Table 1. BSAI Groundfish Plan Team Recommendations for Final OFLs and ABCs (mt) for 2012 and 2013.

		2011			11/5/2011	2012		2013	
Species	Area	OFL	ABC	TAC	Catch	OFL	ABC	OFL	ABC
Pollock	EBS	2,450,000	1,270,000	1,252,000	1,197,578	2,474,000	1,220,000	2,840,000	1,360,000
	AI	44,500	36,700	19,000	1,162	39,600	32,500	42,900	35,200
	Bogoslof	22,000	156	150	140	22,000	16,500	22,000	16,500
Pacific cod	BSAI	272,000	235,000	227,950	202,785	369,000	314,000	374,000	319,000
Sablefish	BS	3,360	2,850	2,850	668	2,640	2,230	2,610	2,200
	AI	2,250	1,900	1,900	950	2,430	2,050	2,400	2,020
	Total	5,610	4,750	4,750	1,618	5,070	4,280	5,010	4,220
Atka mackerel	EAI/BS	n/a	40,300	40,300	40,833	n/a	38,500	n/a	31,700
	CAI	n/a	24,000	11,280	10,714	n/a	22,900	n/a	18,900
	WAI	n/a	21,000	1,500	205	n/a	20,000	n/a	16,500
	Total	101,000	85,300	53,080	51,752	96,500	81,400	78,300	67,100
Yellowfin sole	BSAI	262,000	239,000	196,000	141,399	222,000	203,000	226,000	207,000
Rock sole	BSAI	248,000	224,000	85,000	60,292	231,000	208,000	217,000	196,000
Greenland turbot	EBS	n/a	4,590	3,500	2,979	n/a	7,230	n/a	6,010
	AI	n/a	1,550	1,550	514	n/a	2,430	n/a	2,020
	Total	7,220	6,140	5,050	3,493	11,700	9,660	9,700	8,030
Arrowtooth flounder	BSAI	186,000	153,000	25,900	19,600	181,000	150,000	186,000	152,000
Kamchatka flounder	BSAI	23,600	17,700	17,700	9,242	24,800	18,600	24,800	18,600
Flathead sole	BSAI	83,300	69,300	41,548	13,080	84,500	70,400	83,100	69,200
Other flatfish	BSAI	19,500	14,500	3,000	3,116	17,100	12,700	17,100	12,700
Alaska plaice	BSAI	79,100	65,100	16,000	22,471	64,600	53,400	65,000	54,000
Pacific Ocean perch	EBS	n/a	5,710	5,710	2,053	n/a	5,710	n/a	6,540
	EAI	n/a	5,660	5,660	5,094	n/a	5,620	n/a	6,440
	CAI	n/a	4,960	4,960	4,768	n/a	4,990	n/a	5,710
	WAI	n/a	8,370	8,370	8,181	n/a	8,380	n/a	9,610
	Total	36,300	24,700	24,700	20,096	35,000	24,700	33,700	28,300
Northern rockfish	BSAI	10,600	8,670	4,000	2,644	10,500	8,610	10,400	8,490
Shortraker rockfish	BSAI	524	393	393	275	524	393	524	393
Blackspotted/Rougheye	EBS/EAI	n/a	234	234	75	n/a	231	n/a	241
Rockfishes	CAI/WAI	n/a	220	220	78	n/a	244	n/a	258
	Total	549	454	454	153	576	475	605	499
Other rockfish	EBS	n/a	710	500	274	n/a	710	n/a	710
	AI	n/a	570	500	610	n/a	570	n/a	570
	Total	1,700	1,280	1,000	884	1,700	1,280	1,700	1,280
Squids	BSAI	2,620	1,970	425	325	2,620	1,970	2,620	1,970
Skates	BSAI	37,800	31,500	16,500	21,034	39,100	32,600	38,300	32,000
Sharks	BSAI	1,360	1,020	50	162	1,360	1,020	1,360	1,020
Octopuses	BSAI	528	396	150	563	3,450	2,590	3,450	2,590
Sculpins	BSAI	58,300	43,700	5,200	5,095	58,300	43,700	58,300	43,700
Total	**BSAI**	**3,954,111**	**2,534,729**	**2,000,000**	**1,778,959**	**3,996,000**	**2,511,778**	**4,341,869**	**2,639,792**

Final 2011 OFLs, ABCs, and TACs from 2011-2012 final harvest specifications

The "other species" category was removed in 2011 and replaced with separate categories for skates, sharks, octopuses, and sculpins

North Pacific Council Proposed Harvest Specifications (metric tons) for 2012-2013

