AGENDA D-2d
MARCH 2007

MEMORANDUM

TO: Council, SSC and AP Members

FROM: Chris Oliver
Executive Director

ESTIMATED TIME
2 HOURS (all D items)

DATE: March 20, 2007

SUBJECT: BSAI Salmon Bycatch

ACTION REQUIRED

Receive report on the SSC Salmon Bycatch Workshop and take action as necessary.

BACKGROUND

A SSC workshop on salmon bycatch will be held on Tuesday, March 27. This workshop will review the existing research on stock origins of incidentally-caught salmon species in the BSAI, assessment information for Pacific Salmon stocks and other research relevant to the Council's continued activities with salmon bycatch reduction measures. An agenda for this workshop is attached as **Item D-2(d)(1)**. Abstracts of the presentations are provided as **Item D-2(d)(2)**. A moderated discussion will follow the formal presentations. The goal of the moderated discussion will be to review the materials presented in the context of the information needs to refine the alternatives for Amendment 84B. The topics for workshop discussion are included as **Item D-2(d)(3)**. At the Council meeting, staff will provide the Council with an overview of the discussion and findings (as applicable) of this workshop as it relates to the Council's activities and progress towards refining alternatives in amendment 84B.

The current suite of alternatives including additions made at the February 2007 Council meeting are attached as **Item D-2(d)(4)**. The Council in February moved to appoint a workgroup to work with staff in examining the appropriate methodology for establishing trigger caps and hard caps for the analysis. The workgroup has been appointed and an update on the membership of the committee as well as their proposed meeting schedule will be provided by staff at this meeting.

NPFMC Science and Statistical Committee Workshop on Salmon Bycatch Research

March 27th, 2007, 1:00pm-5:00pm
Hilton Hotel, Anchorage

Objectives

To review existing research on stock-origins of incidentally caught salmon species in the BSAI trawl fisheries, assessment information for Pacific Rim stocks and other research relevant to the Council's continued activities with salmon bycatch reduction measures.

Agenda

1:00-1:15 **D. Stram**. Overview of Council actions on salmon bycatch measures and objectives for salmon workshop discussion

1:15-1:35 **J. Ianelli**. Salmon Bycatch Patterns in the Bering Sea Pollock Fishery

1:35-1:55 **K. Haflinger and J. Gruver.** Results from the pollock Intercoop rolling hot spot closures over the 2007A season and salmon excluder project

1:55-2:15 **A. Haynie**. Evaluating the Cost and Effectiveness of Fixed and Rolling Bycatch Closures in the Bering Sea: Methods and Preliminary Results

2:15-2:35 **J. Murphy**. Immature chum salmon ecology and bycatch in the Bering Sea Pollock fishery.

2:35-2:55 **C. Kondzela** Genetic methods for determining origins of chum salmon in trawl bycatches

2:55-3:15 **G. Sandone**. Status and Trends of Salmon in the AYK Region

3:15-3:35 **J Seeb .** Forecast of AYK Chinook salmon production

3:35-5:00 **Public Comment/ Moderated Discussion on Workshop Objectives**

Note: talks are approximately 15 minutes in length with additional 5 minutes allotted for questions. Further discussion time will be available following the conclusion of the presentations. An afternoon break will be scheduled within the agenda at the discretion of the SSC chair.

Salmon bycatch patterns in the Eastern Bering Sea pollock trawl fisheries

James Ianelli and Diana Stram

Measures to reduce salmon bycatch have been developed for the North Pacific Fishery Management Council and incorporated in a number of amendments to the groundfish Fishery Management Plan (FMP). These measures result in specific closed (no-fishing) areas when established bycatch limits are reached. The closure areas were designed based on analyses of groundfish observer data collected from 1990-1995. Recently, Chinook and chum salmon bycatch have consistently exceeded the limits which closed large areas and altered the spatial pattern of the pollock fleet. For this analysis, NMFS observer data were compiled to compare numbers of salmon (categorized as either Chinook or non-Chinook salmon) with pollock catch to evaluate trends in the trawl fisheries. Salmon-specific length frequency data were also compiled. Temporal and spatial patterns in the bycatch data illustrate sources of variability in salmon bycatch. Day-night difference in pollock behavior and catchability are apparent with pollock and salmon have somewhat higher catch rates during mid-day, but salmon rates drop (relatively speaking) more during night. Salmon sex ratio by size and over time are evaluated and indicate opposite patterns. Length frequency data indicate some variability that might be attributed to changes in stock-of-origin. Some alternatives management measures are suggested and analyses proposed.

