24-Nov-06 (Friday)	NWR sends draft proposed rule package to regional GC.
4-5 Dec-06 (Monday-Tuesday)	Regional GC returns draft proposed rule package to NWR and sends Issues Advisory to HQ.
11-Dec-06 (Monday)	PFMC transmits Amendment. NWR transmits proposed rule with draft EA
18-Dec-06 (Monday)	NOA for Amendment publishes unless OMB review occurs (90 days max).
16-Jan-07 (Tuesday)	Proposed rule is published; 30-day public comment period begins.
15-Feb-07 (Thursday)	60-day public comment period on NOA for Amendment; 30-day public comment period on proposed rule ends.
26-Feb-07 (Monday)	NWR sends final rule package to regional GC.
6-Mar-07 (Tuesday)	Regional GC returns final rule package to NWR.
16-Mar-07 (Friday)*	NWR transmits final EA, FONSI, final rule package, and amendment approval to HQ.
March 4-9	March Council meeting
19-Mar-07 (Monday)	HQ signs FONSI, approves Amendment 15.
30-Mar-07 (Friday)*	Final rule published; APA 30 day cooling-off period begins unless OMB review occurs (60 days max)
April 1-7	April Council meeting
30-April-07 (Monday)*	Cooling-off period ends
1-May-07 (Tuesday)	Salmon fishery begins under adopted de minimis fishery regulations

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Table 4-9. 2006 KOHM Ocean Fishery Contribution Rates

Klamath Contribution Rates: Troll

	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
NO	0.00	0.00	0.00	NA	NA	NA	*0.09*	**0.04**	**0.05**	**0.02**	**0.04**	**0.05**
CO	0.00	0.00	0.00	0.00	NA	NA	**0.04**	**0.04**	*0.07*	*0.07*	*0.12*	0.20
KO	0.00	0.00	0.00	NA	NA	NA	NA	NA	0.25	0.23	0.29	0.19
KC	0.00	NA	NA	NA	NA	NA	NA	NA	0.48	0.31	0.15	0.13
FB	0.00	NA	NA	NA	NA	NA	NA	NA	0.14	0.13	0.15	0.05
SF	0.00	0.00	NA	NA	NA	NA	NA	NA	0.04	0.04	0.03	0.01
MO	0.00	NA	NA	NA	NA	NA	NA	NA	0.01	0.01	0.03	0.00

Klamath Contribution Rates: Sport

	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
NO	0.03	0.00	NA	NA	NA	NA	NA	NA	0.07	0.02	0.02	0.04
CO	0.01	0.00	NA	NA	NA	NA	NA	NA	0.32	0.04	0.03	0.02
KO	0.11	0.00	NA	NA	NA	NA	NA	NA	**0.07**	**0.07**	*0.10*	*0.16*
KC	0.14	NA	NA	NA	NA	NA	NA	NA	**0.09**	**0.07**	*0.08*	*0.14*
FB	0.00	0.00	NA	NA	NA	NA	NA	0.04	0.06	0.04	0.03	0.05
SF	0.00	0.00	0.00	NA	NA	0.01	0.00	0.01	0.01	0.02	0.01	0.00
MO	0.00	NA	NA	NA	NA	NA	0.01	0.01	0.00	0.00	0.01	0.04

Bold = primary; *italics = secondary*

Table 4-10. Season structure scenarios (January-August only) for individual *de minimis* fishing alternatives and California Coastal Chinook salmon consultation standard. The Status Quo Alternative is for a Conservation Alert Year. Alternatives are expressed as ocean impact rates. **(Need to revisit for CO and NO troll)** 1/

Season	Alternative					CCC standard (16% OHR)
	Status	2.5%[2/]	5%[3/]	10%	16%	
Sport Season Outside KMZ	43 days, FB, Feb-March; 47 days NO/CO, March-April	full	full	full	full	full
KMZ Sport:	closed	45 days, May-June[4/] else closed	22 days, May-June	82 days, May-July	Full season (123 days): May-August plus previous fall fishery	Full season (123 days): May-August plus previous fall fishery
OR Troll	closed	10 days, NO, March	45 days, NO, March-April	98 days, NO, March-June; 30 days, CO, April	61 days, NO and CO, March-April; 92 days NO, May-July	92 days, NO and CO, March-May; 63 days, NO, June-August
CA Troll	closed	17 days, SF & MO, August	7 days, MO, May: 31 days, SF & MO, August	38 days, MO, May-June; 31 days, SF & MO, August	53 days, MO, May-June; 31 days, SF & MO, August	58 days, MO, May-June; 31 days, SF & MO, August

1/ KMZ = Horse Mtn, California to Humbug Mtn, Oregon
OR = Oregon; CA = California
NO (Northern Oregon) = Florence south Jetty to Cape Falcon, Oregon
CO (Coos Bay) = Florence south Jetty to Humbug Mtn, Oregon
SF (San Francisco) = Point Arena to Pigeon Pt., California
MO (Monterey) = Pigeon Pt. to Mexico Border, California

2/ The 2.5% ocean impact rate is a mid-range point for the Sliding Scale Alternative.

3/ This scenario is somewhat less restrictive than the maximum age-4 impact on the Sliding Scale Alternative.

4/ The extra days, compared to the 5% Cap Alternative, are due to elimination of previous fall KMZ sport catches.

SALMON ADVISORY SUBPANEL REPORT ON SALMON FISHERY MANAGEMENT PLAN AMENDMENT 15

The Salmon Advisory Subpanel (SAS) supports continuation of the amendment process with the objective of taking final action at the November 2006 Council meeting in order to implement Amendment 15 by the start of the 2007 salmon management season. However, the status of the analyses will ultimately determine whether the SAS can recommend a preferred alternative. At this time there are analyses that are not available, and those that are available have not been adequately described. The SAS requests two additional analyses be included in the Environmental Assessment:

1. The geographical extent of the Precautionary Alternative. This alternative restricts fall/winter fisheries following a *de minimis* fishery, but does not indicate if it applies to all fisheries between Cape Falcon and Point Sur, or if it could be less restrictive to fisheries near the margins of the area. In addition, implementation of this alternative would require an analysis of fall fishery impacts in the preseason planning process.

2. Potential for spawning escapement of less than 500 for the independent populations within the Klamath Basin (Shasta, Scott, and Salmon rivers). This was identified as an evaluation criterion, but the analysis was not included in the executive summary. This issue is a high priority for assessing the impacts of the alternatives on future productivity of the aggregate Klamath River Fall Chinook stock.

The SAS also requests the Council consider substituting a public hearing in Newport, Oregon for the Westport, Washington hearing that was originally proposed.

PFMC
09/12/06

SCIENTIFIC AND STATISTICAL COMMITTEE REPORT ON FMP AMENDMENT 15 – *DE MINIMIS FISHERIES*

Ray Beamesderfer presented the analytical work undertaken to date for evaluating the biological effects of the various alternatives for *de minimis* fisheries on Klamath River fall Chinook salmon. Other members of the team presented economic analyses. The Scientific and Statistical Committee (SSC) commends the team for the amount of work accomplished since the last Council meeting, but notes that the work is not yet complete.

The general biological analysis approach is to define a range of options and then simulate the outcome of these management measures. These options included *de minimis* age-4 ocean impact rates of 16, 10, 5 and 2.5 percent as well as a sliding scale alternative. An alternative approach taken was to define the proportion of years in which to exceed the target, and then find a rate that achieves that goal. The larger the constant *de minimis* rate, the more often *de minimis* fisheries occur, and whenever *de minimis* fisheries occur, the projected post-fishing natural spawner escapement is less than 35,000.

The base model presented was roughly equivalent to Model 2 of the "Klamath River Fall Chinook Stock-Recruitment Analysis" report, as was suggested by the SSC at the June 2006 Council meeting, although there were some analysis errors which need to be addressed. Random changes and trends in in-river survivorship should be included in simulations, which will allow consideration of future changes in the state of the Klamath River basin.

The current analysis adequately models the difference between management action and implementation, i.e. target F and actual F, although including autocorrelation in this relationship would lead to more realistic results. Accounting for errors in preseason abundance estimation when setting target F would further increase the realism of the simulations.

The hindcast analysis does not include dynamics and therefore does not reflect the full effect of changes in management strategies. For this reason the utility of this analysis is limited to a lower bound estimate of the frequency of *de minimis* fisheries which would have occurred under different management regimes.

The modeling exercise used to analyze the alternatives does not capture all the important issues. For example, the Klamath fall Chinook stock consists of several smaller populations, and low composite spawning escapement could lead to localized extinction and/or damage to long-term productivity due to inbreeding depression. Even with the introduction of depensation, the Ricker stock-recruit model may underestimate threats to the stock. For example, with the model it is impossible for the stock to go to extinction. Nor does the model reflect differences in fecundity with spawner age. The sensitivity analysis presented to the SSC consisted of one "pessimistic" alternative with a combination of factors which appears unrealistic. More realistic sensitivity analyses should be undertaken including such issues as changes in freshwater production and a stronger form of depensation.

The economic analysis would be made more clear by improved organization and should include analysis and some discussion of short-term vs. long term trade-offs. The SSC reiterates that this analytical approach is adequate for the comparison of the various alternatives, although the absolute numbers arrived at will be highly dependent upon the model assumptions. Given these concerns, at present only relative comparisons and outputs should be emphasized.

PFMC
09/13/06

SALMON TECHNICAL TEAM REPORT ON
FISHERY MANAGEMENT PLAN AMENDMENT 15 (*DE MINIMIS* FISHERIES)

The Salmon Technical Team (STT) has reviewed available products from the Ad Hoc Salmon Amendment Committee (SAC). The SAC has completed a tremendous amount of work in a very short time and should be commended for its efforts. Our comments will relate to four areas of SAC work and the amendment process:

1) Alternatives for public review
2) Biological analysis
3) Economic analysis
4) Adoption schedule

Alternatives for public review.

The alternatives in the current draft of the proposed fishery management plan (FMP) range from the status quo of no fishing when the Klamath escapement is predicted to fall below the 35,000 floor to a 16% age-4 ocean impact rate cap. Intermediate alternatives authorized by the Council include a sliding scale of allowable impacts and a 5% impact cap. The SAC has also completed an analysis of impacts at a 10% impact cap. The STT recommends this analysis of a 10% impact cap be included as an additional alternative. The STT believes that the 16% age-4 ocean impact rate cap alternative effectively ignores the spawning escapement status of Klamath fall Chinook. Under this alternative, when *de minimis* rules are not in effect, the 16% age-4 harvest rate cap on Klamath fall Chinook is in effect to protect California Coastal Chinook under the Endangered Species Act (ESA). When the *de minimis* rules are in effect, the 16% cap age-4 impact rate cap on Klamath fall Chinook is in effect to protect Klamath fall Chinook. While the 'driver stock' changes under the two scenarios, the harvest impacts to the Klamath stock are effectively the same. We recommend that this alternative be dropped from further consideration.

In addition to the impact rate alternatives, two additional 'features' have been proposed (alternatives five and six), which could be applied separately or together to alternatives one through 4. Alternative five limits *de minimis* fisheries to no more than three consecutive years. Alternative six prohibits 'credit card' fisheries the fall and winter following a year with *de minimis* fishing. The STT believes that at a minimum alternative six, the no credit card fisheries alternative, should be included in the analysis of all alternatives.

Biological Modeling - the Stochastic Stock Recruitment Model (SSRM).

The STT has reviewed in some detail the inputs and algorithms in the SSRM and has identified several inadequacies that should be addressed before the model is ready to use to evaluate *de minimis* alternatives.

1) The error structure employed to estimate variance around the preseason prediction of harvest rates by the Klamath Ocean Harvest Model (KOHM) versus postseason harvest rate estimates is static in that it does not change through time. One result of this static error structure is that predicted ocean harvest rates are biased high. In reality, the

structure of the KOHM has changed over time, and annual recalibration of the model should reduce both the magnitude and the bias of error in management. The error structure employed should be changed to reflect this or an analysis of the adequacy of the current error structure should be completed.

2) Hatchery production is assumed to be constant and independent of parent broodstock size. Hatchery stock survival is assumed to co-vary with wild stock survival. Data on hatchery releases and hatchery stock survival rates are readily available from coded-wire-tag cohort analysis and should be incorporated independently.
3) Currently the model computes the tribal share of the annual harvest after the non-treaty ocean harvest has been observed. In fact, the tribal share of the harvest is set preseason based on the forecast ocean abundance. The adequacy of this allocation scheme in the model has not been demonstrated.

Economic analysis of alternatives.

The STT believes that the economic analysis contained in Agenda Item H.2.a, Supplemental Attachment 2, which concentrates on impacts only during years when the *de minimis* rules would be in effect, are a useful addition to the analysis.

The STT is concerned that no accounting for loss of infrastructure is included in these analyses. When faced with little or no opportunity, fishers, processors, and buyers may leave the industry and never return for a variety of reasons. Some may drop out altogether, others may change target species.

The STT is also concerned about the lack of economic analyses for any inriver fisheries. While we understand some of the difficulties associated with valuation analyses of tribal fisheries, at a minimum the impacts to freshwater sport fisheries should be assessed.

Adoption schedule.

We understand that the Council is considering several time schedules for final adoption of the FMP. The STT believes that all schedule options listed in the situation summary are optimistic. Therefore, of the options listed in that summary, we recommend that the Council choose the schedule that includes selection of the preferred alternative in November of this year, and final adoption at the March 2007 Council meeting.

PFMC
09/15/06

Amendment 15 Comments by Dave Hillemeier, September 15, 2006
(Yurok Tribal Fisheries Program Manager)

In light of the rushed schedule regarding the development of the proposed amendment, as well as it's relatively incomplete status, the Yurok Tribal Council has not had an opportunity for adequate review. Therefore, my comments will be brief and primarily technical in nature, with more comments from the Tribal Council to be developed at a later time.

When considering alternatives that would allow fishing below the 35,000 natural spawning escapement floor, the Yurok Tribe recommends that a precautionary approach be taken. Such an approach is in-line with the management philosophy implemented by the Tribal Council each year when they structure their spring and fall fisheries. A primary consideration for the Tribal Council is that current fishery management actions do not negatively affect the fishery that future generations of Yurok People will depend upon.

Our primary concern with Amendment 15 as it's being developed is the potential effect that fishing upon extremely low stock abundances may have upon sub stocks within the basin. In particular, we are concerned that the genetic integrity of sub stocks not be compromised, as these genetic resources are what will be necessary for viable fisheries to exist into the distant future.

