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]

[1]Juneau Center, School of Fisheries and Ocean Sciences
University of Alaska Fairbanks
Juneau, AK 99801

[2]NOAA, National Marine Fisheries Service
Alaska Fisheries Science Center, Auke Bay Laboratory
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.