Results from the pollock Intercoop rolling hot spot closures over the 2007A season and salmon excluder project

Karl Haflinger and John Gruver

The Bering Sea pollock fishery, operating under an Exempted Fishing Permit, was exempt from regulatory Chinook Salmon Savings Area (CHSSA) closures, and instead worked to control salmon bycatch through a system of rolling hot spot closures. The first closure went into effect on January 31, and between January 31 and February 18, six salmon savings closures were enacted in response to high bycatch rates experienced by the fleet. Preliminary analysis of those closures indicates that a 75% reduction in bycatch was seen for observed vessels that could be tracked fishing inside and later outside the closures. After the base rate adjustment on February 15, few coops were outside of Tier 1, but the fleet continued to observe advisory closures that were largely based on information received from the F/V Pacific Prince, which was testing salmon excluders on a separate EFP. The Pacific Prince was seeking areas with high salmon bycatch and thus provided valuable information on bycatch rates from grounds that had been vacated on suspicion of high bycatch rates. A progress report on the on-going salmon excluder project will also be presented.

Evaluating the Cost and Effectiveness of Fixed and Rolling Bycatch Closures in the Bering Sea: Methods and Preliminary Results

Alan Haynie

NOAA Fisheries/NMFS,
Alaska Fisheries Science Center – F/AKC2

Spatial management efforts to address salmon bycatch in the Bering Sea pollock fishery have consisted of both large long-term Salmon Savings Area closures and short-term voluntary rolling hotspot (VRHS) closures. In this presentation, we consider the costs and benefits of various spatial closures designed to reduce salmon bycatch in the Bering Sea pollock fishery. Specifically, we discuss research on the estimation of the costs of both fixed and VRHS closures and the estimation of the change in bycatch that has resulted from VRHS closures from 2002-2006. We discuss a variety of economic issues involved in the potential creation of alternative fixed areas. We also present summary information on the number of vessels affected by VRHS closures and briefly discuss the estimation of economic benefits to different communities that depend on salmon.

Immature chum salmon ecology and bycatch in the Bering Sea Pollock fishery.

J. Murphy, E. Farley, J. Seeb, C. Kondzela, R. Wilmot

Immature chum salmon are captured in the Bering Sea Pollock fishery as they move onto the eastern Bering Sea shelf during the summer and fall. Size-structured distribution patterns of chum salmon from the BASIS (Bering-Aleutian Salmon International Survey) survey indicate that the movement of chum salmon onto the shelf is size-selective (with the largest/oldest chum salmon leading the on-shelf movement) and occurs in both the northern and southern regions of the eastern Bering Sea shelf. Chum salmon diets varied spatially with jellyfish as the primary diet item of chum salmon in the northern shelf region, age-0 pollock in the southern shelf region, and euphasiids in the Bering Sea basin. Age-0 pollock are consistently the most important diet item of chum salmon in the southern shelf region, emphasizing the potential for age-0 pollock to influence the distribution of chum salmon and bycatch patterns in the fishery. The location of peak densities of age-0 pollock during the BASIS survey was similar to the location of highest chum salmon bycatch in 2005; however limited spatial coherence was present in 2004 and 2006. Reduced coherence may reflect the importance of migratory behavior as a controlling factor in the distribution of chum salmon or the inability of the BASIS survey to adequately describe age-0 pollock distribution in the fishery.