Members of the Salmon Amendment Committee have recently undertaken efforts to quantify the relationship between various basin-wide escapement levels and extremely low returns to three of the primary sub stocks within the Basin (the Shasta, Scott, and Salmon Rivers). While this analysis is appreciated, it should be kept in mind that these three sub stocks are being used as a surrogate for many other sub stocks within the basin; some of which are typically much less abundant than these three primary sub stocks (e.g. Blue Creek and surrounding tributaries).

As the PFMC contemplates the alternatives for this proposed Amendment, it is important to remember the scope of the Amendment. As was noted in the handout from the Salmon Amendment Committee, De minimis refers to something so little, small, miniscule, or tiny that effects need not be considered. That is not what is reflected in some of the current alternatives that are under consideration for the amendment. In fact, a harvest rate as large as 16% upon age-4 fish has only been targeted during two of the past 15 years (16% in 2003 and 17% in 1996). The 16% age-4 ocean harvest rate equates to approximately a 45% spawner reduction rate; hardly within the realm of having a miniscule affect upon Klamath fall Chinook.

Given that a large portion of Klamath River fall Chinook harvest occurs in river fisheries, it's important to understand the total impact to the stock when considering various alternatives. Therefore, I recommend that when the Amendment goes out for public review, all options be presented to the public in terms of spawner reduction rates, as these much more clearly illustrate the impacts to the stock than does an age-4 ocean harvest impact rate.

For example, at first glance a 10% age-4 ocean harvest rate may seem somewhat minimal to some, however such a fishery would actually result in a spawner reduction rate of approximately 28%; an impact that may be considered to be outside the realm of "miniscule".

Given the somewhat incomplete status of the Amendment and associated analysis, which is largely driven by an extremely ambitious time line for amendment development, we recommend that the schedule regarding adoption of a preferred alternative by the Council be delayed.

Finally, I'd like to acknowledge that many of the problems facing Klamath Basin fall Chinook are not harvest related, but related to habitat conditions within the river. The PFMC is well aware of this, as is reflected by the many letters that have been sent requesting that actions be taken to remedy these problems.

There is momentum underway to resolve the habitat issues that have caused the decline of the Klamath Basin's fishery resource. We have hope that within the not too distant future we will see four dams removed from the river; an action that would result in major improvements to the fishery. We also believe that current efforts by interests from throughout the Basin working together to develop long-term solutions will result in substantial benefits to the fishery. As these long-term solutions to the Basin's problems are on the horizon, it is important that fisheries continue to manage Klamath Fall Chinook in a prudent, responsible manner.

Thank you.

Ad Hoc Committee
P.O. Box 484
Occidental, CA 95465
707 874-3855

Keep the Salmon fishing season open
Review the Statistics -- curtailment of commercial fishing not justified
35,000 returns to sustain Klamath run not substantiated

One would think that keeping up the numbers of salmon in the rivers would insure a healthy restoration of the fishery. *It would seem* that curtailing commercial fishing and protecting salmon from predation would bring salmon numbers back up to historical highs. It was thought that 35,000 is the critical number of adult salmon needed to return to the Klamath to sustain it.

But things aren't always as they seem, and what is "intuitive" is not always correct. A fresh review of the old statistics shows that:

The best "returns" of Klamath Chinook come three years after the *lowest* returns -- *below* 35,000 -- some as low as 12,000! Conversely, the highest runs, well over the targeted 35,000 result in a *collapse* in the numbers of returning adults three years later. How can that be?

(Salmon return to our rivers to lay eggs when they are about three years old. The eggs hatch and the young go out to the ocean and that next generation returns *three years later).*

Typically, the skimpiest numbers of returning "natural" salmon in the Klamath, (averaging only about 18,000 in number) produce, three years later, *the highest runs* (averaging over 100,000 returns)! Between 1978 and 2005, the years when the "natural" spawners dropped *below* 35,000 in the Klamath, the numbers of salmon returning three years later showed the most dramatic *increases*! Look at this:

Klamath River "Natural" Spawners

year	number of spawners		three years later	number of spawners
1983	30,000	yielded	1986	115,000
1984	12,000	"	1987	100,000
1985	15,000	"	1988	80,000
1992	12,000	"	1995	160,000
1993	20,000	"	1996	80,000
1999	20,000	"	2002	70,000

What happened when the number of "natural" adult reproducing salmon (spawners) returning to the Klamath was *higher* than the targeted minimum of 35,000 as requested by NMFS?

By contrast, when returns were <u>above</u> 35,000, the number of Klamath spawners returning three years later <u>plummeted dramatically</u>:

Klamath River "Natural" spawners

year	number of spawners		three years later	number of spawners
1978	60,000	yielded	1981	35,000
1986	110,000	"	1989	40,000
1987	100,000	"	1990	12,000
1988	75,000	"	1991	12,000
1995	160,000	"	1998	40,000
1996	80,000	"	1999	20,000

Between 1978 and 2005 (27 years) there were only *three* occasions when more than 35,000 natural spawners returned to the Klamath to produce a higher number of spawners three years later!

Results -- What the statistics show:

1. That 35,000 returning "natural" spawners is ***not necessary*** to sustain the salmon run. Dramatic increases have been produced *typically* by "natural" spawning runs averaging only about 18,000;

2. That returns *above* the "floor" of 35,000, rather than sustaining a healthy return of their offspring, typically produce instead a *dramatic crash* in returns three years later.

3. That 35,000 may be too high a number of "natural" spawners -- the number of their young are above the carrying capacity of the Klamath River implying that there is not enough quality food or water in the Klamath to sustain them so that they either die off in the river and never make it out to sea, or cannot survive in, or make the transition to the ocean; 35,000 may be *overstocking*.

4. No justification for relying on 35,000 as a "floor" number for "natural" spawning returns on the Klamath; it certainly does not appear to be "optimum";

5. That the number of spawners is *not* the limiting factor to increasing salmon runs because even when above 35,000, the number of spawners returning three years later rarely continues to rise;

6. That the river is following a "boom and bust" pattern often associated with fluctuating food supply -- and associated factors like water, oxygen, pollutants, diseases impacting not only juvenile salmon but especially what they eat (caddis flies in the river, krill in the ocean);

We conclude that the PFMC, before taking Draconian steps to curtail the already ailing commercial fishing industry, needs to re-evaluate more than 25 years of data and revisit the policy regarding the "floor" of 35,000 "natural" spawners for the Klamath and focus instead on dramatic measures to increase the ability of the Klamath to sustain a larger population of young salmon.

Ann Maurice

H-2

Ad Hoc Committee

P.O. Box 484
Occidental, CA 95465
707 874-3855

PFMC

re: Amendment 15 Salmon regulations "de minimis" fishery

The salmon industry is already a *de minimis* fishery. The number of salmon boats in the fleet are but a fraction of what they once were. Fifteen years ago there were four times the number of boats and the sason was May to September. Now there are only one fourth the boats and the season is severely curtailed due to the assumption that fewer than 35,000 natural chinook spawners should trigger a crisis.

We continue to challenge your assumptions, and find no proof in your data to justify the 35,000 "floor".

We suggest:

1. That the justification for the 35,000 floor be re-examined;
2. That the statistical modeling is not adequate to determine the actual carrying capacity of the Klamath and the appropriate number of spawners;

If after re-examination, you still do not recognize that 35,000 is inappropriate, then we propose:

IF:
You fear that groundfish trawlers have depressed the number of 2-year olds, and no action is taken to stop it;
and you continue to use that depressed number as an indicator of the next years' spawners;
and you believe that fewer than 35,000 natural spawners will return to the Klamath;
and you still believe that 35,000 is necessary for a productive fishery;
and there is still no aggressive action to curtail the diversions for wasted irrigation waters, and lawn-watering in the Klamath basin;

THEN:
1. Mark ALL hatchery fish;
2. Allow two salmon per man with a commercial fishing license (on a par with recreational allowances).
3. In addition, allow landing of hatchery fish from May to September.

Ann Maurice
9/15/06

H-2

Ad Hoc Committee

P.O. Box 484
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5/15/06

Where's Jack?

The PFMC predicted that there will be an extremely low return of "natural" Chinook spawners to the Klamath river this year; and that dire prediction is the rationale for severely curtailing the salmon season. That forecast is based on the *low number of "jacks"* or immature *2-year olds* that returned to the Klamath in the fall of 2005. ***Why was that "jack" count so low?*** What happened to the offspring of the 2003 spawners that ***so few 2-year olds*** returned? Was the count accurate? ***If so, where's Jack?***

There were lots of "natural" spawners in 2003 -- plenty of eggs and plenty of juveniles. How many spawners? ***90,000*** "natural" spawners in 2003! That's about *2 1/2 times* PFMC's "floor" number of 35,000. **So there should have been no problem!** There were lots of spawners, lots of eggs, lots of offspring. So what happened to the offspring of 90,000 Klamath spawners? ***Where's Jack?***

Did the salmon fishermen catch them? No. "Jacks" are juveniles **too small** for commercial catch or sale -- they are ***not*** marketable.

What does this all mean?

*90,000 spawners in 2003, and a low jack count in 2005 means that a high number of spawners is no guarantee of sustainable yield; focusing on obtaining a high number of spawners in the Klamath is no guarantee of sustainability, is poor science and defies common sense;

***since commercial *salmon* fishermen do not catch one and two year olds, *salmon* fishing is not the problem and curtailing the *salmon* season is not a policy based on science.**

Where were the jacks lost? In fresh water or in the ocean? If in fresh water that means that the young of 90,000 natural spawners cannot survive in current Klamath conditions, so what good are more spawners and more eggs? In fact, too many young will make matters worse by competing with each other over limited food supply, like too many seeds on a field or too many cows on a pasture. If they were lost in the ocean, who caught them? **The PFMC's own report shows that most of the chinook "bycatch" caught by groundfish trawlers are 2-year olds!** So we have:

*Salmon fishing is regulated by the number of returning 2-year old chinook.

*Groundfish trawlers are catching 2-year old chinook, inadequately monitored and inadequately counted;

***The salmon industry, instead of the groundfish industry, is shut down when the 2-year old count doesn't meet PFMC requirements;**

*PFMC requirements for jack counts and spawner counts for the Klamath are artificially high and above the carrying capacity of the river.

We need a fresh, open-minded review of this dysfunction and regulatory correction.

Ann Maurice

H-2

Dean Estep
Fort Bragg, Ca

to the PFMC:

Dear sirs:

Some comments on the state of affairs of the salmon industry and your proposed new regulations:

In 1988, 4 million pounds of salmon were landed in Fort Bragg. Now there are 75% fewer commercial salmon boats, but you have allowed those few of us remaining to land only 4000 salmon and fish only the month of September.

Your shortening the season is based on a floor number of 35,000 spawners. But 35,000 is unrealistic under the present conditions. We should be allowed to fish May 1 - September 1 unless the PFMC can prove that commercial salmon fishing is causing harm.

Salmon are not vegetarians. They need food, water, oxygen and low temperatures, not pesticides.

How can you destroy an industry because you are unwilling or do not know how to solve the problem after almost 2 decades.

Low returns to the Klamath produced the largest runs. Even in drought years, the low returns produced the largest harvests.

In July, I drove through the Klamath watershed. On July 18, 2006, I saw a Cal Trans diesel pump water out of the Trinity River for water trucks spraying water for dust supression in Highway construction. All along the river were PVC pipes sending water from the Trinity for private gardens.

How many councilmembers have actually been to the Klamath to see the conditions and learn the real causes for salmon spawning problems?

Dean Estep
Fort Bragg

SALMON ADVISORY SUBPANEL REPORT ON SALMON METHODOLOGY REVIEW

The Salmon Advisory Subpanel (SAS) recommends that Council instruct the Scientific and Statistical Committee (SSC) and Salmon Technical Team (STT) to review the following topics, in priority order, for the 2006 Salmon Methodology Review.

1. The Klamath Ocean Harvest Model (KOHM) contact rate and harvest estimates. The changes to the model during the 2006 preseason process were made without review, and should be subject to review and approval prior to continued implementation in 2007.

2. Coho Fishery Regulation Assessment Model (FRAM) base period update. The Council should maintain concurrence with the Pacific Salmon Commission (PSC) coho model and update the base period for the Coho FRAM used by the Council.

3. Genetic Stock Identification (GSI) study proposal. GSI technology has the potential to improve fishery management and provide additional opportunity, which is critical to survival of salmon fisheries during years like 2006. The SAS requests that industry representatives be included in development of an appropriate study design.

The SAS also requests an update on the status of the following topics, and to include them as high priorities for future reviews.

1. Lower Columbia River Natural coho index stock and allowable impact rate. This is a critical issue for all sectors of ocean and in-river fisheries in Oregon and Washington.

2. Oregon Production Index hatchery coho forecast. This predictor has been consistently low recently and it also affects the impact rate for Lower Columbia River Natural coho.

3. Oregon Coast Natural coho forecast. Any improvement in the accuracy would help forecast impacts, particularly in selective fisheries off the Oregon coast.

4. September 1 maturity date for Klamath River fall Chinook. Fall fishery impacts need to be accurately attributed to the correct brood year, and appropriate tag codes used to represent the natural portion of the run. This could help reduce the uncertainty associated with setting fall fisheries.

5. Sea lion predation at the mouth of the Klamath River. This mortality source has the potential to significantly impact spawning escapement and should be accounted for in predictions.

6. A comparison of impacts using the current and historical management lines in the KOHM.

PFMC
09/11/06

Agenda Item H.1.d
Supplemental SSC Report
September 2006

SCIENTIFIC AND STATISTICAL COMMITTEE REPORT ON
SALMON METHODOLOGY REVIEW

The Scientific and Statistical Committee (SSC) met with Mr. Larrie LaVoy (Model Evaluation Workgroup) and Mr. Chuck Tracy to identify items for review by the SSC Salmon Subcommittee at its October meeting. The following items were identified as ready for review:

- Chinook and Coho Fishery Regulation Assessment Model (FRAM) Documentation;
- Columbia River fall Chinook ocean abundance forecast;
- experimental design for near-shore commercial test fisheries.

The SSC Salmon Subcommittee will review these products in October prior to the full SSC meeting in November. As always, the SSC requires good documentation and ample review time to make efficient use of the SSC Salmon Subcommittee's time. Materials to be reviewed should be submitted at least two weeks prior to the scheduled review. Agencies should be responsible for ensuring that materials submitted to the SSC are technically sound, comprehensive, clearly documented, and identified by author.