October 2011 recommendations

		2011 final			8/20//2011	2012 proposed			2013 proposed		
Species	Area	OFL	ABC	TAC	Catch	OFL	ABC	TAC	OFL	ABC	TAC
Pollock	EBS	2,450,000	1,270,000	1,252,000	936,151	3,170,000	1,600,000	1,253,658	3,170,000	1,600,000	1,253,658
	AI	44,500	36,700	19,000	1,019	50,400	41,600	19,000	50,400	41,600	19,000
	Bogoslof	22,000	156	150	140	22,000	156	150	22,000	156	150
	Total	2,516,500	1,306,856	1,271,150	937,310	3,242,400	1,641,756	1,272,808	3,242,400	1,641,756	1,272,808
Pacific cod	BSAI	272,000	235,000	227,950	153,563	329,000	281,000	229,608	329,000	281,000	229,608
Sablefish	BS	3,360	2,850	2,850	434	3,080	2,610	2,610	3,080	2,610	2,610
	AI	2,250	1,900	1,900	566	2,060	1,740	1,740	2,060	1,740	1,740
	Total	5,610	4,750	4,750	1,000	5,140	4,350	4,350	5,140	4,350	4,350
Atka mackerel	EAI/BS	n/a	40,300	40,300	23,199	n/a	36,800	36,800	n/a	36,800	36,800
	CAI	n/a	24,000	11,280	7,314	n/a	21,900	10,293	n/a	21,900	10,293
	WAI	n/a	21,000	1,500	205	n/a	19,200	1,500	n/a	19,200	1,500
	Total	101,000	85,300	53,080	30,718	92,200	77,900	48,593	92,200	77,900	48,593
Yellowfin sole	BSAI	262,000	239,000	196,000	98,656	266,000	242,000	197,660	266,000	242,000	197,660
Rock sole	BSAI	248,000	224,000	85,000	56,891	243,000	219,000	85,000	243,000	219,000	85,000
Greenland turbot	BS	n/a	4,590	3,500	1,974	n/a	4,300	3,500	n/a	4,300	3,500
	AI	n/a	1,550	1,550	464	n/a	1,450	1,450	n/a	1,450	1,450
	Total	7,220	6,140	5,050	2,438	6,760	5,750	4,950	6,760	5,750	4,950
Arrowtooth flounder	BSAI	186,000	153,000	25,900	13,471	191,000	157,000	25,900	191,000	157,000	25,900
Kamchatka flounder	BSAI	23,600	17,700	17,700	8,060	23,600	17,700	17,700	23,600	17,700	17,700
Flathead sole	BSAI	83,300	69,300	41,548	9,515	82,100	68,300	41,548	82,100	68,300	41,548
Other flatfish	BSAI	19,500	14,500	3,000	2,799	19,500	14,500	3,000	19,500	14,500	3,000
Alaska plaice	BSAI	79,100	65,100	16,000	17,293	83,800	69,100	16,000	83,800	69,100	16,000
Pacific Ocean perch	BS	n/a	5,710	5,710	856	n/a	5,710	5,710	n/a	5,710	5,710
	EAI	n/a	5,660	5,660	3,698	n/a	5,660	5,660	n/a	5,660	5,660
	CAI	n/a	4,960	4,960	3,938	n/a	4,960	4,960	n/a	4,960	4,960
	WAI	n/a	8,370	8,370	8,181	n/a	8,370	8,370	n/a	8,370	8,370
	Total	36,300	24,700	24,700	16,673	34,300	24,700	24,700	34,300	24,700	24,700
Northern rockfish	BSAI	10,600	8,670	4,000	2,164	10,400	8,330	4,000	10,400	8,330	4,000
Shortraker rockfish	BSAI	524	393	393	236	524	393	393	524	393	393
Blsptd/Rgheye rockfish	BSAI	549	454	454	131	563	465	465	563	465	465
Other rockfish	BS	n/a	710	500	220	n/a	710	500	n/a	710	500
	AI	n/a	570	500	402	n/a	570	500	n/a	570	500
	Total	1,700	1,280	1,000	622	1,700	1,280	1,000	1,700	1,280	1,000
Squid	BSAI	2,620	1,970	425	222	2,620	1,970	425	2,620	1,970	425
Skates	BSAI	37,800	31,500	16,500	15,883	37,200	31,000	16,500	37,200	31,000	16,500
Sharks	BSAI	1,360	1,020	50	107	1,360	1,020	50	1,360	1,020	50
Octopuses	BSAI	528	396	150	174	528	396	150	528	396	150
Skulpins	BSAI	58,300	43,700	5,200	4,028	58,300	43,700	5,200	58,300	43,700	5,200
Total	BSAI	3,954,111	2,534,729	2,000,000	1,371,954	4,731,995	2,911,610	2,000,000	4,731,995	2,911,610	2,000,000

Final 2011 OFLs, ABCs, and TACs from final 2011-2012 final harvest specifications rule

The "other species" category was disolved beginning in 2011 into skates, sharks, octopuses, and sculpins

2012 final amounts (recommended in Dec 2011) were used as a place holder for proposed 2012-2013 OFLs and ABCs

Minutes of the
Bering Sea Aleutian Islands Groundfish Plan Team
North Pacific Fishery Management Council
605 W 4th Avenue, Suite 306
Anchorage, AK 99501

November 14 - 18, 2011

Mike Sigler	AFSC (Co-chair)	Grant Thompson	AFSC REFM (Co-chair)
Jane DiCosimo	NPFMC (Coordinator)	Lowell Fritz	AFSC NMML
Kerim Aydin	AFSC REFM	Alan Haynie	AFSC REFM
David Carlile	ADF&G	Dana Hanselman	AFSC ABL
Brenda Norcross	UAF	Mary Furuness	NMFS AKRO
David Barnard	ADF&G	Nancy Friday	AFSC NMML
Leslie Slater	USFWS	Yuk. W. Cheng	WDFW
Bill Clark	IPHC		

The BSAI Groundfish Plan Team first convened on Monday, November 14, 2011, at 3:25 pm.

Octopuses Liz Conners presented the octopus assessment. The 2011 catch was the highest recorded and exceeded 2011 catch limits. The Plan Team supported the author's predation-based estimate of octopus mortality from 1984-2008 survey data of Pacific cod diets as an alternate Tier 6 estimate, which results in a 2012 OFL and ABC higher than in 2011. This new approach was first applied in the Bering Sea because this area has the most diet data available. The author will apply this approach to the AI and GOA next year but those results may have poorer estimates because of lower sample sizes. Also, the GOA calculation may be more elaborate and potential uncertainty may be greater since octopus are consumed in similar amounts by Pacific cod, arrowtooth flounder, and halibut (all three will be included in the GOA estimate).

The Team discussed several points pertaining to the appropriateness of this approach. Theoretically, using natural mortality (in biomass units) from young (preyed-upon) ages as a proxy for natural mortality at older (fished or mature) ages could result in either an under- or over-estimate, depending on parameter values. Team members analyzed several likely combinations of parameter values and concluded that, in the case of BSAI octopus, the estimate resulting from the predation-based approach should be conservative.

Tier 5 estimates were reviewed, but not considered acceptable since they are minimum estimates of biomass. The consumption estimate is a generally independent check on survey biomass. The Tier 5 and predation-based estimates are similar and could be considered to support each other. The Pacific cod diet appears to be a better sampling method for octopus than the trawl survey. They have a similar size bias, but the consumption estimate is slightly lower (3,450 t versus the Tier 5 estimate of 4,020 t listed in the chapter) and more conservative, especially as other species eat octopus (in the Bering Sea, most other consumers of octopus are marine mammals for which quantitative estimates of consumption are not possible).

The Plan Team requested that next year, the authors examine: 1) a test for time trend of consumption; 2) analysis of the AI Pacific cod diet; 3) discussion of the data needed for a discard mortality rate analysis.

The Team supports additional research to estimate rates of non-spawning mortality and discard mortality.

Squids Olav Ormseth presented the squid assessment. This is an off-year for the squid assessment and therefore only an executive summary was prepared.

Catch dropped during 2009-2011 from historical levels but this drop is not mirrored in survey biomass estimates.

Dana Hanselman asked whether groundfish consumption estimates could be used to estimate squid harvest specifications similar to this year's recommendation for octopus harvest specifications. Kerim Aydin noted that prey species may not be the same species or size as those in the fishery. For next year the author plans to look at the overlap between squid in predator diets and squid in bycatch (species, size, and location comparisons).