Genetic methods for determining origins of chum salmon in trawl bycatches

A.J. Gharrett[1], S.A. Fuller[1], M. Garvin[1], R. Riley[1], S. Hall[1], C. Kondzela[2], and R. Wilmot[2]

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Juneau, AK 99801

Chum salmon (*Oncorhynchus keta*) bycatch in the Gulf of Alaska and Bering Sea continues to create problems for the groundfish fisheries, particularly the Bering Sea trawl fisheries. Chum salmon are critical to the livelihood and culture of rural Alaskans and the focus of a number of other issues including allocation among Alaskan users and between the U.S. and Canada. Between 1997 and 2002 unexpected and dramatic declines in returns to watersheds of western Alaskan salmon runs prompted 15 disaster declarations by the Governor of Alaska and federal agencies (AYK Scientific Technical committee 2005). Although those runs appear to be rebounding, incidental catches in the pelagic trawl fisheries have been increasing dramatically.

Central to bycatch questions is the origin/destination of intercepted fish. Use of natural genetic markers is the best method for stock identification of wild fish in the marine environment; and substantial effort has been (and continues to be) devoted to genetic studies of North Pacific salmon stocks. An extensive allozyme baseline was developed in the last two decades to address those questions, but the logistics of sampling and increasing costs of storing and processing the samples have obviated their use. Most labs have terminated allozyme operations. Moreover, allozymes do not appear to provide the fine-scale resolution needed to address some important questions involving origins of western Alaskan chum salmon stocks.

Two promising approaches include analysis of microsatellite variation and the recent development of tools to resolve single nucleotide polymorphisms (SNPs) from both nuclear and mitochondrial DNA. Both approaches have challenges and all genetic methods require that substantial baseline data, which includes most of the geographic range of a species, have been assembled before these tools can be confidently applied.

Our University of Alaska Fairbanks and Alaska Fisheries Science Center genetics laboratories have been examining both the microsatellite and SNP approaches by using DNA samples from populations that represent most of the geographic range of chum salmon (Bering Sea Fisherman's Association and UAF Pollock Cooperative Conservation Research Center). We are surveying microsatellite variation using loci that are being applied by other labs acquiring microsatellite data from chum salmon. Comparisons for data from samples analyzed by two labs indicate that the data are highly concordant. We are developing SNP markers that by their nature should produce data that is concordant from lab to lab. In the last year, an additional 10 nuclear SNPs were developed using a new and inexpensive method to identify and survey SNPs (in press), and we are continuing to develop a technique to resolve multiple variants that occur in a short region of DNA. Data for both marker types is available for twice as many populations as reported last year. We are still in the process of developing and evaluating these microsatellite and SNP tools. Our laboratories are embarking on a recently funded, joint stock identification study of current and past chum salmon bycatch samples and further development of the chum baseline (AYKSSI). We anticipate cooperating with the Alaska Department of Fish and Game to incorporate the informative chum salmon SNPs that have been developed at the Gene Conservation Laboratory.

Status and Trends of Salmon in the AYK Region

Gene Sandone
ADF&G

Generally, salmon runs throughout the AYK Region were much better than anticipated in 2001 and continued to improve through the present. During the most recent BOF work session meeting in January 2007, because of increased production from most salmon stocks in AYK, the Board made additional adjustments to the AYK stock of concern list. No "Management" concerns were identified. One previously identified "Management" concern is now classified as a "Yield" concern; the classification for the other stock was discontinued. Of the seven "Yield" concerns identified in 2004, only 3 continued the "Yield" classification. Currently, there are 4 salmon stocks in the AYK Region and all are further classified as "Yield Concerns". Those four stocks are Norton Sound Subdistrict 1 (Nome) chum salmon and Norton Sound Subdistrict 2 and 3 (Golovin and Moses Point) chum salmon, Norton Sound Subdistrict 5 and 6 (Shaktoolik and Unalakleet) Chinook salmon, and Yukon River Chinook Salmon

Harvest rate of the BSAI bycatch of Western Alaska Chinook salmon appears to be increasing over time. Additionally, possible revenue lost to commercial fishers in the Yukon River District 1 Chinook salmon fishery was explored.