PFMC
09/13/06

SALMON TECHNICAL TEAM REPORT ON SALMON METHODOLOGY REVIEW

In April of this year, the Council listed eight subjects for review by the Scientific and Statistical Committee this fall. Of those, the Salmon Technical Team (STT) believes that three will be ready for review. They are:

1) The Chinook and Coho Fishery Regulation Assessment Model documentation.
2) Columbia River fall Chinook ocean abundance forecast methodologies.
3) Experimental design for near shore commercial test fisheries.

The STT understands that another of the eight subjects, Oregon Coast Natural coho ocean abundance prediction methodology, will be addressed by the Oregon Production Index Technical Team in February of 2007.

PFMC
09/14/06

PRELIMINARY DRAFT SUPPLEMENT TO ECONOMIC ANALYSIS CONTAINED IN

APPENDIX H
EXECUTIVE SUMMARY OF PRELIMINARY DRAFT PACIFiC COAST SALMON PLAN AMENDMENT 15: AN INITIATIVE TO PROVIDE FOR DE MINIMIS FISHING OPPORTUNITY FOR KLAMATH RIVER FALL-RUN CHINOOK SALMON

I. Introduction

The economic analysis provided in Appendix H of *Executive Summary of Preliminary Draft Pacific Coast Salmon Plan Amendment 15: An Initiative to Provide for De Minimis Fishing Opportunity for Klamath River Fall-Run Chinook Salmon* (Agenda Item H.2.a, Attachment 1, September 2006 – hereafter referred to in this report as PFMC Sep 2006) discusses differences among the de minimis alternatives (status quo, 2.5%, 5%, 10%, 16%) in terms of aggregate salmon troll revenues and associated income impacts. That analysis indicated little difference among the alternatives in terms of long-term economic effects, largely due to the relative infrequency of Conservation Alert years over the 40-year projection period. The alternatives, however, indicated more substantial differences when the analysis focused on fishery outcomes in Conservation Alert years.

This analysis supplements the results of Appendix H by demonstrating potential effects of the alternatives on fishing communities and the salmon troll fleet in terms of their ability to adapt to the restrictions imposed in Conservation Alert years. The indicators of adaptability used here pertain to community and vessel dependence on the salmon fishery and the extent to which other fisheries are viable alternative sources of revenue.[1]

II. Fishing Communities

The fishing communities considered in this analysis include the 16 ports in the Klamath management areas for which the annual ex-vessel value of salmon troll landings averaged at least $100,000 during 2003-2005 (see Figure 1). Table 1 characterizes port dependence on salmon in terms of the percentage of total landings and revenues attributable to salmon, and the percentage of vessels based in the port who participate in the salmon troll fishery.[2] Port dependence (as reflected in the percentage of total port revenue attributable to salmon) was highest for Santa Cruz, Bodega Bay, Fort Bragg, Princeton and San Francisco. Ports with the highest absolute salmon revenues included Fort Bragg, Newport, Coos Bay, San Francisco, Bodega Bay and Princeton.

Table 2 augments the salmon revenue information in Table 1 by identifying, for each port, all non-salmon fisheries that accounted for at least 5% of of the average annual ex-vessel value of landings during 2003-2005. Average revenue values for these same fisheries during 1994-2005 are also provided. For some fisheries (e.g, non-

[1] William Daspit and Brad Stenberg (Pacific States Marine Fisheries Commission, PacFIN Program) provided and facilitated interpretation of the data used in this analysis.

[2] To avoid double counting of vessels that land fish in multiple ports, each vessel was assigned to the port that accounted for the plurality of its revenue from all fisheries.

whiting groundfish trawl, which will likely continue to be restricted as it has in recent years), the 2003-2005 values are probably more reflective of future revenues than the 1994-2005 values. For other fisheries (e.g., squid seine, which experiences high inter-annual variability in landings), the 1994-2005 values may be the more appropriate indicator of future revenues. For yet other fisheries (e.g., salmon troll, crab pot), it is not clear which of the average revenue estimates is more appropriate, as these fisheries have experienced unusually high revenues in recent years which may or may not be sustainable over the long term (see Figure 2).

Table 3 predicts what salmon troll landings would be in each port in a Conservation Alert year under each of the de minimis alternatives - based on the assumed season structure scenarios described in Table ES-1 of PFMC (Sep 2006). Specifically, the projections were made by converting the low, medium and high CPUE revenue estimates contained in Table H-1 of PFMC (Sep 2006) to pounds, then allocating the resulting poundage among the ports within each management area in proportion to the 2003-2005 salmon landings for that area. To facilitate comparison of the landings projections associated with the management alternatives (which are expressed in Table H-1 in dressed weight) to recent 2003-2005 salmon troll landings, the latter values were converted to dressed weight by multiplying the corresponding round weight estimates in Table 1 by 87% (the implicit round-to-dressed weight conversion used in PacFIN).

III. Commercial Salmon Troll Fleet[3]

Table 4 describes the salmon troll fleet in each management area in terms of number of boats, total salmon landings and revenues made by these boats, and average salmon landings and revenues per boat. The fleet is categorized into salmon-only and multiple-fishery vessels to convey the extent to which vessels are likely to forego all or part of their fishery revenue in a Conservation Alert year. For all management areas combined, salmon-only vessels comprise 40% of all trollers, account for about 27% of total salmon landings and revenues, and make (on average) lower salmon landings and revenues than multiple fishery vessels. It should be noted that the averages provided in Table 4 obscure the considerable variation in salmon revenue observed among vessels (see Figures 3a and 3b).

The most common non-salmon fisheries targeted by multiple-fishery trollers are crab pot, albacore troll and groundfish fixed gear. Table 5 describes the extent to which multiple-fishery trollers in each management area depend on salmon relative to these other fisheries. Dependence on crab is particularly notable in virtually all management areas except Monterey, where vessels are more likely to depend on albacore and

[3] For purposes of Tables 4-6, vessels were assigned to the management area associated with their port assignment. The port assignment method is described in Footnote 2.

groundfish as alternative sources of income.

Table 6 describes the number of trollers projected to participate in the salmon fishery in four management areas (Monterey, San Francisco, Coos Bay, Northern Oregon) in a Conservation Alert year under each of the de minimis alternatives. These projections were derived as follows: Using 1994-2005 data, the number of trollers associated with each management area was regressed on the number of days that the season was open in that area (see appendix A). The number of salmon fishery participants under each of the de minimis alternatives was predicted, based on the regression coefficients provided in appendix A and the season structure for each management area assumed for each of the de minimis alternatives (from Table ES-1 of PFMC Sep 2006). The medium estimates provided in Table 6 correspond to the regression coefficients and the low/high estimates correspond to the lower/upper bound of those coefficients.

Table 1. Port dependence on the salmon troll fishery, as reflected in share of port landings (1000s of pounds round weight), ex-vessel value ($1000s, base year=2005) and vessel activity attributable to salmon.

Mgmt Area Port	2003-2005 Average								
	Landings			Ex-Vessel Value			# Vessels		
	Salmon	Total	%Sal	Salmon	Total	%Sal	Sal	Total	%Sal
Monterey:									
Monterey	147.1	5,024.1	6%	$ 351.6	$ 2,096.1	24%	43	65	67%
Moss Landing	449.2	40,402.9	1%	$ 1,087.5	$ 7,154.0	20%	74	112	66%
Santa Cruz	221.9	515.0	43%	$ 578.5	$ 914.9	60%	38	58	66%
SanFrancisco:									
Princeton	803.4	4,198.0	27%	$ 2,032.7	$ 5,158.5	41%	76	107	70%
San Francisco	1,099.4	7,259.1	20%	$ 2,566.4	$ 8,813.1	32%	62	153	41%
Bodega Bay	1,112.2	2,572.4	47%	$ 2,350.2	$ 4,591.0	55%	109	144	76%
Fort Bragg:									
Point Arena	47.5	739.9	7%	$ 118.6	$ 570.0	22%	8	20	40%
Fort Bragg	2,051.6	6,663.4	28%	$ 4,213.0	$ 7,721.4	53%	93	144	64%
KMZ-CA:									
Eureka	71.9	15,937.5	0%	$ 177.9	$ 10,389.8	2%	28	77	38%
Crescent City	136.1	11,386.2	1%	$ 364.5	$ 14,894.8	2%	31	109	28%
KMZ-OR:									
Brookings	85.5	5,134.7	2%	$ 215.7	$ 6,312.9	4%	22	61	36%
Coos Bay:									
Port Orford	141.2	1,937.1	8%	$ 394.7	$ 3,173.7	13%	26	63	42%
Coos Bay	1,259.4	26,492.1	5%	$ 3,169.6	$ 20,074.2	16%	123	188	65%
Winchester Bay	87.3	845.8	11%	$ 215.9	$ 1,386.8	16%	28	37	74%
Northern OR:									
Newport	1,451.9	96,850.9	2%	$ 3,544.0	$ 27,001.1	13%	147	232	63%
Tillamook	229.6	3,897.5	6%	$ 538.8	$ 3,594.1	15%	58	82	71%

Table 2. Port dependence on the salmon troll fishery, as reflected in ex-vessel value of landings ($1000s, base Year=2005) in salmon troll fishery and all other fisheries that account for at least 5% of 2003-2005 average annual ex-vessel revenue.

Port Fishery	94-05 Avg $1000s	%ofport$	2003	2004	2005	03-05 Avg $1000s	%ofport$
Monterey:							
Salmon troll	$ 1,291.8	16%	$ 156.5	$ 436.4	$ 462.0	$ 351.6	17%
Squid seine	$ 1,846.6	23%	$ 2,151.6	$ 670.1	$ 256.4	$ 1,026.0	49%
Shrimp/prawn pot	$ 1,157.5	14%	$ 374.0	$ 289.2	$ 150.6	$ 271.2	13%
Non-wht grdfsh trwl	$ 943.4	12%	$ 274.8	$ 324.8	$ 96.2	$ 231.9	11%
Rock/ling fixed	$ 798.1	10%	$ 82.7	$ 145.1	$ 77.8	$ 101.9	5%
All else	$ 1,982.4	25%	$ 192.4	$ 133.1	$ 14.7	$ 113.4	5%
Total	$ 8,019.8	100%	$ 3,232.0	$ 1,998.7	$ 1,057.7	$ 2,096.1	100%
Moss Landing:							
Salmon troll	$ 1,291.8	16%	$ 498.5	$ 1,166.2	$ 1,597.5	$ 1,087.4	15%
Squid seine	$ 1,846.6	23%	$ 6,269.7	$ 2,279.9	$ 747.7	$ 3,099.1	43%
CPS seine	$ 1,157.5	14%	$ 715.6	$ 1,559.8	$ 425.4	$ 900.3	13%
Non-wht grdfsh trwl	$ 943.4	12%	$ 993.1	$ 836.9	$ 566.2	$ 798.7	11%
Sablefish fixed	$ 798.1	10%	$ 625.1	$ 444.1	$ 239.6	$ 436.3	6%
All else	$ 1,982.4	25%	$ 1,194.8	$ 843.0	$ 458.9	$ 832.2	12%
Total	$ 8,019.8	100%	$10,296.7	$ 7,129.9	$ 4,035.4	$ 7,154.0	100%
Santa Cruz:							
Salmon troll	$ 606.0	47%	$ 247.7	$ 679.8	$ 807.9	$ 578.5	63%
Crab pot	$ 116.6	9%	$ 139.4	$ 179.6	$ 88.2	$ 135.7	15%
Albacore troll	$ 48.6	4%	$ 67.3	$ 56.1	$ 7.7	$ 43.7	5%
All else	$ 511.7	40%	$ 173.2	$ 181.2	$ 116.8	$ 157.1	17%
Total	$ 1,282.8	100%	$ 627.5	$ 1,096.7	$ 1,020.6	$ 914.9	100%
Princeton:							
Salmon troll	$ 1,968.8	34%	$ 499.9	$ 3,389.5	$ 2,208.7	$ 2,032.7	39%
Crab pot	$ 1,702.0	29%	$ 2,717.0	$ 2,446.0	$ 479.3	$ 1,880.8	37%
Non-wht grdfsh trwl	$ 1,131.7	20%	$ 715.3	$ 674.9	$ 721.8	$ 704.0	14%
Squid seine	$ 227.4	4%	$ 973.2	$ 93.7	$ 0.0	$ 355.6	7%
AllElse	$ 774.7	13%	$ 222.1	$ 192.0	$ 142.1	$ 185.4	4%
Total	$ 5,804.7	100%	$ 5,127.6	$ 6,796.0	$ 3,551.9	$ 5,158.5	100%
San Francisco:							
Salmon troll	$ 1,432.6	13%	$ 1,021.9	$ 4,542.4	$ 2,134.8	$ 2,566.4	29%
Crab pot	$ 2,078.1	19%	$ 3,516.2	$ 5,119.4	$ 557.9	$ 3,064.5	35%
Non-wht grdfsh trwl	$ 1,832.1	17%	$ 1,153.0	$ 1,600.2	$ 1,297.7	$ 1,350.3	15%
Swordfish longline	$ 220.1	2%	$ 1,316.8	$ 241.1	$ 0.0	$ 519.3	6%
Herring gillnet/dive	$ 3,713.1	35%	$ 726.5	$ 475.6	$ 36.6	$ 412.9	5%
All else	$ 1,427.7	13%	$ 1,402.5	$ 896.3	$ 400.4	$ 899.7	10%
Total	$10,703.8	100%	$ 9,136.9	$12,874.9	$ 4,427.4	$08,813.1	100%