Sharks Cindy Tribuzio presented the shark assessment. This is an off-year for the BSAI shark assessment and therefore only an executive summary was prepared.

The authors' recommendations for 2012 and 2013 ABC and OFL values were identical to last year's values. The team accepted the authors' recommendations under Tier 6 for based on average catch. Cindy reported that, as in past years, non-commercial removals and halibut fishery incidental catch estimates (HFICE) results were not considered in the specifications, but they would be in the future. Because of overlap in the estimates for some species, differentiating catch from the NMFS Catch Accounting System and incidental catch in the halibut fishery (HFICE) is difficult. In the case of shark species, however, the overlap appears minimal. **Thus the Team requests that the authors and Regional Office staff review whether the incidental catch estimates should be included in the official time series of historic catch for Tier 6 stock complexes.** In general, for all species, it would be good to understand the unaccounted-for catches and the degree of overlap between the CAS and HFICE estimates and to discuss this at the Plan Team next September.

Sculpins Olav Ormseth presented the sculpin assessment. This is an off-year for the BSAI sculpins assessment and therefore only an executive summary was prepared. The ABC and OFL recommendations are identical to last year's assessment.

Mike Sigler pointed out that since sculpins are managed under Tier 5, the biomass estimates from the 2011 EBS shelf survey could be included to update the ABC and OFL values rather than rollover the same values from last year. Olav commented that the new BS slope and AI bottom trawl survey data are more important to include in order to update these values and the BS shelf bottom trawl survey data, less so. Dana Hanselman suggested that, with the catch so far below the ABC, it was reasonable to leave it to the author's discretion whether the new survey showed any trends that justified an assessment update, versus a rollover. The Plan Team accepted the authors' recommended rollover of 2011 harvest specifications for 2012 and 2013.

Skates Olav Ormseth presented the skate assessment. The skate assessment was a full update of the 2010 assessment. The shelf survey biomass for Alaska skates increased slightly, but decreased slightly for the remaining skate species. Overall, the skate ABC and OFL values for 2012 and 2013 increased slightly. Next year's assessment will use a newer version of Stock Synthesis software in response to a long-standing SSC request regarding lack of fit to the size-at-age data. Olav noted that species identification in the survey has been good since 1999, but skate species often is not identified by observers, especially for the hook-and-line Pacific cod fishery; skates often drop off the gear before species can be identified by observers.

Greenland turbot Jim Ianelli presented the Greenland turbot assessment. Jim highlighted recent trends in Greenland turbot abundance indices, with abundance from the EBS shelf survey for 2011 slightly higher than in 2010. In 2010 and 2011 the proportion of small Greenland turbot (i.e., < 27 cm) has increased markedly and signal increased recruitment.

Jim attempted to allow natural mortality of males to be freely estimated within the model, but ultimately concluded that a non-sex-specific natural mortality was appropriate. The Plan Team discussed the fixed catchability coefficients used in the model. Previous attempts to estimate catchability resulted in very small estimates of catchability and large biomass estimates. Jim stated that a constant survey catchability of 0.75 has been applied to the EBS slope trawl survey. The combined shelf and slope BS and AI trawl survey biomass estimates approximately equal estimated spawning biomass, which raises questions about the catchability estimate, particularly as might be affected by differing sex-specific selectivities. **The Plan Team suggests that alternative selectivities for the longline survey be explored.** Conducting a slope survey in 2012 is unlikely due to limited funding. **Nevertheless, the Plan Team recommends that the slope survey be conducted to monitor the Greenland turbot population which appears to be increasing.**

The Plan Team supports the author's ABC and OFL recommendations.

Pacific cod

Eastern Bering Sea

Grant Thompson presented the Pacific cod assessment. The various candidate models for this year's harvest specifications were discussed by the joint teams (see JPT minutes). In the EBS, Model 3b was the clear choice by the standards adopted by the author and the teams. The BSAI team agrees with the specifications based on Model 3b recommended by the author.

In addition to the joint teams' recommendations, **the BSAI team recommends that the author check for any poor fits to commercial length frequencies that might indicate a change in selectivity resulting from the implementation of Amendment 80 in 2008 and the creation of longline cooperatives in 2010.**

Aleutian Islands

The team discussed two alternatives for accounting for the Aleutians in the ABC: a Tier 5 calculation based on Kalman filtering of the Aleutian survey biomass estimate, or a simple expansion of the ABC from the EBS assessment by the ratio of AI and EBS survey estimates (presently 9%). The team preferred the second method, which has been the standard. The combined BS/AI specifications were calculated this way.

Pollock

Eastern Bering Sea

Jim Ianelli presented the eastern Bering Sea walleye pollock assessment. The Team noted the "acoustic vessels of opportunity" (AVO) index was reviewed last year, but its use in the model is new this year. It appears to have a relatively small impact on the results (Figure 1.33). This was the only substantive change in methodology relative to last year's assessment. The Team agreed that the EBS pollock stock continues to be assessed exceptionally well.

The authors recommend setting the ABCs for 2012 and 2013 below their respective maximum permissible levels; specifically, at values corresponding to the average harvest rate over the most recent five complete years (0.30), with the strength of the 2008 year class set equal to the long-term average. Projected harvesting under this scenario results in ABCs for 2012 and 2013 equal to 1.09 million t and 1.14 million t, respectively. Last year, the Plan Team agreed with the authors that ABC should be set well below the maximum permissible level, the primary reason being the large hole in the age structure created by poor recruitments from the 2002-2005 year classes, which was expected to result in half of the 2011 catch coming from a single (2006) year class. As of this year, the 2008 year class has been observed by multiple surveys over three years and its above-average strength has been substantially confirmed, one result of which is that the 2012 catch is projected to be much less dependent upon a single year class, so the Plan Team's concerns from last year are somewhat lessened. Nevertheless, the Plan Team agreed that the authors, who listed 14 reasons in support of their recommendation to set ABC well below the maximum permissible level, have made a compelling case. At the same time, the Plan Team disagreed with the authors' recommendation to set the strength of the 2008 year class equal to the long-term average, concluding instead that the strength estimated by the model should be used in making projections. When the strength of the 2008 year class is set equal to the model estimate, harvesting at the recent average fishing mortality rate is projected to result in 2012 and 2013 catches of 1.22 million t and 1.36 million t, respectively, which are the Plan Team's recommended ABCs. Other points raised during the Team's discussion of the 2012-2013 ABCs included the following (note that these do not necessarily represent Team consensus):

1. We are not anticipating the ocean to be on the "very warm" end of the spectrum for the next few years, so maybe we are a little less worried about returning to conditions that led to the poor 2002-2005 cohorts.
2. It is easier to predict biomass declines than increases.
3. It seems odd that we cut the ABC in half for the stock with one of the best assessment models in the region (and perhaps the world), but go with maxABC for virtually all other stocks.
4. Maybe point #3 is explained by the fact that this stock has been so extensively studied that areas where we lack information are spotlighted more clearly.
5. Last year's strategy for setting ABC seems to be achieving reasonable results; note that catch will be less than TAC for 2011 by about 5%.