Forecast of AYK Chinook salmon production

James E. Seeb , Lisa W. Seeb , Doug Eggers , William D. Templin ,
Kate W. Meyers Nancy Davis, Ed Farley and Richard Wilmot

Unanticipated declines of major stocks of Chinook salmon in Western Alaska prompt interest in the marine migratory patterns and survival. Variable survival in the context of the changing marine environment confounds our ability to forecast run strength and manage these stocks. Additionally, record numbers of Chinook salmon were harvested in the Bering Sea pollock fishery in 2005. What impact might this bycatch have on returns to AYK drainages? We propose a run reconstruction model that may offer critical insight into marine survival of AYK stocks of Chinook salmon, ultimately providing a forecast tool for improved management. First, Auke Bay Laboratory marine surveys will provide Chinook salmon age 1.0 in the eastern Bering Sea collected during the summers of 2002-2006; we will use stock composition analysis and abundance estimates to approximate relative year class strength of contributing stocks. We will then perform stock composition and abundance estimates of subadults (by age class) in the Bering Sea trawl bycatch. The reconstruction model will use a cohort analysis to test the utility of the juvenile data and bycatch data to forecast run strength of AYK stocks.

At this work session we will present stock of origin from approximately 1000 Chinook salmon each from the 2005 and 2006 fishing seasons.

Salmon bycatch workshop discussion topics

1. Methods for determining annual upper limits of bycatch allowances

   Outline the steps required to develop rational bycatch guidelines. Predetermined levels could be based on measures of abundance; e.g., moving average CPUE (trawl-fleet based), run size estimates, direct surveys (e.g., BASIS). Are meaningful abundance-based caps feasible under the current data collection schemes? What additional information is required? What factors most affect variability in stock composition of the bycatch? How can stock-of-origin (stock structure) information be used for developing robust policies?

2. Developing limits that trigger inseason management closures

   Similar to the above, but implemented at more local spatial/temporal scales. Can alternative strategies be tested given known patterns of distribution? For example, can rules be developed which account for errors in closure implementation and between-year spatial variability that still provide robust protection of salmon runs?

3. Alternatives to area closures

   Are there combinations of management measures that can minimize the impact of salmon bycatch in trawl fisheries. E.g., by selecting periods of the day where fishing is restricted in certain areas? Are there additional incentives that can modify current fishing practices (e.g., use of salmon excluders in trawl nets) that will minimize bycatch impacts?

4. Methodology for evaluating current VRHS closures

   How does the status quo (including VRHS closure system as well as historical regulatory closures) compare with proposed bycatch measures? What problems are there with making these comparisons?

Problem Statement and Suite of Alternatives for Amendment Package 84B (**bold** are additions from February 2007 Council meeting)

Problem Statement:

The Council and NMFS have initiated action to exempt AFA qualified and CDQ vessels participating in the intercooperative voluntary rolling hotspot system (VRHS) from regulatory Bering Sea salmon bycatch savings areas. Analysis and refinement of the current salmon savings areas may be necessary in the event pollock vessels either surrender or lose their exemption and return to fishing under the regulatory salmon bycatch program.

Further, alternatives to the VRHS system and/or the regulatory salmon bycatch program should be developed to assess whether they would be more effective in reducing salmon bycatch. The following amendment packages are not intended to preclude the intercooperative annual review as required under Amendment 84.

Amendment Package B-1

Establish new regulatory salmon savings systems taking into account the most recent available salmon bycatch data. In developing alternatives include an analysis of the need and implementation strategy for appropriate caps as bycatch control measures. This package should be completed first and implemented when ready so that salmon savings regulations are based on the best available information.

> Option: Adjust the Chinook and non-Chinook regulatory closure areas periodically based on the most current bycatch data available, such as the 2-3 year rolling average of bycatch rates by species and area.

Process for determining caps:

A Council appointed workgroup (with analysts' assistance) will evaluate approaches for establishing caps and make recommendations to the Council accordingly.