Bodega Bay:							
Salmon troll	$ 1,397.5	27%	$ 2,843.5	$ 2,661.9	$ 1,545.1	$ 2,350.2	51%
Crab pot	$ 1,886.5	36%	$ 2,262.0	$ 3,067.3	$ 610.2	$ 1,979.8	43%
All else	$ 1,901.3	37%	$ 478.8	$ 227.3	$ 77.1	$ 261.0	6%
Total	$ 5,185.3	100%	$ 5,584.3	$ 5,956.5	$ 2,232.3	$ 4,591.0	100%
Point Arena:							
Salmon troll	$ 49.3	4%	$ 81.6	$ 184.3	$ 89.7	$ 118.6	21%
Urchin dive/net	$ 997.7	87%	$ 509.4	$ 349.3	$ 149.0	$ 335.9	59%
Rock/ling fixed	$ 52.2	5%	$ 33.9	$ 91.8	$ 57.0	$ 60.9	11%
Crab pot	$ 38.6	3%	$ 81.2	$ 64.1	$ 15.4	$ 53.6	9%
All else	$ 4.8	0%	$ 1.4	$ 0.6	$ 1.3	$ 1.1	0%
Total	$ 1,142.6	100%	$ 707.5	$ 690.0	$ 312.5	$ 570.0	100%
Fort Bragg:							
Salmon troll	$ 1,454.9	18%	$ 6,818.7	$ 3,446.0	$ 2,374.1	$ 4,213.0	55%
Non-wht grdfsh trwl	$ 3,077.1	37%	$ 1,650.2	$ 1,457.5	$ 1,389.9	$ 1,499.2	19%
Crab pot	$ 1,042.9	13%	$ 1,000.3	$ 1,411.3	$ 422.2	$ 944.6	12%
Sablefish fixed	$ 737.7	9%	$ 742.1	$ 772.8	$ 526.3	$ 680.4	9%
All else	$ 1,923.2	23%	$ 554.3	$ 367.0	$ 231.2	$ 384.2	5%
Total	$ 8,235.8	100%	$10,765.7	$ 7,454.7	$ 4,943.8	$ 7,721.4	100%
Eureka:							
Salmon troll	$ 125.4	1%	$ 96.7	$ 282.8	$ 154.3	$ 177.9	2%
Crab pot	$ 4,021.4	44%	$ 8,788.5	$ 8,448.4	$ 1,333.9	$ 6,190.3	60%
Non-wht grdfsh trwl	$ 2,883.7	31%	$ 2,596.6	$ 1,987.1	$ 1,928.7	$ 2,170.8	21%
Albacore troll	$ 731.9	8%	$ 611.1	$ 1,018.8	$ 274.2	$ 634.7	6%
Shrimp trawl	$ 596.8	7%	$ 327.9	$ 618.9	$ 535.8	$ 494.2	5%
All else	$ 828.2	9%	$ 645.9	$ 881.5	$ 638.4	$ 721.9	7%
Total	$ 9,187.4	100%	$13,066.7	$13,237.4	$ 4,865.2	$10,389.8	100%
Crescent City:							
Salmon troll	$ 106.3	1%	$ 97.1	$ 925.3	$ 71.0	$ 364.5	2%
Crab pot	$ 8,530.3	59%	$15,398.7	$18,170.0	$ 4,273.9	$12,614.2	85%
Non-wht grdfsh trwl	$ 2,140.0	15%	$ 1,160.5	$ 472.9	$ 699.3	$ 777.6	5%
All else	$ 3,604.5	25%	$ 1,143.3	$ 1,195.0	$ 1,077.5	$ 1,138.6	8%
Total	$14,381.1	100%	$17,799.5	$20,763.1	$ 6,121.8	$14,894.8	100%
Brookings:							
Salmon troll	$ 135.1	2%	$ 99.4	$ 357.9	$ 189.9	$ 215.7	3%
Crab pot	$ 2,876.7	47%	$ 4,954.1	$ 7,704.1	$ 1,769.2	$ 4,809.1	76%
Non-wh grdfsh trwl	$ 1,549.7	25%	$ 1,241.2	$ 580.5	$ 739.0	$ 853.6	14%
All else	$ 1,532.6	25%	$ 491.2	$ 244.9	$ 567.3	$ 434.5	7%
Total	$ 6,094.0	100%	$ 6,785.9	$ 8,887.5	$ 3,265.4	$ 6,312.9	100%
Port Orford:							
Salmon troll	$ 192.4	7%	$ 252.7	$ 497.7	$ 433.8	$ 394.7	12%
Crab pot	$ 1,213.7	41%	$ 818.7	$ 3,399.2	$ 967.4	$ 1,728.4	55%
Sablefish fixed	$ 658.6	22%	$ 557.9	$ 489.1	$ 635.4	$ 560.8	18%
Rock/ling fixed	$ 587.0	20%	$ 407.1	$ 436.2	$ 387.8	$ 410.4	13%
All else	$ 312.6	11%	$ 54.7	$ 104.2	$ 79.2	$ 79.4	3%
Total	$ 2,964.3	100%	$02,091.1	$ 4,926.2	$ 2,503.6	$ 3,173.7	100%

Coos Bay:							
Salmon troll	$ 1,311.6	8%	$ 2,573.3	$ 3,941.2	$ 2,994.4	$ 3,169.6	16%
Crab pot	$ 4,272.7	26%	$ 6,468.8	$14,594.2	$ 5,652.5	$ 8,905.2	44%
Non-wht grdfsh trwl	$ 5,516.7	34%	$ 3,759.6	$ 2,815.8	$ 2,395.3	$ 2,990.2	15%
Albacore troll	$ 1,067.4	7%	$ 1,138.5	$ 2,709.9	$ 2,016.3	$ 1,954.9	10%
Shrimp trawl	$ 2,659.7	16%	$ 1,595.5	$ 417.8	$ 1,764.8	$ 1,259.4	6%
Sablefish fixed	$ 985.8	6%	$ 1,007.8	$ 978.4	$ 1,370.5	$ 1,118.9	6%
All else	$ 489.9	3%	$ 507.0	$ 572.9	$ 948.0	$ 676.0	3%
Total	$16,303.8	100%	$17,050.5	$26,030.3	$17,141.9	$20,074.2	100%
Winchester Bay:							
Salmon troll	$ 142.1	11%	$ 172.7	$ 278.2	$ 196.8	$ 215.9	16%
Crab pot	$ 917.5	72%	$ 1,030.6	$ 784.4	$ 1,042.8	$ 952.6	69%
Albacore troll	$ 111.1	9%	$ 188.6	$ 101.3	$ 191.4	$ 160.4	12%
All else	$ 106.9	8%	$ 110.8	$ 31.9	$ 30.9	$ 57.8	4%
Total	$ 1,277.6	100%	$ 1,502.6	$ 1,195.8	$ 1,461.9	$ 1,386.8	100%
Newport::							
Salmon troll	$ 2,272.8	9%	$ 3,289.3	$ 4,061.7	$ 3,280.9	$ 3,544.0	13%
Crab pot	$ 7,173.9	29%	$10,471.9	$12,249.3	$ 6,766.1	$ 9,829.1	36%
Albacore troll	$ 3,088.7	12%	$ 3,447.0	$ 3,992.8	$ 3,098.7	$ 3,512.9	13%
Whiting trawl	$ 3,423.0	14%	$ 2,183.6	$ 3,284.5	$ 4,827.4	$ 3,431.8	13%
Non-wht grdfsh trwl	$ 4,418.3	18%	$ 2,916.2	$ 2,550.2	$ 2,033.7	$ 2,500.1	9%
Shrimp trawl	$ 2,619.7	11%	$ 1,602.5	$ 2,294.0	$ 2,321.7	$ 2,072.7	8%
Sablefish fixed	$ 1,735.0	7%	$ 1,954.5	$ 2,132.5	$ 1,850.2	$ 1,979.1	7%
All else	$ 325.9	1%	$ 179.5	$ 79.2	$ 135.9	$ 131.5	1%
Total	$25,057.5	100%	$26,044.4	$30,644.3	$24,314.5	$27,001.1	100%
Tillamook:							
Salmon troll	$ 290.4	11%	$ 468.8	$ 422.5	$ 725.1	$ 538.8	15%
Crab pot	$ 1,230.7	47%	$ 1,963.0	$ 2,592.2	$ 1,531.4	$ 2,028.8	56%
Shrimp trawl	$ 542.5	21%	$ 666.7	$ 382.1	$ 756.5	$ 601.8	17%
Albacore troll	$ 199.5	8%	$ 215.5	$ 154.8	$ 212.0	$ 194.1	5%
All else	$ 651.0	25%	$ 785.1	$ 691.8	$ 831.4	$ 769.4	21%
Total	$ 2,623.8	100%	$ 3,630.3	$ 3,820.9	$ 3,331.2	$ 3,594.1	100%

Table 3. Average 2003-2005 salmon troll landings and projected landings in Conservation Alert years (1000s of pounds dressed weight) under five alternatives (status quo, 2.5%, 5%, 10% and 16%) and three scenarios (low, medium, high CPUE) - by management area and port

Mgmt Area Port	03-05 Avg Salmon Landings (1000 lbs)		Status Quo	2.5% Alternative			5% Alternative			10% Alternative			16% Alternative		
				Low	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High
Monterey:															
Monterey	128.0	18%	0.0	5.8	10.5	18.1	33.7	61.5	105.6	135.1	246.6	423.5	182.1	332.2	570.8
Moss Landing	390.8	55%	0.0	17.6	32.2	55.2	103.0	187.7	322.6	412.7	752.9	1,293.3	556.0	1,014.5	1,743.0
Santa Cruz	193.1	27%	0.0	8.7	15.9	27.3	50.9	92.7	159.3	203.9	371.9	638.8	274.7	501.1	860.9
Other	0.2	0%	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.3	0.4	0.2	0.3	0.6
Total	712.0	100%	0.0	32.1	58.6	100.6	187.7	342.0	587.7	751.9	1,371.6	2,356.2	1,013.0	1,848.1	3,175.3
San Francisco:															
Princeton	699.0	26%	0.0	46.2	72.2	115.5	84.2	131.9	210.5	84.2	131.9	210.5	84.2	131.9	210.5
San Francisco	956.5	36%	0.0	63.2	98.8	158.1	115.2	180.4	288.1	115.2	180.4	288.1	115.2	180.4	288.1
Bodega Bay	967.6	36%	0.0	64.0	100.0	159.0	116.5	182.8	291.5	116.5	182.8	291.5	116.5	182.8	291.5
Other	35.9	2%	0.0	0.6	1.0	1.8	3.3	6.0	10.4	3.3	6.0	10.4	3.3	6.0	10.4
Total	2,670.1	100%	0.0	176.5	275.9	441.4	321.6	503.7	804.3	321.6	503.7	804.3	321.6	503.7	804.3
Coos Bay:															
Port Orford	122.8	9%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.8	7.6	10.9	7.1	19.3	28.0
Coos Bay	1,095.7	82%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	24.6	67.4	97.4	63.0	172.2	249.9
WinchesterBay	76.0	6%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.7	4.7	6.8	4.4	11.9	17.3
Other	47.2	4%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	2.9	4.2	2.7	7.4	10.8
Total	1,341.7	100%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	30.1	82.5	119.3	77.1	210.8	306.0
Northern OR:															
Newport	1,263.1	85%	0.0	31.8	66.2	107.3	116.0	241.3	391.7	288.5	600.2	975.5	516.0	1,074.1	1,745.6
Tillamook	199.7	14%	0.0	5.0	10.5	17.0	18.3	38.2	61.9	45.6	94.9	154.2	81.6	169.8	276.0
Other	19.2	1%	0.0	0.5	1.0	1.6	1.8	3.7	6.0	4.4	9.1	14.8	7.8	16.3	26.5
Total	1,482.0	100%	0.0	37.3	77.7	125.9	136.1	283.1	459.6	338.6	704.2	1,144.6	605.4	1,260.2	2,048.2

Table 4. Average number of salmon-only and multiple-fishery trollers who fished for salmon during 2003-2005 and 1994-2005 and associated total and average salmon landings and revenues, by management area. (Landings expressed in 1000s of pounds round weight; revenue in $1000s, base year=2005.)

Managemt Area	# Salmon Trollers			Total Salmon Troll Landings and Revenue						Average Salmon Landings and Revenue Per Troller					
				Landings			Revenue			Landings			Revenue		
	SalOnly	Mult	All	SalOnly	Mult	All	SalOnly	Mult	All	SalOnly	Mult	All	SalOnly	Mult	All
Monterey															
03-05 Avg	85	78	164	290.4	537.1	827.5	$ 732.3	$ 1,257.2	$ 1,989.5	3.1	7.0	5.0	$ 7.5	$16.6	$11.7
94-05 Avg	109	112	221	415.7	840.4	1,256.1	$ 767.0	$ 1,489.8	$ 2,256.7	3.3	7.3	5.3	$ 6.2	$13.5	$ 9.8
SanFran															
03–05 Avg	138	172	310	904.9	2,386.3	2,146.3	$2,199.1	$ 5,774.7	$ 7,973.8	6.5	13.4	10.4	$15.5	$31.4	$24.5
94-05 Avg	165	227	391	787.6	2,146.3	2,933.8	$1,627.1	$ 4,307.9	$ 5,935.0	4.9	9.8	7.8	$10.1	$19.6	$15.6
FortBragg															
03-05 Avg	47	68	115	699.4	1,353.7	2,053.0	$1,447.0	$ 2,648.8	$ 4,095.8	13.9	16.6	15.6	$29.8	$34.9	$32.9
94-05 Avg	29	39	68	218.1	483.8	701.8	$ 435.9	$ 906.0	$ 1,342.0	5.3	7.8	6.8	$10.7	$15.2	$13.4
KMZ-CA															
03-05 Avg	10	21	31	33.3	169.7	203.0	$ 76.9	$ 426.8	$ 503.7	4.3	7.1	6.4	$ 9.5	$17.4	$15.5
94-05 Avg	8	19	26	16.2	65.8	82.0	$ 33.3	$ 150.4	$ 183.7	2.0	2.9	2.7	$ 4.0	$ 6.5	$ 5.9
KMZ-OR															
03-05 Avg	4	12	16	5.3	54.3	59.6	$ 14.5	$ 130.3	$ 144.8	1.3	4.3	3.6	$ 3.4	$10.1	$ 8.6
94-05 Avg	5	14	18	4.4	47.1	51.6	$ 10.9	$ 94.5	$ 105.4	1.0	3.2	2.7	$ 2.4	$ 6.6	$ 5.6
CoosBay															
03-05 Avg	71	140	211	313.2	1,212.4	1,525.6	$ 778.1	$ 2,999.9	$ 3,777.9	4.4	8.7	7.2	$11.0	$21.4	$17.8
94-05 Avg	54	105	159	178.8	665.7	844.6	$ 364.2	$ 1,374.1	$ 1,738.3	3.0	5.9	4.9	$ 6.0	$11.7	$ 9.8

NorthOR															
03-05 Avg	69	152	221	778.1	2,999.9	3,777.9	$ 811.4	$ 3,161.0	$ 3,972.4	5.3	8.9	7.7	$11.7	$20.9	$18.0
94-05 Avg	84	125	209	364.2	1,374.1	1,738.3	$ 661.1	$ 1,918.5	$ 2,579.6	4.5	8.0	6.6	$ 8.1	$14.7	$12.1
Total															
03-05 Avg	423	644	1,068	2,621.1	7,013.4	9,634.4	$6,059.3	$16,398.7	$22,458.1	6.3	10.9	9.1	$14.3	$25.2	$20.9
94-05 Avg	453	641	1,093	1,998.2	5,257.6	7,255.9	$3,899.6	$10,241.3	$14,140.8	4.5	8.2	6.7	$ 8.7	$15.9	$13.0

Table 5. Average annual 2003-2005 and 1994-2005 landings and revenues by multiple-fishery salmon trollers, by management area and fishery.