In recent years, the ABCs for EBS pollock have sometimes been set at the maximum permissible level under Tier 1, while at other times they have been set at levels lower than the maximum permissible, where these lower levels have been developed using a number of different methodologies and rationales. To make the process of setting ABCs for this stock more coherent, **the Plan Team recommends that the authors or the AFSC analyze the consequences of adopting a target harvest rate lower than the MSY level**, which is now estimated to be 0.6, well above recent actual harvest rates of 0.3-0.4. The alternative maximum targets could be, for example, 0.2, 0.3, 0.4, 0.5, and 0.6, with a B35 or B40 control rule. Possible performance measures could include the mean, variance, and example trajectories of: 1) ABC, 2) spawning biomass, 3) largest proportion of the catch contributed by a single cohort, 4) largest proportion of the spawning biomass contributed by a single cohort, 5) probability of falling below $B_{20\%}$, 6) amount of salmon bycatch, 7) total numbers of age 1-5 fish, 8) probability of falling below the long-term average number of age 1-5 fish (about 40 billion), and 9) other ecosystem metrics. The alternatives could be tested in simple simulations that assume the 2011 model parameter estimates are correct and impose an appropriate level of recruitment autocorrelation. The aim would be to show the main differences among cases in a straightforward way.

Bogoslof

Jim Ianelli presented the Bogoslof pollock assessment. There was no Bogoslof survey in 2011. The last Bogoslof survey was conducted in 2009 and the biomass estimate was 110,000 t. The stock status evaluation is the same as last year. The main new information in the assessment was three new strategies for setting ABC in addition to the status quo strategy.

The status quo strategy has been routinely applied in the past and has led to the small 2011 ABC of 156 t. Grant Thompson suggested using $B_{40\%}$ rather than $B_{35\%}$ as reference points for the first and second new strategies. The third new strategy is a Tier 5 approach, which leads to a larger ABC of 16,500 t. Mary Furuness noted that sticking with the first strategy and the 156 t ABC may impact approval decisions on experimental fishing permits and research survey permits. The Team accepted the authors' recommendation to adopt the third new strategy for setting ABC and OFL values.

Aleutian Islands
Steve Barbeaux presented the Aleutian Islands pollock assessment. No new data were available for the assessment except updates of recent catch values. This year Steve focused on estimating weight-at-age values in years when otolith samples were not collected. This analysis implies that fish are heavier at given age in recent years. The addition of the estimated values had minimal effect on the assessment model results. The Team accepted the authors' recommendation for ABC and OFL values.

POP, Northern rockfish, Rougheye/blackspotted rockfishes, Shortraker rockfish, and Other rockfish This is an off-year for rockfish assessments. For all of these species, the Plan Team received a straightforward update of the assessments from Paul Spencer, with updated catch. The Team supports the authors recommended ABCs and OFLs for 2012 and 2013.

Atka mackerel Sandra Lowe presented a straightforward update of last year's assessment with updated fishery catch, age composition, and weight-at-age data. There were no changes in the assessment methodology, and implementation of the Steller sea lion protective measures continued to be reflected in catch projections. In 2011, the areas used by the directed Atka mackerel fishery were Petrel Bank and Tanaga Pass in 542 and south of Seguam Pass in 541. Atka mackerel catches in the eastern Bering Sea were largely due to bycatch in the pollock fisheries. Fish were smaller in 542 than in 541 in 2011 (perhaps due to large catches on Petrel Bank), and Sandra indicated she will investigate whether fish were younger or smaller at age. Inclusion of new information increased the estimated sizes of the 2006 and 2007 year-classes. Model fits to the survey biomass are poor in 2002-2010; this may be due to inclusion of SE Bering Sea survey data which are highly variable (within and between years), and can add considerable biomass. Survey catchability estimates were discussed but this did not help explain the lack of fit to recent survey biomass estimates. The Team accepted the authors' ABC, OFL, and apportionment recommendations.

Yellowfin sole Tom Wilderbuer presented the yellowfin sole assessment. Tom highlighted a strong 2003 year class and noted that good recruitment has occurred about every fourth year. The Plan Team supports the authors recommended ABCs and OFLs for 2012 and 2013. The author noted a 9% buffer between ABC and OFL.

Based on new growth studies - relying partly on application of dendrochonology techniques and evaluation of alternative growth models - the time invariant growth applied previously for the model was abandoned in favor of an approach that incorporates time-varying and temperature-influenced growth. Incorporation of these newly identified growth influences contributed to a slight decline in this year's ABC and OFL compared to last year.

A Plan Team member suggested that Tom explore the use of non-parametric smoothing methods to reduce occasional large variances in empirically estimated weights at age. For evaluation of alternative growth models, a Plan Team member suggested further consideration regarding the use of the observed weight at age as the standard (i.e., "truth") against which to evaluate the performance of alternative growth models because of potential influence of sampling error associated with the empirical data.

Northern rock sole Tom Wilderbuer presented the northern rock sole assessment. This is a straightforward update from last year. The ABC is lower than last year. The Plan Team supports the author's recommended ABCs and OFLs for 2012 and 2013. The buffer between ABC and OFL is 9%. Seven models were examined. The preferred model (#1) is the same as last year's model and gives the best fit to the observed sex ratio while maintaining catchability close to the value estimated by trawl gear experiments.

Flathead sole Buck Stockhausen presented the stock assessment for the flathead sole/Bering flounder complex. Changes to the assessment include the addition of survey and fishery data from 2009, 2010, and 2011. The assessment model this year was identical to the 2010 model. The author examined an alternative model with a Ricker stock-recruitment relationship versus having recruitment independent of stock size, and chose to have recruitment remain independent. The Plan Team agreed with this choice.