Types of caps under consideration (by species):

- **Trigger caps (closes discrete areas to in-season fishing)**
- **Fixed cap (closes all areas to the pollock fishery)**

Methodologies to consider in evaluating appropriate caps:

1. **Abundance-based caps (this would be a framework only since required information is currently unavailable)**
2. **Fixed caps: updated fixed values caps**
3. **Combination (e.g., a stair-step of catch limits based on some measure of abundance)**

Candidate closure areas:

Council to review suggested closures for inclusion in analysis (analysts to provide candidate closures for Council review)

Time/area closures:

1. **Evaluate discrete areas with individual trigger limits by area**
   - **Option to close during discrete temporal periods only**
2. **Evaluate discrete areas with aggregate trigger limits to close all areas**
   - **Option to close during discrete temporal periods only**
3. **Fixed temporal closure (closes during a discrete time period(s) annually and is not dependant upon a trigger to close)**

AGENDA D-2(d)
Supplemental
APRIL 2007

YUKON RIVER DRAINAGE FISHERIES ASSOCIATION

March 20, 2007

RECEIVED
MAR 2007
N.P.F.M.C.

North Pacific Fishery Management Council
605 West 4th Avenue, Suite 306
Anchorage, AK 99501-2252

Re: Salmon Bycatch, Agenda Item D-2(d)

Dear Chairwoman Madsen and Council Members:

The Yukon River Drainage Fisheries Association (YRDFA) appreciates the opportunity to comment again on the issue of salmon bycatch. Salmon bycatch numbers are at record highs again this year, with 64,850 Chinook salmon caught as bycatch as of March 10, 2007.[1] Our concern continues to grow with these increasingly high numbers. To this end the YRDFA Board of Directors passed a resolution regarding salmon bycatch at YRDFA's recent Annual Meeting in Pilot Station. This resolution (attached) specifically asks the Council to **adopt management measures which will effectively reduce the number of salmon caught as bycatch, including explicit limits on the total number of salmon that may be caught as bycatch.**

We are happy to see that the Council is holding another Salmon Bycatch workshop in the SSC at this meeting and look forward to the results of that workshop. We also commend the Council's action at the February meeting forming a workgroup to formulate methodologies for setting a salmon bycatch cap. We hope this workgroup will fairly represent stakeholders from Western Alaska and the pollock fishery and can move quickly towards establishing a salmon bycatch cap.

As Chinook salmon returns to Western Alaska remain average with several stocks including Yukon River and Norton Sound Chinook salmon listed as Stocks of Concern, it is essential that salmon bycatch in the pollock fleet is reduced, not increased as in recent years. To this end we urge the Council to continue to move forward quickly in adopting a salmon bycatch cap which will effectively reduce the *number* of salmon caught as bycatch.

Sincerely,

Rebecca Robbins Gisclair

[1] NMFS (National Marine Fisheries Service). 2006. Prohibited Species Catch (PSC) Reports. Available online: http://www.fakr.noaa.gov/.

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Resolution: 2007-01

Salmon Bycatch

WHEREAS YRDFA represents subsistence, commercial and sport fishers from over 40 communities within the U.S. portion of the Yukon River drainage who depend on wild salmon for subsistence and income; and

WHEREAS YRDFA has been working on reducing salmon bycatch in the Bering Sea/Aleutian Islands Pollock fishery since 1994; and

WHEREAS the Bering Sea Aleutian Islands Pollock fishery continues to catch increasingly high numbers of Chinook and chum salmon as bycatch; and

WHEREAS the pollock fleet caught over 84,000 Chinook salmon and 325,000 chum salmon in 2006; and

WHEREAS approximately 16,000 of those Chinook salmon were likely of Yukon River origin, which represents 35% of the 2006 commercial catch, 32% of the 2006 subsistence catch, and 57% of the Canadian border passage goal; and

WHEREAS the current Voluntary Rolling Hot Spot system operating under an Experimental Fishing Permit has not been shown to effectively reduce bycatch;

BE IT RESOLVED that YRDFA supports the continued monitoring of salmon bycatch; increased understanding of stock composition, salmon distribution and the relationship between salmon abundance and salmon bycatch; and management measures at the North Pacific Fishery Management Council that will effectively reduce the number of salmon caught as bycatch, including explicit limits on the total number of salmon that may be caught as bycatch.

COPIES of this resolution will be sent to the North Pacific Fishery Management Council, BSFA, AVCP, TCC and other Western Alaska salmon groups.

APPROVED unanimously this 28th day of February 2007 by the Board members and Delegates of YRDFA assembled at their Seventeenth Annual Meeting held in Pilot Station, Alaska.

Attest:

William Alstrom, YRDFA Co-Chair