Mgmt Area Fishery	Average Landings Per Troller (1000 lbs round weight)				Average Revenue Per Troller ($1000s, Base Year=2005)			
	03-05 Average		94-05 Average		03-05 Average		94-05 Average	
Monterey:								
Salmon troll	7.0	25%	7.3	24%	$16.6	40%	$13.5	33%
Crab pot	2.6	7%	2.1	6%	4.8	11%	4.5	11%
Albacore line	8.9	30%	8.7	29%	7.4	19%	8.0	21%
Groundfish fixed	3.7	13%	4.0	14%	5.5	15%	5.7	16%
Other	12.9	25%	11.5	27%	7.4	17%	8.5	20%
Total	35.1	100%	33.6	100%	$41.8	100%	$40.2	100%
San Francisco:								
Salmon troll	13.4	34%	9.8	34%	$31.4	46%	$19.6	39%
Crab pot	16.7	37%	9.8	32%	28.8	38%	19.9	40%
Albacore line	6.9	15%	4.5	15%	5.9	8%	4 .2	9%
Groundfish fixed	1.0	3%	1.7	7%	1.9	3%	2.6	6%
Other	5.0	12%	4.0	14%	3.5	5%	3.3	7%
Total	43.1	100%	29.8	100%	$71.5	100%	$49.6	100%
Fort Bragg:								
Salmon troll	16.6	36%	7.8	26%	$34.9	47%	$15.2	31%
Crab pot	21.6	46%	9.5	37%	35.1	44%	17.9	43%
Albacore line	0.9	2%	0.6	2%	0.8	10%	0.6	1%
Groundfish fixed	2.3	6%	3.3	17%	3.8	5%	5.3	16%
Other	4.9	11%	5.0	18%	2.3	3%	2.6	9%
Total	46.4	100%	26.2	100%	$76.9	100%	$41.6	100%
KMZ-CA:								
Salmon troll	7.1	12%	2.9	12%	$17.4	15%	$ 6.5	13%
Crab pot	41.4	76%	17.5	69%	67.6	70%	31.6	72%
Albacore line	0.8	2%	0.4	2%	0.6	1%	0.4	1%
Groundfish fixed	3.0	7%	2.4	12%	5.2	6%	3.8	10%
Other	1.4	4%	0.9	4%	5.3	8%	1.6	3%
Total	53.6	100%	24.1	100%	$96.1	100%	$43.8	100%
KMZ-OR:								
Salmon troll	4.3	10%	3.2	14%	$10.1	14%	$ 6.6	16%
Crab pot	37.0	85%	20.1	57%	60.2	82%	35.9	66%
Albacore line	0.8	1%	1.5	5%	0.7	1%	1.4	3%
Groundfish fixed	1.6	4%	4.2	14%	2.2	3%	4.6	11%
Other	0.0	0%	9.6	12%	0.0	0%	2.9	5%
Total	43.6	100%	38.6	100%	$73.2	100%	$51.4	100%

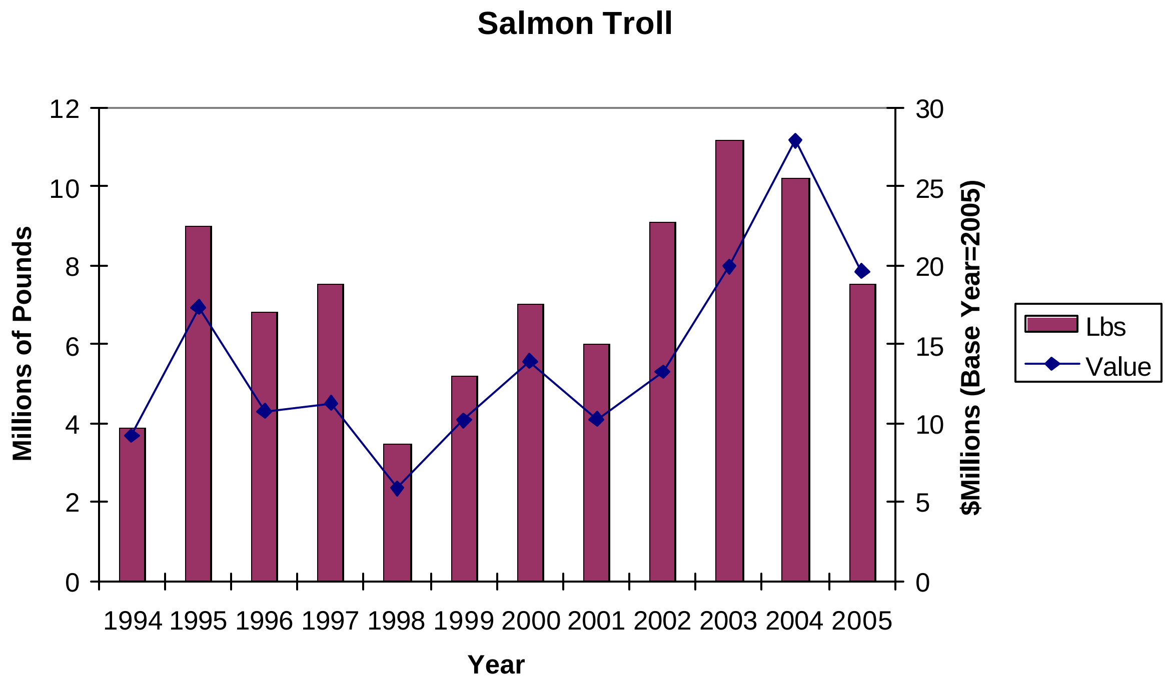
Coos Bay:								
Salmon troll	8.7	17%	5.9	17%	$21.4	28%	$11.7	23%
Crab pot	21.6	40%	11.7	32%	35.2	45%	21.8	43%
Albacore line	11.6	21%	5.3	14%	9.9	13%	4.8	9%
Groundfish fixed	4.3	9%	5.3	18%	7.5	10%	8.0	18%
Other	7.0	13%	6.2	18%	3.2	4%	3.4	8%
Total	53.2	100%	34.4	100%	$77.1	100%	$49.8	100%
North OR:								
Salmon troll	8.9	21%	8.0	25%	$20.9	33%	$14.7	30%
Crab pot	18.1	43%	11.1	34%	28.9	44%	20.6	43%
Albacore line	10.5	25%	8.0	26%	9.1	14%	7.3	16%
Groundfish fixed	2.7	6%	2.6	9%	4.8	7%	4.1	9%
Other	2.3	6%	1.9	6%	1.3	2%	1.2	3%
Total	42.4	100%	31.5	100%	$65.0	100%	$48.0	100%
All Areas:								
Salmon troll	10.9	24%	8.2	25%	$25.2	36%	$15.9	33%
Crab pot	18.5	40%	9.9	31%	30.5	43%	18.8	39%
Albacore line	8.1	18%	5.8	18%	7.0	10%	5.3	11%
Groundfish fixed	2.7	6%	3.1	10%	4.6	7%	4.6	10%
Other	5.6	12%	5.3	16%	3.3	5%	3.8	8%
Total	45.8	100%	32.3	100%	$70.6	100%	$48.4	100%

Table 6. Average number of trollers who landed salmon during 2003-2005 and 1994-2005, and low/medium/high number of trollers projected to participate in salmon fishery in a Conservation Alert year under each alternative (status quo, 2.5%, 5%, 10%, 16%), by management area.

	Monterey	San Francisco	Coos Bay	North OR
Historical Average				
03-05 avg	164	310	211	221
94-05 avg	221	391	159	209
Status Quo	0	0	0	0
2.5% Alternative				
Low	21	40	0	8
Medium	28	47	0	11
High	34	53	0	14
5% Alternative				
Low	46	73	0	36
Medium	61	85	0	51
High	77	97	0	65
10% Alternative				
Low	84	73	15	82
Medium	112	85	22	111
High	140	97	30	141
16% Alternative				
Low	102	125	30	127
Medium	136	145	46	174
High	170	166	61	220

Figure 1. Major salmon ports by Klamath management area

Figure 2. Total landings and ex-vessel value of salmon troll and crab pot landings in Klamath management areas, 1994-2005.



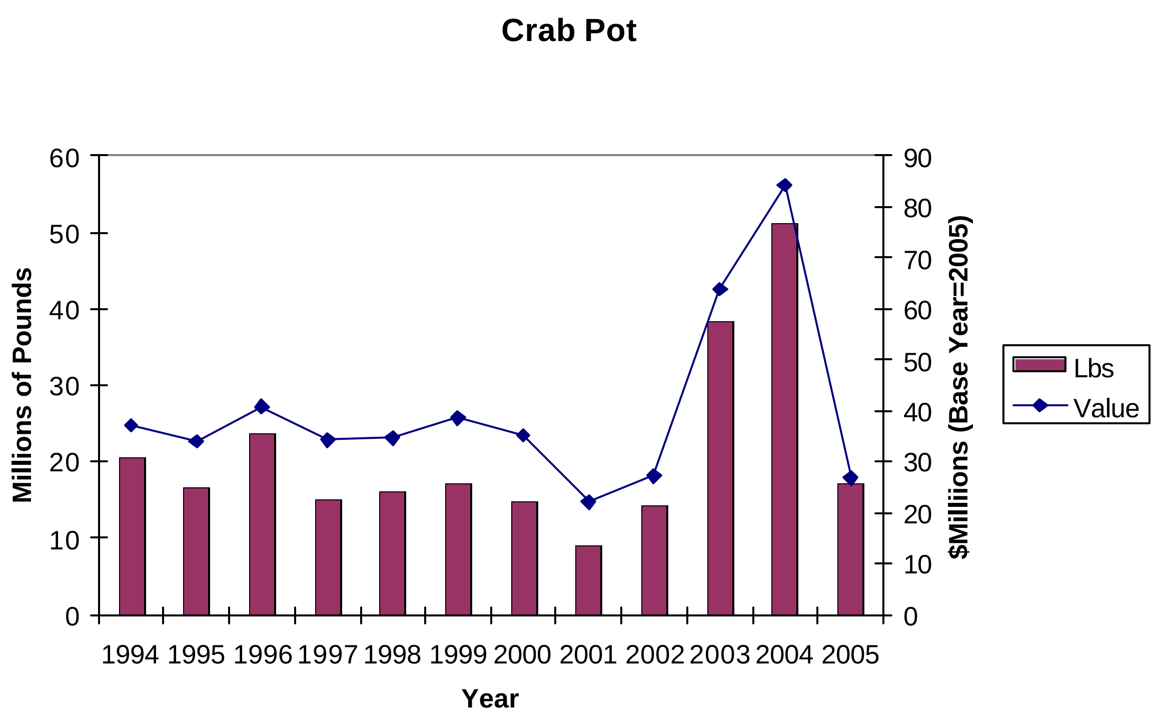


Figure 3a. Absolute distribution of salmon-only and multiple-fishery trollers in Klamath management areas by annual salmon revenue category, 2003-2005 average.

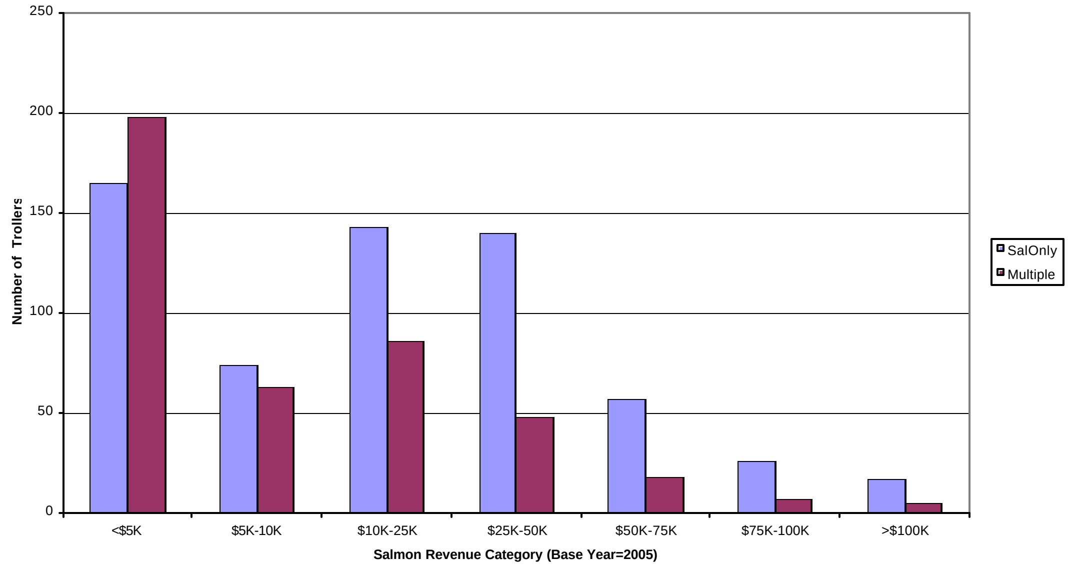
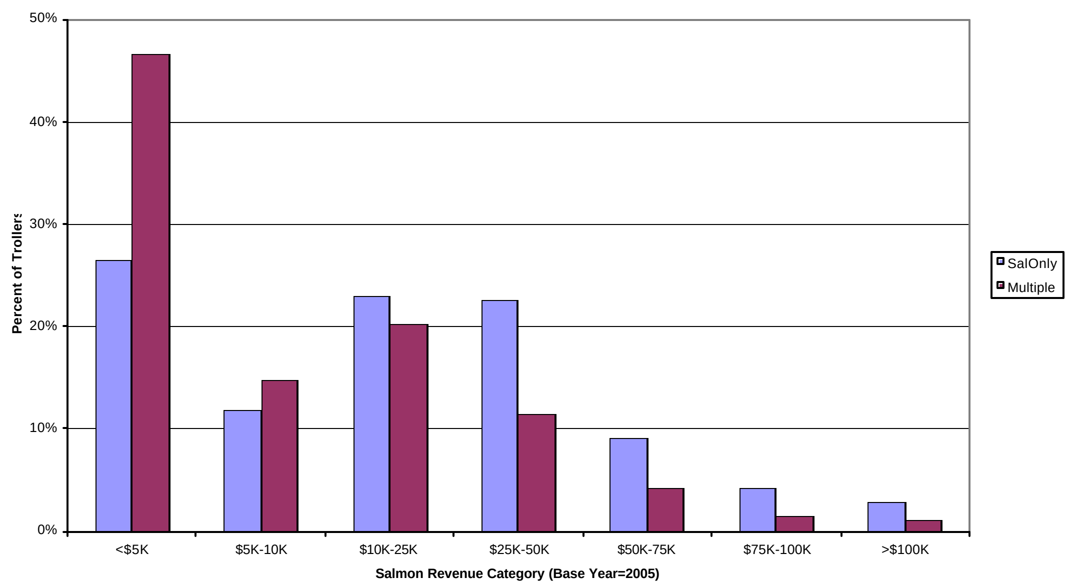


Figure 3b. Relative distribution of salmon-only and multiple-fishery trollers in Klamath management areas by annual salmon revenue category, 2003-2005 average.