Retention has been high since the implementation of Amendment 80. Seasonal progression in the catch has been slower for 2011 and is projected to total about 15,000 t. Similar to 2010, most of the catch was in the bottom trawl fishery, mostly east and west of the Pribilof Islands. Bering flounder make up a small proportion of the flathead sole/Bering flounder complex catch, mostly coming from north and west of the Pribilof Islands.

Survey spatial abundance patterns for flathead sole were similar to the catch patterns with concentrations north and west of the Pribilof Islands. Bering flounder survey distribution was different from the catch and was much farther to the north. According to the 2010 bottom trawl survey, which included the northern Bering Sea only in 2010, approximately 50% of the total abundance of Bering flounder is in the northern Bering Sea area. As an exercise the author conducted a Tier 5 calculation based on the standard survey and the northwest extension, which resulted in an OFL of 1,850 t and an ABC of 1,390 t.

A Plan Team member asked whether forcing mean catchability to equal 1.0 was appropriate given what is known about flathead sole herding behavior. Buck answered that he would like to estimate catchability within the model, but based on other assessments, this estimation usually results in a trade-off between estimating catchability or M. A Plan Team member asked why catch usually was lower than TAC. An industry representative answered that flathead sole catch is limited by the catch of other species such as Pacific cod and Pacific halibut.

Alaska plaice Tom Wilderbuer presented the Alaska plaice assessment. The authors explored Tier 1 as requested by the SSC. They determined that Tier 1 was not appropriate because of the lack of data near and to the left of the peak of the estimated stock-recruitment relationship. The Plan Team agrees with this determination.

The standard shelf bottom trawl survey was extended into the northern Bering Sea (NBS) in 2010. About 38% of the biomass of Alaska plaice was found inside the NBS. The authors examined ways to account for the northward distribution of Alaska plaice in the Bering Sea. In assessments prior to 2010, catchability had been fixed at 1.2 on the assumption that Alaska plaice are herded like yellowfin sole and rock sole, although Alaska plaice were not included in that experiment. To account for the biomass in the NBS, catchability was fixed at 1.0 in last year's assessment and in the authors' preferred model from this year's assessment. The Plan Team discussed and dismissed this option because the author indicated that there was no basis for choosing the catchability value of 1.0. Another option considered by the authors was to return to $q = 1.2$ and multiply the estimate of biomass by the ratio (=1.62) of NBS+EBS biomass to EBS biomass as estimated by the surveys in 2010. After discussion it was agreed that this type of adjustment should not be used with only one year of survey data in the northern Bering Sea. **The team concurred with a December 2010 SSC recommendation that the assessment authors consider how best to handle biomass data for species that have a substantial percentage of biomass in the northern Bering Sea, particularly if future northern Bering Sea surveys are planned.**

Arrowtooth flounder Ingrid Spies presented the arrowtooth flounder assessment. Input data for the present assessment includes arrowtooth flounder only, as this assessment no longer applies to the former *Atheresthes* complex. Ingrid presented the same model as last year. The current model includes the Aleutian Islands, Bering Sea slope and Bering Sea shelf. The biomass is modeled with 76% of the stock on the shelf, 14% in the Aleutian Islands and 10% on the Bering Sea slope. The Plan Team accepted the (Tier 3a) OFL and ABC values recommended by the authors.

More female arrowtooth flounder are caught than males in the surveys, resulting in estimates of differential mortality for males and females. With fixed female M=0.2, the profile likelihood run with male M=0.35 provides a reasonable fit to all the data components and is consistent with observations of differences in sex ratios observed from trawl surveys. The maximum shelf survey selectivity for males occurs at 0.93 for age 8 fish and the estimated value of survey catchability is 1.12. **The Plan Team recommended that the authors consider estimating the female natural mortality coefficient internally with male selectivity constrained to reach a maximum of 1.0 instead of using the profile likelihood method.** This would allow estimation of the standard errors of the female natural mortality coefficient.

A simulation analysis was conducted assuming arrowtooth flounder survival decreased by 10%, and allowing the rest of the ecosystem to adjust to this decrease for 30 years. This simulation indicates that positive changes in biomass for affected species were only minimal, with flathead sole showing the largest increase (~3%), probably due to competition for a variety of shared prey resources such as shrimp, and produced a negligible effect on pollock.

Kamchatka flounder Tom Wilderbuer presented the stock assessment model of Kamchatka flounder. The assessment was a straightforward update and Kamchatka flounder are managed under Tier 5. The Plan Team accepted the ABC and OFL values recommended by the authors. The authors apply a 7-yr running average of biomass estimates from trawl surveys for determination of ABC and OFL values. The authors did not explore the option of apportionment between the EBS and AI because catch rates were similar in both areas.

Prior to 2011, this species was a constituent of the arrowtooth flounder/Kamchatka flounder complex. In the eastern part of their range, Kamchatka flounder overlap with arrowtooth flounder, which are very similar in appearance and were not routinely distinguished in the commercial catches until 2007. Observers can distinguish between arrowtooth and Kamchatka flounder when they have the fish in hand. However, managing the two species as a complex became undesirable in 2010 due to the emergence of a directed fishery for Kamchatka flounder in the BSAI management area.

Other flatfish Tom Wilderbuer presented the other flatfish assessment. This is a straightforward update of last year's assessment. The decrease in the ABC estimate appears to be due to the decrease in biomass of starry flounder in the survey, which is the single most abundant species. Some other species are at the periphery of their ranges. Exploitation of "other flatfish" species is low.

Items suggested for September Plan Team meeting discussion

1. Alternate year assessments for flatfish species (BSAI)
2. Stock-recruitment workshop (joint)

<u>Attendance</u>: Attendance fluctuated by assessment, but peaked at 60 (public and agency) during the EBS pollock assessment review.

TABLE 8a-FINAL 2012 AND 2013 APPORTIONMENT OF PROHIBITED SPECIES CATCH ALLOWANCES TO NON-TRAWL GEAR, THE CDQ PROGRAM, AMENDMENT 80, AND THE BSAI TRAWL LIMITED ACCESS SECTORS

PSC species	Total non-trawl PSC	Non-trawl PSC remaining after CDQ PSQ[1]	Total trawl PSC	Trawl PSC remaining after CDQ PSQ[1]	CDQ PSQ reserve[1]	Amendment 80 sector[2]	BSAI trawl limited access fishery
Halibut mortality (mt) BSAI	900	832	3,675	3,349	393	2,325	875
Herring (mt) BSAI	n/a	n/a	2,094	n/a	n/a	n/a	n/a
Red king crab (animals) Zone 1[1]	n/a	n/a	197,000	175,921	21,079	87,925	53,797
C. opilio (animals) COBLZ[2]	n/a	n/a	7,029,520	6,277,361	752,159	3,085,323	2,017,544
C. bairdi crab (animals) Zone 1[2]	n/a	n/a	980,000	875,140	104,860	368,521	411,228
C. bairdi crab (animals) Zone 2	n/a	n/a	2,970,000	2,652,210	317,790	627,778	1,241,500

[1]Section 679.21(e)(3)(i)(A)(2) allocates 326 mt of the trawl halibut mortality limit and § 679.21(e)(4)(i)(A) allocates 7.5 percent, or 67 mt, of the non-trawl halibut mortality limit as the PSQ reserve for use by the groundfish CDQ program. The PSQ reserve for crab species is 10.7 percent of each crab PSC limit.