Appendix A. Troller Participation Regression

Regression equation:

$ntroller_{ij}$= $ß_1$ season_mnt + $ß_2$ season_sf + $ß_3$ season_coos + $ß_4$ season_north + e_{ij}

where

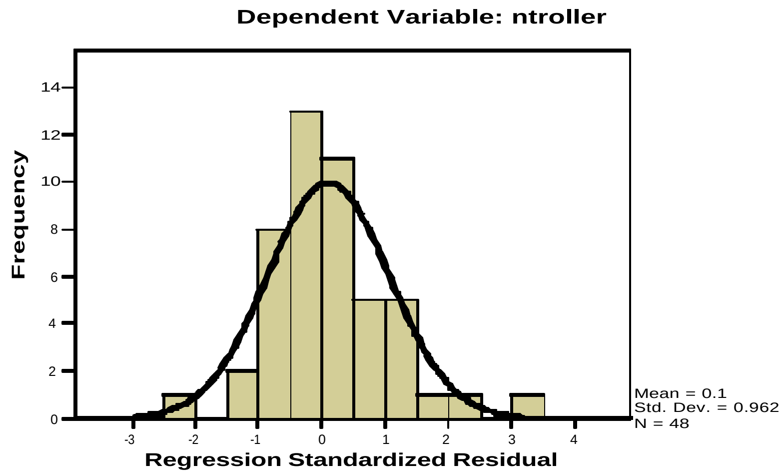
$ntroller_{ij}$ = number of trollers who landed salmon in year i (i=1994,...,2005) and made the plurality of their revenue (all fisheries) from a port in management area j (j=mnt, sf, coos, north)
$season\_mnt_{ij}$ = mntdum * $season_{ij}$
$season\_sf_{ij}$ = sfdum * $season_{ij}$
$season\_coos_{ij}$ = coosdum * $season_{ij}$
$season\_north_{ij}$ = northdum * $season_{ij}$

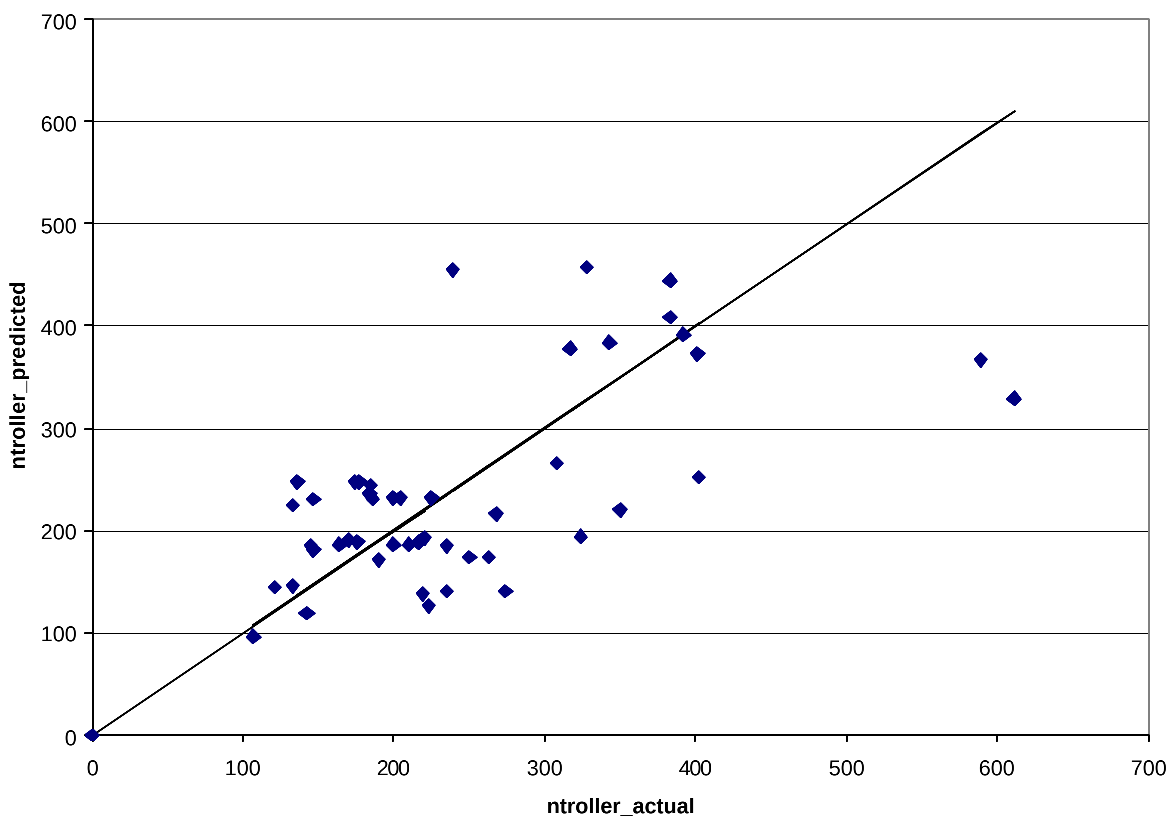
mntdum = 1 for Monterey management area, 0 otherwise.
sfdum = 1 for San Francisco management area, 0 otherwise
coosdum = 1 for Coos Bay management area, 0 otherwise
northdum = 1 for Northern Oregon management area, 0 otherwise
$season_{ij}$ = salmon troll season (# days) in year i and management area j
(Note: In cases where the season varied among subareas within a management area, the subarea with the longest season was used to represent the area as a whole.)

Regression results:

r^2adj=0.881, n=48					
Dependent Variable	Independent Variable	coefficient	t-value	95% confidence interval lower bound	upper bound
Ntroller	season_mnt	1.618	8.011	1.211	2.024
	season_sf	2.741	14.217	2.352	3.129
	season_coos	0.747	5.934	0.493	1.001
	season_north	1.136	7.542	0.832	1.439

Histogram


Dependent Variable: ntroller
Frequency
14
12
10
8
6
4
2
0
-3
-2
-1
0
1
2
3
4
Regression Standardized Residual
Mean = 0.1
Std. Dev. = 0.962
N = 48


700
600
500
400
300
200
100
0
ntroller_predicted
0
100
200
300
400
500
600
700
ntroller_actual

Agenda Item H.2.b
Supplemental SAC Report
September 2006

SALMON AMENDMENT COMMITTEE REPORT ON FMP AMENDMENT 15 (*DE MINIMIS FISHERIES*)

The results of the biological and economic analyses were not adequately developed to allow a complete draft of Amendment 15 in time for distribution with the briefing materials. Because of various shortcomings, Pacific Fishery Management Council staff has recommended the Council consider the need for further development of the alternatives and analyses, and possible modification of the amendment schedule. A document update and recommendations are presented in this report.

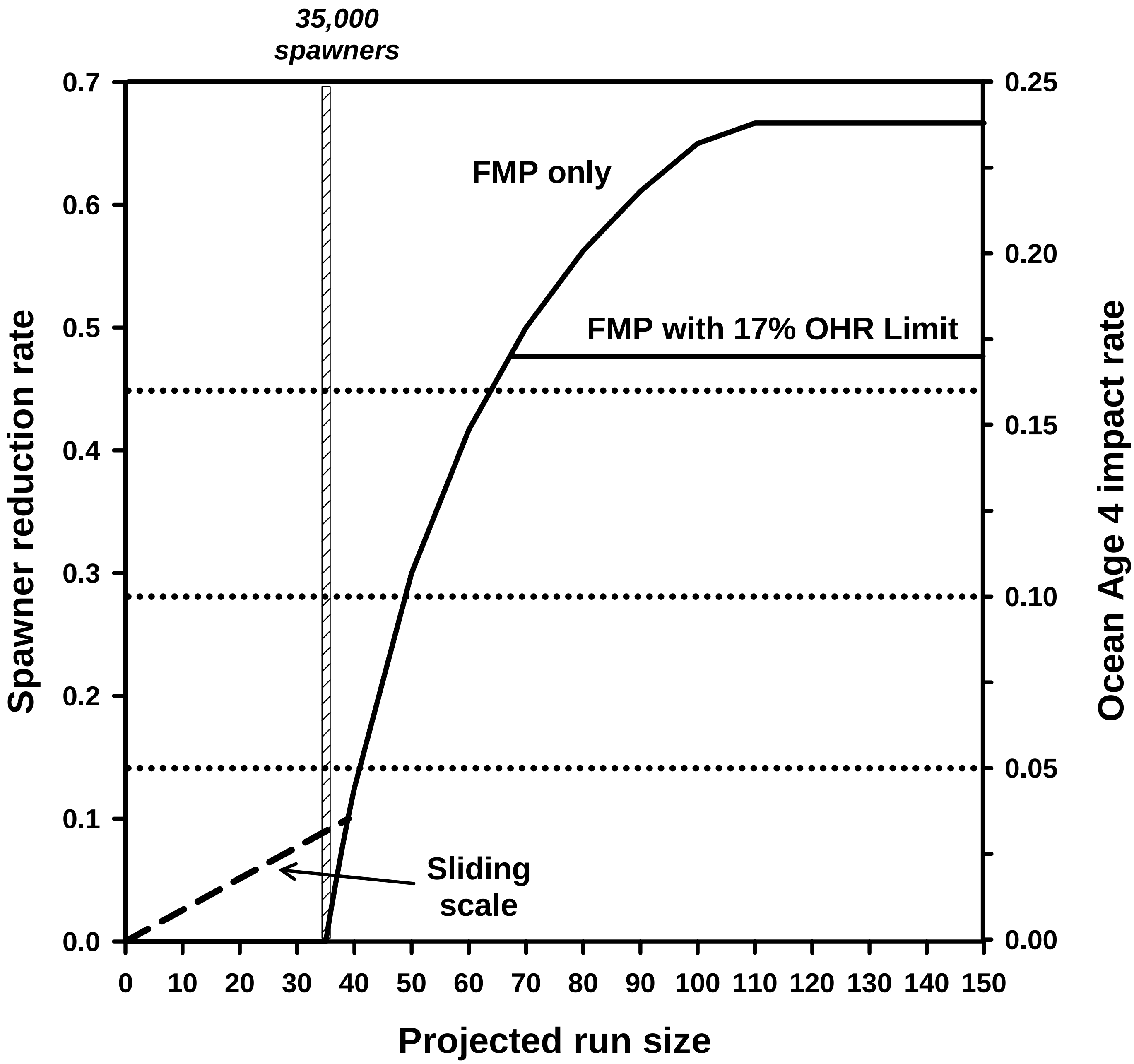
The purpose of this action is to provide for minimal or *de minimis* salmon fishing during times when the Klamath River fall Chinook (KRFC) conservation objective for the stock precludes fishery access to co-mingled Chinook salmon stocks while ensuring the long term productivity of KRFC is not jeopardized. This action is needed to prevent fishery restrictions that can lead to severe economic consequences to local communities that target more robust salmon stocks, which are typically available for harvest in the Council area. Currently, this can be addressed only through the emergency regulation process as provided in the Magnuson-Stevens Fishery Conservation and Management Act (MSA) and implemented by the National Marine Fisheries Service (NMFS).

The Draft Amendment currently contains 6 main sections, 8 appendices, 19 tables, and 4 figures. Two more appendices are expected to be added following the September 2006 Council meeting. The document includes 88 pages and is expected to reach about 110 pages before it is ready for transmittal to NMFS. Informational sections and descriptions of the alternatives and relevant issues have been fairly well developed. The Salmon Amendment Committee (SAC) has reviewed and commented on those sections. The purpose and needs section was discussed by the SAC at this meeting and it was agreed that the current section wording can be improved to provide greater clarity and context with regard to the historic importance of the stock in providing meaningful ocean and river fisheries.

De minimis is Latin for "of minimum importance" or "trifling." Essentially it refers to something or a difference that is so little, small, minuscule, or tiny that effects need not be considered. This definition is proposed to be added to the Introduction. A recap of the alternatives follows (clarifications to briefing book verbiage are shown in underline):

1. Status quo (no fishing in Conservation Alert Years).
2. A 4% to 0% age-4 ocean impact rate scaled linearly to the projected range of 39K to zero natural adult spawners absent fishing (sliding scale-equivalent to Klamath Fishery Management Council recommendation).
3. A 5% age-4 ocean impact rate cap.
4. A 16% age-4 ocean impact rate cap.
5. A rebuilding feature that would 1) prohibit *de minimis* fishing in the fourth year commencing March 15 following three consecutive years of *de minimis* fishing in which the escapement floor was not met, and 2) prohibit *de minimis* fishing thereafter until the escapement floor was met for three consecutive years.
6. The prohibition of any fall/winter fisheries (September 1 [current biological year start] through March 14) following spring/summer *de minimis* fisheries in the area between Cape Falcon, Oregon and Pt. Sur, California.

Alternatives 5 and/or 6 could be coupled with one of the *de minimis* fishery Alternatives (2, 3, or 4 above.
A graph of the *de minimis* fishery alternatives follows.