2 The Amendment 80 program reduced apportionment of the trawl PSC limits by 150 mt for halibut mortality and 20 percent for crab PSC. These reductions are not apportioned to other gear types or sectors.

[3] Refer to § 679.2 for definitions of zones.

[4]Sector apportionments may not total precisely due to rounding.

TABLE 8b-FINAL 2012 AND 2013 HERRING AND RED KING CRAB SAVINGS SUBAREA PROHIBITED SPECIES CATCH ALLOWANCES FOR ALL TRAWL SECTORS

Fishery Categories	Herring (mt) BSAI	Red king crab (animals) Zone 1
Yellowfin sole	179	n/a
Rock sole/flathead sole/other flatfish [1]	31	n/a
Turbot/arrowtooth/sablefish[2]	15	n/a
Rockfish	11	n/a
Pacific cod	31	n/a
Midwater trawl pollock	1,600	n/a
Pollock/Atka mackerel/other species[2]	227	n/a
Red king crab savings subarea non-pelagic trawl gear[3]	n/a	49,250
Total trawl PSC	2,094	197,000

[1]"Other flatfish" for PSC monitoring includes all flatfish species, except for halibut (a prohibited species), arrowtooth flounder, flathead sole, Greenland turbot, Kamchatka flounder, rock sole, and yellowfin sole.

[2]"Arrowtooth flounder" for PSC monitoring includes Kamchatka flounder.

[3]Pollock other than pelagic trawl pollock, Atka mackerel, and "other species" fishery category.

[4]"Other species" for PSC monitoring includes sculpins, sharks, skates, and octopuses.

[5]In December 2010 the Council recommended that the red king crab bycatch limit for non-pelagic trawl fisheries within the RKCSS be limited to 25 percent of the red king crab PSC allowance (see § 679.21(e)(3)(ii)(B)(2)).

[6]Species apportionments may not total precisely due to rounding.

TABLE 8c–FINAL 2012 AND 2013 PROHIBITED SPECIES BYCATCH ALLOWANCES FOR THE BSAI TRAWL LIMITED ACCESS SECTOR

BSAI trawl limited access fisheries	Prohibited species and area[1]				
	Halibut mortality (mt) BSAI	Red king crab (animals) Zone 1	C. opilio (animals) COBLZ	C. bairdi (animals)	
				Zone 1	Zone 2
Yellowfin sole	167	47,397	1,901,193	346,228	1,185,500
Rock sole/flathead sole/other flatfish[2]	0	0	0	0	0
Turbot/arrowtooth/sablefish[3]	0	0	0	0	0
Rockfish April 15 - December 31	5	0	3,232	0	1,000
Pacific cod	453	6,000	80,799	60,000	50,000
Pollock/Atka mackerel/other species	250	400	32,320	5,000	5,000
Total BSAI trawl limited access PSC	875	53,797	2,017,544	411,228	1,241,500

[1] Refer to § 679.2 for definitions of areas.

[2] "Other flatfish" for PSC monitoring includes all flatfish species, except for halibut (a prohibited species), flathead sole, Greenland turbot, rock sole, yellowfin sole, Kamchatka flounder, and arrowtooth flounder.

[3] Arrowtooth flounder for PSC monitoring includes Kamchatka flounder.

[4]"Other species" for PSC monitoring includes sculpins, sharks, skates, and octopuses.

[5]Seasonal or sector apportionments may not total precisely due to rounding.

TABLE 8d–FINAL 2012 AND 2013 PROHIBITED SPECIES BYCATCH ALLOWANCES FOR NON-TRAWL FISHERIES

Non-trawl fisheries	Catcher/processor	Catcher vessel
Pacific cod-Total	760	15
January 1 - June 10	380	10
June 10 - August 15	190	3
August 15 - December 31	190	2
Other non-trawl-Total		58
May 1 - December 31		58
Groundfish pot and jig		Exempt
Sablefish hook-and-line		Exempt
Total non-trawl PSC		833

[1]Seasonal or sector apportionments may not total precisely due to rounding.

AGENDA C-3(b)(5)
DECEMBER 2011

STATE OF ALASKA

SEAN PARNELL, GOVERNOR

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DEPARTMENT OF FISH AND GAME

Division of Commercial Fisheries

November 29, 2011

RECEIVED
NOV 29 2011

Mr. Chris Oliver, Executive Director
North Pacific Fishery Management Council
604 West 4th Avenue, Suite 306
Anchorage, AK 99501-2252

Dear Chris:

This letter provides an estimate of the 2012 spawning biomass of Pacific herring (*Clupea harengus*) in the eastern Bering Sea for the purposes of establishing bycatch caps per Amendment 16A of the Bering Sea/Aleutians Islands Groundfish FMP. The department's estimate of the 2012 biomass is 230,844 short tons, equivalent to 209,419 metric tons. This estimate is the sum of the spawning location estimates contained in the attached table.

Sincerely,

Doug Woodby
Chief Marine Fisheries Scientist

Table 1. Projections of Pacific herring spawning biomass for spawning aggregations in the eastern Bering Sea, Alaska in 2012.

Spawning area	short tons	metric tons
Norton Sound	43,426	39,396
Cape Romanzof	4,794	4,349
Nunivak Island	2,879	2,612
Nelson Island	4,703	4,267
Cape Avinof	2,095	1,901
Goodnews Bay	33,008	29,944
Security Cove	12,193	11,061
Togiak	123,745	112,260
Port Moller/Port Heiden	4,000	3,629
	230,844	209,419

cc: Jane DiCosimo, NPFMC
Jeff Regnart, ADF&G

AGENDA C-3
Supplemental
DECEMBER 2011

To: North Pacific Fishery Management Council, and
NPFMC Scientific and Statistical Committee

Fm: Jay Cox
Cape Elizabeth, Maine

11/23/11

Ladies and Gentlemen:

I have been involved in all aspects of the fishing and shipping industries for over 30 years as a crewmember, captain, vessel manager, vessel owner, financier and product marketer. I have owned and/or operated catcher vessels and factory trawlers in several fisheries in various parts of the world. Most recently, I have been the captain of a pollock catcher vessel for the last four years. I am writing you today to comment on the proposed 2012 BSAI Alaska pollock specification.