SAC comments on alternatives 5 & 6 follow:

Alternative 5 - the rebuilding feature:

- may be inconsistent with the *de minimis* fishing concept (i.e., has minimal or trifling impact on KRFC, therefore should not require further restriction);
- is highly prescriptive and complicated because of the many possible combinations of *de minimis* and non-*de minimis* fishing events and whether the natural escapement floor is met in those same years; and
- specifies outcomes for future years that will superseded by recommendations from overfishing reviews. This is a particular concern with the second clause of this alternative.

Alternative 6: the fall/winter fishing prohibition in *de minimis* fishing years should take into account the *significance* of fishery impacts in fall/winter fisheries by time and area. The Salmon Technical Team (STT) has assessed relative impacts of February-November fisheries since the early 1980s on KRFC (STT March 2006 Report, see table below). This information is important because some fall/winter fisheries have lower impact on KRFC and probably higher economic importance than some spring/summer fisheries. It will also be important to continually update and apply this database in the event of future stock distribution or fishery effort shifts.

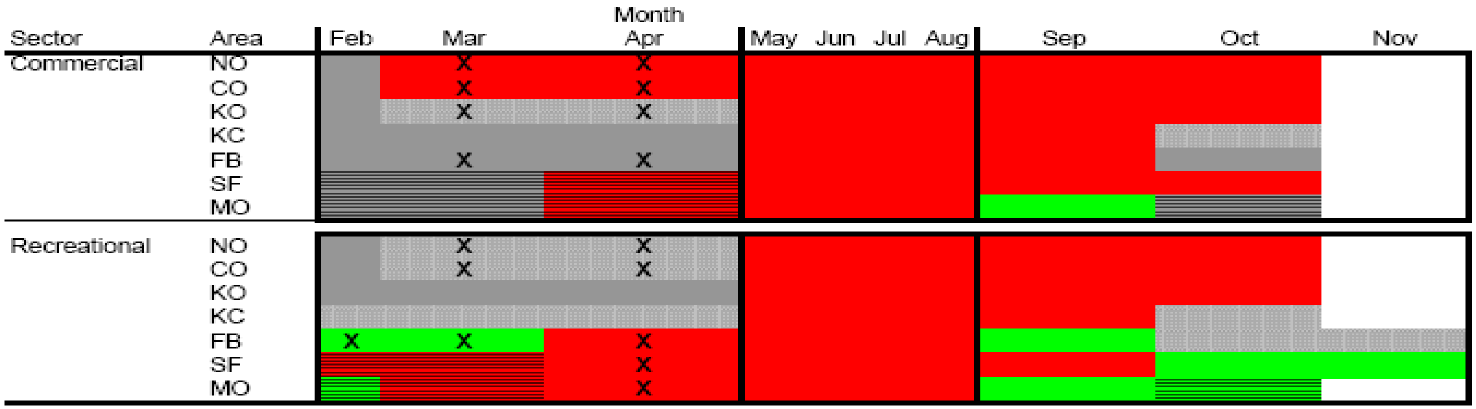
A review of the proposed evaluation criteria follows:

1. The probability of a natural spawning escapement lower than any historically observed (12,000).
2. The probability of any of the major mid-Klamath Basin sub-stock (Shasta, Scott, or Salmon rivers) having a natural spawning escapement of less than 500 adults in any year.
3. The probability of a spawning escapement below the 35,000 natural spawner floor in any year.
4. The probability of three consecutive years of spawning escapement less than the 35,000 floor within a 40-year time period.
5. The probability that hatchery egg collection goals will be met every year.
6. The probability of meeting the terms of the NMFS consultation standard in any year for the California Coastal Chinook (CCC) salmon evolutionary significant unit, which is an ocean harvest rate of no more than 16.0% on age-4 KRFC.
7. Annual community and state level personal income impacts generated from Council-area commercial and recreational salmon fisheries, and river tribal and recreational salmon fisheries.

All criteria will be evaluated in relative terms compared to status quo.

National Environmental Policy Act (NEPA): The regulatory streamlining committee reviewed the list of questions required for a finding of no significant impact (FONSI) required under NEPA, and felt it was reasonable to expect the analysis of Amendment 15 should result in a FONSI. Likewise, they felt the range of alternatives would meet the intent of National Standard guidelines, and recommended the analysis continue as an environmental assessment (EA) rather than an environmental impact statement (EIS).

KRFC Feb-Aug Impacts



Sector	Area	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
Commercial	NO		7320 (323)	8141 (516)					30103 (1053)	23969 (765)	
	CO		7470 (363)	17217(754)					18994 (618)	8500 (441)	
	KO		25 (3)	63 (8)					1211 (84)	554 (110)	
	KC		---	---					6399 (305)	0 (2)	
	FB		---	---					27219 (1029)	---	
	SF		---	---					11997 (1222)	1860 (284)	
	MO		---	---					488 (118)		
Recreational	NO		6 (39)	28 (112)					2627(1053)	1314 (765)	
	CO		1 (24)	19 (57)					1458 (618)	24 (441)	
	KO		---	---					1510 (84)	469 (110)	
	KC		---	---					1990 (2108)	---	
	FB		426 (878)	746 (1310)					396 (996)	28 (75)	0 (8)
	SF		---	5536 (6248)					6266 (8790)	2207 (4057)	390 (1128)
	MO		2235 (2946)	15947 (20473)					81 (320)	0 (0)	

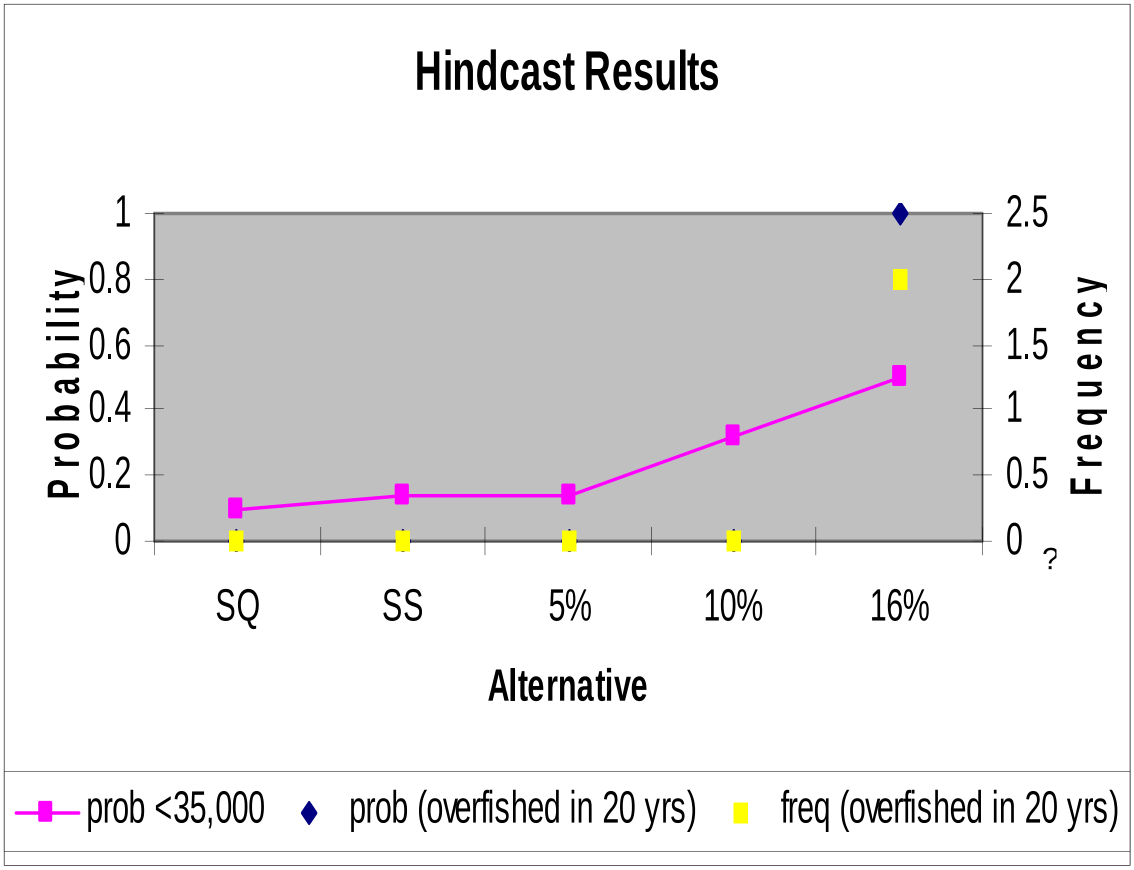
X = fisheries authorized for 2006 (as of 2 Mar 2006)

impact
no impact
potential impact (open historical fisheries w / no impact but minimal effort)
no information

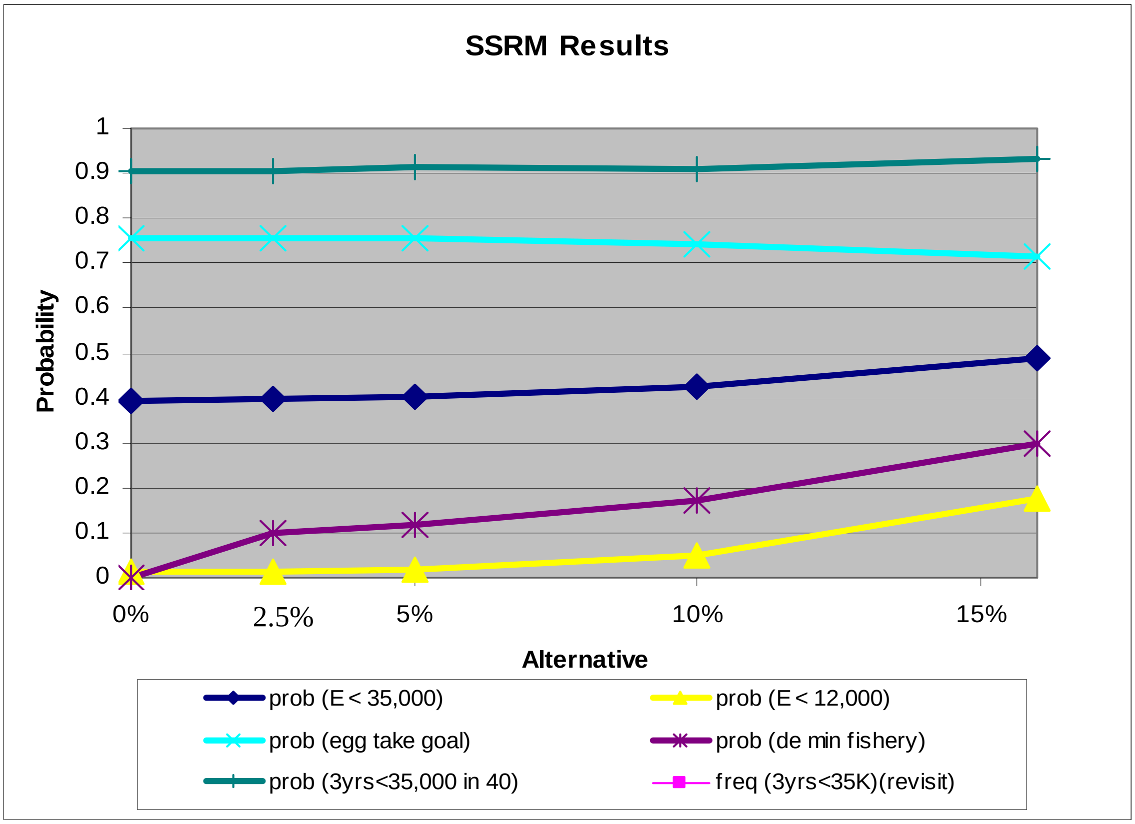
Note: lower table is total Chinook salmon catch (and effort) averages for 2001-2005.

Biological Analyses: Two approaches used for evaluating the biological impact of the alternatives were: 1) Hindcast analysis, based on 1985-2006 pre-season ocean stock size estimates, and 2) development and application of a stock-recruitment forecast model (SSRM) which projected impacts based on a 40-year time frame. The technical details for these and associated methodologies were included with the Council's briefing papers and are expected to be reported on by Council advisory groups at this meeting.

Two slides presented below show preliminary results of the biological analyses.



Comments: 10% was added by the SAC for greater resolution. Prob (probability) <35K is based on proportion of 22 years <35K. Data were not adequate to address overfishing under any of the alternatives except 16% which had two overfishing events in the 20-yr time series that overfishing could have occurred.



Comments: All options have 16% CCC harvest rate limitation

Key Factors:	SQ	2.5%	5%	10%	16%
prob (E < 35,000)	.392 .	396	.402	.427	.488
prob (E < 12,000)	.012	.015	.019	.051	.177
prob (egg take goal)	.757	.756	.755	.743	.714
prob (de min fishery)	.000	.101	.116	.173	.300
prob (3yrs<35,000 in 40)	.905	.905	.915	.910	.930
freq (3yrs<35,000 in 40)	values need to be confirmed				

Economic Analysis: The economic analyses were developed for 1) a Conservation Alert Year (CAY, <35K adult natural spawners) and 2) a 40-year time frame. Various methods and tools were used to perform these analyses. The new information presented at this meeting by Ms. Cindy Thomson is proposed to be added to the economic section (see Agenda Item H.2.a., Supplemental Attachment 2).

The economic analyses for ocean salmon fisheries were based in part on ocean salmon fishery regulatory scenarios that were developed for each of several ocean fishery regulatory alternatives (*de minimis* and CCC standard). The 2006 Klamath Ocean Harvest Model (KOHM) was used to construct the individual scenarios, and to produce estimates of recreational and troll fishing effort by time, port area, and state. The recreational fisheries had full seasons in all of these analyses except under status quo (generally closed) and in the Klamath management zone (KMZ) (17 % allocation of ocean share). Historic troll fishery catch-per-unit of effort data were used to develop a range of troll fishery catch estimates by time, port area and state. The following table displays the fishing seasons that have been developed for each alternative with comparative regulations for recent years. **(insert regulation table here).**

2.5% OIR	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
NO							10					
CO												
KO												
KC												
FB												
SF												17
MO												17

5% OIR	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
NO							15	30				
CO												
KO												
KC												
FB												
SF												31
MO									7			31

10% OIR	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
NO							98					
CO								30				
KO												
KC												
FB												
SF												31
MO									38			31

16% OIR	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
NO							31	30	31	30	31	
CO							31	30				
KO												
KC												
FB												
SF												31
MO									53			31

NO (Northern Oregon)=Cape Falcon, Oregon to Florence south jetty.
CO (Coos Bay)= Florence south jetty to Humbug Mt.
KO (Oregon KMZ-Brookings)= Humbug Mt. to Oregon-California border
KC (California KMZ-Eureka/Crescent City)=Oregon-California border to Horse Mt.
FB (Fort Bragg)=Horse Mt to Pt. Arena
SF (San Francisco)= Pt. Arena to Pigeon Pt.
MO (Monterey)=Pigeon Pt. to Pt. Sur.