As you are aware, despite tremendous effort on the part of all sectors of the fishery, the fleet was unable to harvest all of the 2011 B-season TAC due to a lack of available fish. Despite expected abundance leading to a 54 percent increase in 2011 pollock TAC, the CPUE of the fleet actually decreased by 39 percent (from observer database) when compared with the 2010 B-season. Further, a lack of market-sized fish in the western portion of the Bering Sea led to increased effort in the Horseshoe and Slime Bank areas; the catch rates in these areas were very poor, as well. Due to the increased level and location of the fishing effort, as well as high abundance of salmon species during the season, the bycatch rates of king and dog salmon were very high.

While these problems were particularly pronounced during this recent season, this was not a new or unique situation. Over at least the last four years, we operators have all felt very fortunate to take our quota as the fishing was usually difficult and very unpredictable. We felt that something was very wrong in the fishery and we were on the verge of calamity. We were pleased to see the TAC reduced during these years; however the general feeling on the grounds was that it should have been dropped sooner and further. Only during the 2010 season did we begin to feel we were beginning to see some improvement in fish size and abundance, however we were shocked and dismayed at the recommended and approved 54 percent TAC increase in 2011. Of my cohorts, I know only one captain that was not adamantly opposed to this.

Due to various factors spelled out in the stock assessment, the pollock Assessment Team recently recommended a 2012 ABC of 1.088 million tons; down somewhat from 2011. The Plan Team, however, recommended an ABC of ~1.2 million tons and cited the quality of the science as part of the rationale. This seems odd logic to me, however, since the very scientists who are most familiar with the fishery are the ones who are recommending a reduction. Because of this, and because of what we have been consistently seeing on the grounds over the last several years (and particularly in 2011), I herewith urge you to recommend and/or approve a 2012 Bering Sea pollock quota of not more than 1 million metric tons.

Respectfully,

Jay Cox

1148 Sawyer Road
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To: North Pacific Fishery Management Council
NPFMC Scientific and Statistical Committee

From: Floyd E Smith
F/V Starlite

Date: Nov 22,2011

Council Members:

I have been involved in fishing on the Bering Sea since 1974. I have been a Pollock skipper of the F/V Starlite since 1991. I am writing to you about the proposed 2012 Alaska Pollock Fishery quota.

For many years we fished Pollock, knowing that when the season was over we left behind plenty of fish for the next season. These past 4-5 years have been challenging as many of us thought we were catching too much too soon not allowing smaller fish to grow up and have true market value. Not allowing for them to have a chance to spawn and replace themselves in a true lifecycle. As our annual TAC was reduced it had the feeling of not being soon enough or large enough. We as fishermen often talked about this as we passed.

I believe in the science and many of us discuss their concerns as well as our own when reflecting over this time period. We all agree that there are and could be more factors that effect conditions we see on the grounds. If fish aren't schooling up, they are harder to catch. If smaller fish are caught, they have less value and never get that chance to spawn, while those that push through the meshes of our gear face increased mortality never to be utilized. Longer towing times increasing the possibility of more Salmon bycatch. All important individually and more so when added together.

If we look at ourselves in this equation we have to look at what we have done to change the odds in our favor. Every boat that fishes Pollock has increased its gear size to double what it was 10 years ago. Many have increased hold capacity, and many have repowered all to be more efficient. The efficiency of the fleet has always been good, over the years it's only gotten better.

In 2008 and 2009 many boats started A season only to tie up for a month, or fish Yellowfin Sole, or Cod until the Pollock showed up. A first in this fishery!

2010 once again had that good feeling to it, at year end we felt we had left fish behind for next year, like the "good old days".

In 2011 by August the concerns mounted over the large increase in a quota that rose by over 50% in one year. Small fish were caught far to the NW while larger fish remained harder to find, and Salmon bycatch numbers climbed. Towing times increased for everyone and still the fleet attempted to catch all we were given.

Our crew stood down for 30 days waiting for things to get better. When that wasn't the case we decided to leave our remaining quota in the water, a tough choice, but a small step in the right direction.

If the 2011 TAC had increased by 10% vs 50% I believe we would all have seen that we were moving in the right direction. We are stewards of a public resource that requires us to add caution until we see the positive results from our actions.

For these reasons I strongly believe a TAC of not more than 1,000,000 M/T for 2012 would allow us all to add "caution while needed", insuring that future year classes have the time needed to grow and replace the fish being caught in this delicate cycle we all can control.

Respectfully,

Floyd E Smith
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Freezer Longline COALITION

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November 29, 2011

December 2011 SSC Meeting

Written Public Testimony on Agenda item C-3

C-3: Groundfish Harvest Specifications – BSAI and GOA

ACL management and development of DMRs based on best available science; and the use of DMRs in NMFS catch accounting and inseason management (particularly for octopus, skates, sharks, and crab)

Chairperson Livingston,

With the implementation of ACL management in 2011, the FLC would like the SSC to consider the following recommendations to improve estimates of actual mortality that could be incorporated into management decisions:

1.) Development of interim DMRs (based on observer estimates) for octopus, sharks, and skates. If the assumption of 100% mortality remains the default (until a multi- year comprehensive study can be done), there is little additional benefit realized by the fishing in reducing bycatch mortality. If DMRs are used in management decisions, the fleet has further incentive to reduce handling mortality and engage in cooperative research to reduce discard mortality.

2.) Inclusion of best estimates of DMRs (discard mortality rates) in SAFE documents particularly for species that are: incidentally caught; have significant non-retention (either voluntary or by regulation); and whose OFL/ABC/TAC may prove to be constraining (if 100% discard mortality is continued to be assumed).

3.) Encourage ongoing studies and new research on improving interim DMRs including cooperative research with the fishing fleet.

4.) Encourage NMFS Inseason Management to incorporate DMRs (or actual mortality) in the catch accounting system – where mortality is less than catch. Minimally, NMFS should consider DMRs when making decisions on inseason closures or when to place species on non-retention.