17% OIR	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
NO							31	30	31		63	
CO							31	30	31			
KO												
KC												
FB												
SF												31
MO									58			31

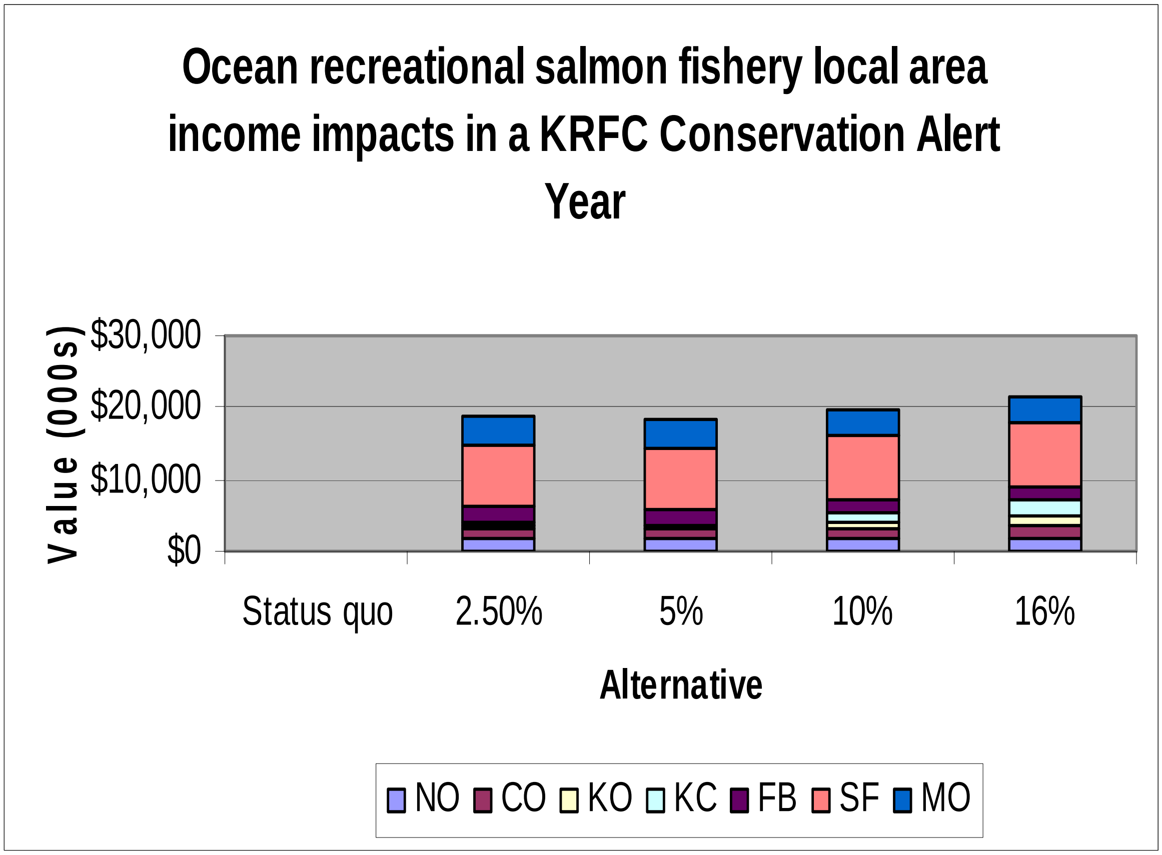
2004-05	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
NO	30	31					11	16	12	30		
CO	30	31					11	16	30			
KO	22						11	16				
KC	17											
FB	30											
SF	30	11									28	29
MO	30								31		28	29

2005-06	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
NO	14									16	9	3
CO	23	31										
KO	26											
KC	14											
FB	30											
SF	30	10									6	31
MO	30								31		6	31

~12%

NO (Northern Oregon)=Cape Falcon, Oregon to Florence south jetty.
CO (Coos Bay)= Florence south jetty to Humbug Mt.
KO (Oregon KMZ-Brookings)= Humbug Mt. to Oregon-California border
KC (California KMZ-Eureka/Crescent City)=Oregon-California border to Horse Mt.
FB (Fort Bragg)=Horse Mt to Pt. Arena
SF (San Francisco)= Pt. Arena to Pigeon Pt.
MO (Monterey)=Pigeon Pt. to Pt. Sur.

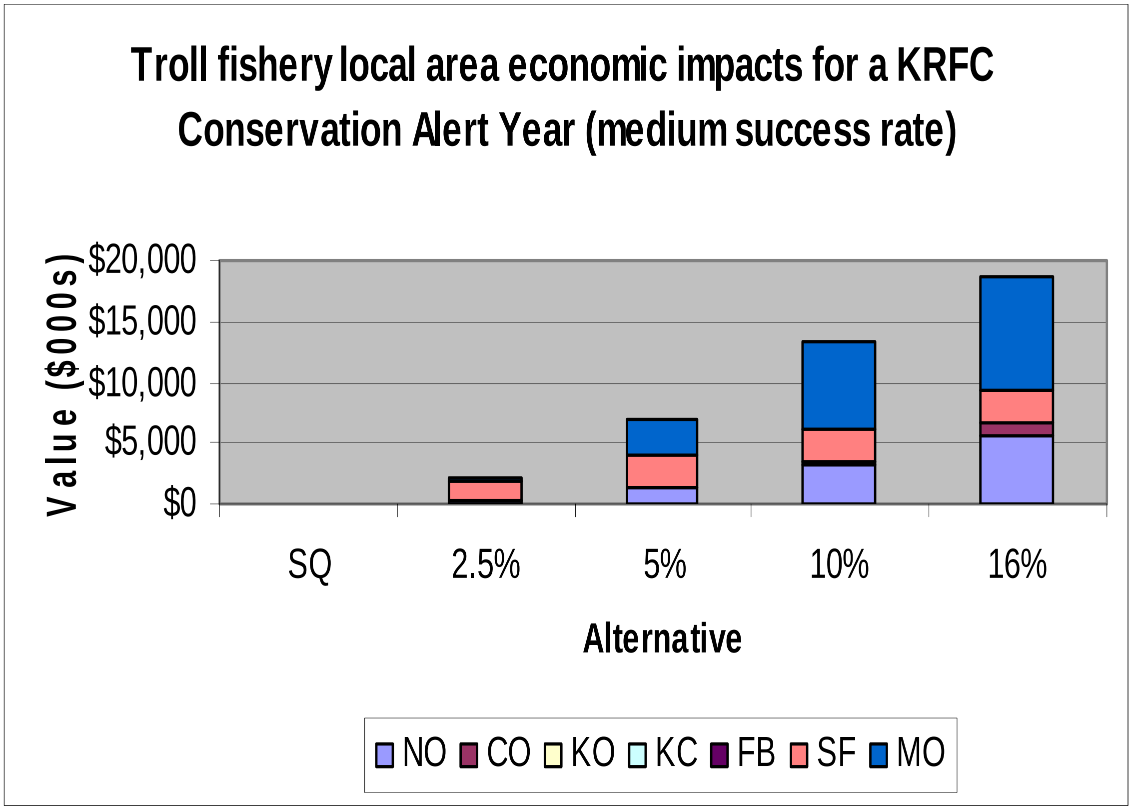
The following three charts show preliminary results for three economic analyses.



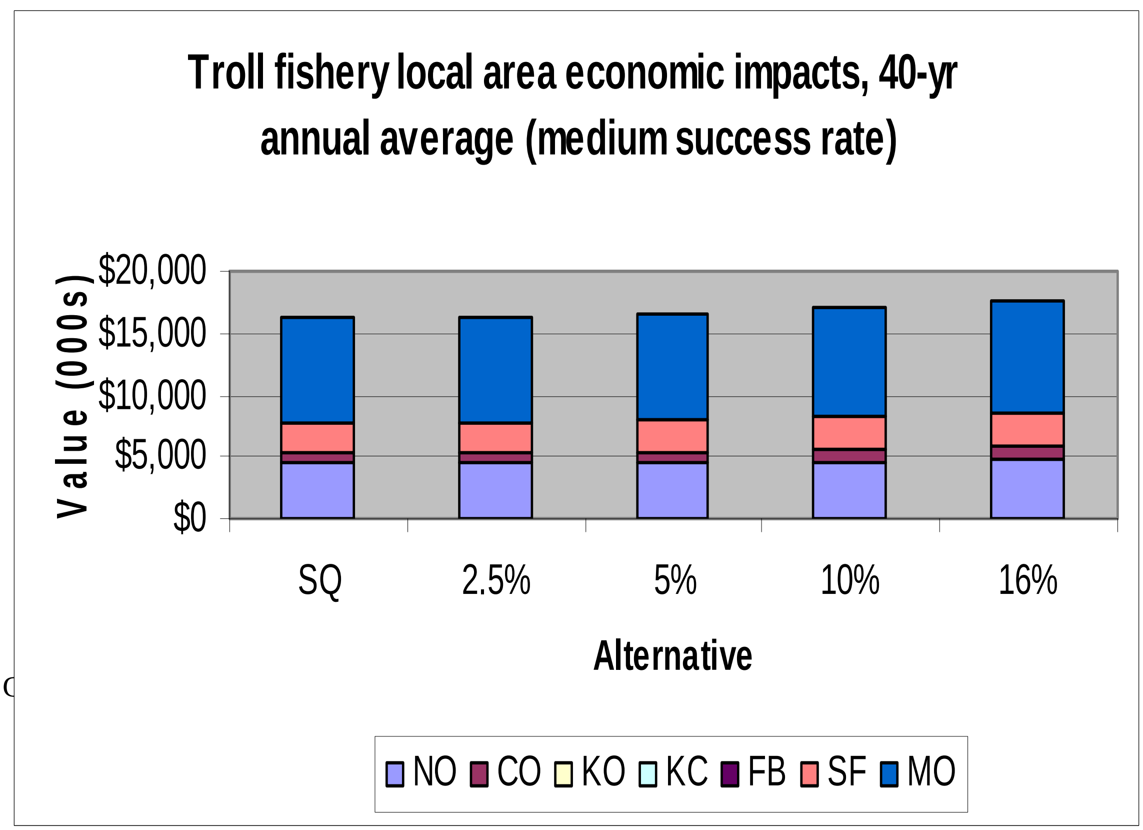
Comments: Values are in $000s.

The 2.5% alternative was added to represent an approximate mid-point for the sliding scale alternative while the 5% alternative is slightly above the upper end of the sliding scale alternative. The dip between 2.5 and 5.0 is because there would be no fishing in the KMZ (KO and KC) under 2.5% so we removed the fall fisheries in the KMZ under this option.

Note: a 10% alternative was analyzed to provide greater resolution to impacts between the 5% and 16% alternatives. These differences will be more apparent in some of the following slides. Values: <$100, $18,792, $18,331, $19,898, and $21,658. All of the differences are in the KMZ cells because all other sport fisheries had full seasons under all alternatives except under status quo.



Comments: This is for a medium troll fishing success rate scenario. Most of the benefits are in MO, SF, and NO areas. This is due to the regulation structure. Values: $0, $2,181, $5,922, $13,897, and $19,739.



C

Most of the benefits are in MO, SF, and NO. This is due to the regulation structure. The reason for the similarity in impacts is because de minimis fishing years are masked by large catches in high abundance years. Values: $16,992, $17,077, $17,246, $17,817, and $18,400.

To Do List:

1. Incorporate sub-stock analysis in the report.
2. Confirm KOHM regulation scenarios and effort level outputs.
3. Complete tribal/river sport economic analyses (tribes and California Department of Fish and Game are working on SAC request).
4. Modify/check SSRM (check overfishing "counter," make river allocations on pre-season basis, confirm ocean to river roll-over toggle is working correctly, calculate sub-stock spawning escapement probabilities, create frequency tables for river catches, produce outputs for *de minimis* fishing years only, other actions as recommended by Scientific and Statistical Committee, STT, and Council).
5. Modify/expand Amendment 15 alternatives and analyses as directed by Council.

Recommendations:

1. Add 10% age-4 ocean impact rate cap to alternatives.
2. Remove the second clause from Alternative 5: "<u>, and 2) prohibit *de minimis* fishing thereafter until the escapement floor was met for three consecutive years</u>."
3. Add "significant" to Alternative 6 re: fall/winter fisheries in *de minimis* years and associated data analysis, Council action, and future data management and input needs.
4. Limit public hearings to Oregon and California.
5. Consider delaying decision meeting until March 2007.

Schedule and Proposed Changes:

Week of September 11	SAC meets in conjunction with Council in Foster City, CA. Council reviews Preliminary Draft Amendment 15 and adopts preliminary preferred alternative for Public Review at meeting. (If schedule cannot be met, a new schedule is identified at this point). <u>The SAC does not recommend selection of a preferred alternative until the sub-stock analysis can be completed. However, a range of alternatives might be considered based on the available information.</u>
Week of September 18	DS meets in Portland to review Council action and assign work tasks to complete Draft Amendment 15 for hearings and presentation at November 2006 Council meeting.
Week of October 16	Hearings on Amendment 15 in Santa Rosa, Coos Bay, and Westport <u>This will be very difficult to do; the SAC suggests having hearings after the briefing book deadline of October 25, 2006.</u>
October 25	Draft Amendment due for inclusion in November 2006 Council meeting briefing book. **<u>It is problematic that all of the analyses can be completed and the document updated by this date. The To Do List is just too long and labor intensive to ensure meeting an October 25 mailing date.</u>**
Week of November 13	Council reviews Draft Amendment 15 at meeting in Del Mar, California and adopts preferred alternative for implementation by NMFS. <u>See previous comments. A March 2007 decision date would better ensure a defensible document.</u>

December ?	DS completes Amendment 15 and EA and submits to NMFS. A March decision date would delay the document submittal date to May 2007.
Not later than May 1, 2007	Amendment 15 implemented by Final Rule. A March decision date would require an emergency rule in 2007 if the KRFC natural spawning escapement absent fishing is projected to be <35,000 adult fish. However, a decision framework would have been established in the draft document that the Council and NMFS could use in developing fishing regulations effective May 1, 2007.

PFMC
09/15/06