The FLC is making these recommendations based on observations of recent management actions in 2011 (resulting from ACL implementation) in the BSAI that resulted in increased regulatory discards of skates, sharks, and octopus – as well as the premature closure of the BSAI CV pot cod fishery (due to incidental catch of octopus). If a DMR based on the best available science had been taken into consideration by NMFS, the pot cod fishery would not have closed and octopus mortality would have been well below ABC. This approach was also suggested by the stock assessment author for BSAI octopus:

"These data suggest that a gear-specific discard mortality factor could be estimated for octopus, similar to approach currently used for Pacific halibut. If a discard mortality factor were included in catch accounting for octopus, the fraction of discarded octopus that are assumed to survive would not be counted toward the total "take" for the assemblage." (p. 12, 2011 BSAI Octopus SAFE).

Two observer studies indicate that octopus caught in pot gear are 99.5% "alive" and 94.4% in "excellent" condition. For longline, 78.6% were "alive" and 83.6% were in "excellent" condition (2011 BSAI octopus SAFE): P. 12: *"Octopus caught with longline and pot gear are more likely to be handled and returned to the water quickly, thus improving the probability of survival. Octopuses have no swim bladder and are not affected by depth changes, and can survive out of water for brief periods. Large octopus caught in pots were observed to be very active during AFSC field studies and are expected to have a high survival rate. Octopus survival from longlines is probably high unless the individual is hooked through the mantle or head. Observers report that octopus in longline hauls are often simply holding on to hooked bait or fish catch and are not hooked directly."*

This high survival rate by octopus should have been a consideration by NMFS in their management decisions. The NS guidelines provide for flexibility in management and the application of the guidelines – particularly for species with unusual life characteristics such as octopus (mature at 1.5-3 years and are terminal spawners).

Instead, BSAI octopus went on non-retention on September 1 and the CV pot cod fishery closed on October 24. The potential management action of a cod closure due to octopus bycatch was not anticipated by the Council during final action on the ACL compliance that established the octopus ACL – primarily because the EA analysis chose not to analyze or estimate the potential loss of target harvest (due to incidental catch limits). Instead, the analysis only quantitatively estimated loss of octopus harvest.

Approximately 71% of the BSAI octopus catch occurs in the pot fishery (NPT = 16%, H&L = 11%; and pelagic trawl = 2%). On average (2003-2010), 39% of all octopuses are retained annually (almost all of that occurring in the pot fleet). In 2011, only 6% were retained. Similarly BSAI skates and sharks went on non-retention on September 24th – again based on the assumption of 100% discard mortality. While discard mortality of skates and sharks is higher than that of octopus in longline fisheries, in our experience it is less than 100%. If a DMR had been considered and utilized, the time period for retention of skates by the longline fishery would have been extended, and regulatory discards could have been minimized.

Annual catch limits are to prevent overfishing from fishing mortality. However, without the development and use of DMRs, "catch" can greatly overestimate fishing mortality, particularly of incidental non-target species. Without inclusion or consideration of DMRs by Inseason Management, fishing mortality will continue to be overestimated and result in increased regulatory discards and potential premature closure of fisheries – when no actual conservation concern has occurred.

According to the NS guidelines, ACLs are supposed to be based on the "best scientific information available". Catch is defined to include the "mortality of fish that are discarded." This is not a mandate to assume 100% mortality, but to assess the mortality of discarded fish. Similarly NS guidelines on fisheries data references identifying "sources of fishing mortality (both landed and discarded)". Again, the emphasis is on actual "mortality" – which is not always represented by catch.

The potential for increased discards and premature closures seems to be highest in the following fisheries: BSAI and GOA octopus; BSAI and GOA sharks; and BSAI and GOA skates. These incidental non-target species are all in Tier 5 or Tier 6, where the tier methodology already results in a very precautionary OFL/ABC – a catch limit that is proving to be constraining (and is exacerbated by assuming 100% mortality of discards – which may not be the case). While stock assessment authors and the Plan Team have explored alternative approaches to Tier 6, the variability of incidental catch of these species is large, and could still result in possible unnecessary closures. The long term approach to ACL management needs to include calculation of actual mortality of discards and for that mortality to be considered in management decision.

The lack of use of DMRs by NMFS management is of great concern for the fixed gear fleet – as the difference between actual mortality and 100% mortality maybe significantly larger in fixed gear than that experienced by the trawl fleet. However, it is the interest of all fleets to have accurate DMRs so that one sector does not preclude another sector – particularly when actual mortality is lower than catch.

Currently, the only DMR currently used by NMFS inseason management is for halibut (working in conjunction with the IPHC). The Crab Plan Team makes estimates of crab DMRs by gear type in the crab stock assessments. However for unknown reasons, NMFS inseason management does not use these gear specific DMR estimates and assumes all crab bycatch has 100% mortality - for purposes of PSC accounting. The continued blanket assumption of 100% mortality of all discards for crab and octopus is not supported by the best available science.

The methodology to develop the halibut DMRs may not be best model or only model for establishing DMRs for incidentally caught groundfish. Consider that halibut is a highly valuable and fully allocated species that is subject to an international treaty, a bilateral commission, and domestic legislation – the Halibut Act. Suffice to say that due to the political and highly charged allocative nature of the halibut resource, the scrutiny level on halibut is at maximum zoom.

For non-target groundfish species, it may be appropriate to have observers gather preliminary data on condition of discarded species (prioritizing those species that may prove constraining at assumed 100% mortality). The stock assessment authors could then establish an interim DMR rate, which could be improved by subsequent cooperative research or additional observations.

Thank you for your consideration of these suggestions to improve estimates of actual mortality.

Kenny Down
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Freezer Longline Coalition

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November 23, 2011

December 2011 SSC Meeting

Written Public Testimony on Agenda item C-3 (a, b)

and November 2011 Plan Team report on EBS and GOA P cod models

Chairperson Livingston,

Thank you for your consideration of the attached comments submitted by the Freezer Longline Coalition on the Pacific cod models used for analyzing the setting for the 2012 ABC and OFL on P cod in the BSAI and GOA.

It has been a very busy year for the EBS P cod assessment with the March CIE review, the May Joint Plan Team meeting, and the August and November Plan Team meetings resulting in the selection of models and ABC recommendations before the SSC.

Most important to our success in creating long-term sustainable harvests of Pacific cod in the Bering Sea, Aleutian Islands and Gulf of Alaska is the mutual cooperation between industry and well-informed scientific bodies. Thank you for another great year of cooperation!

Kenny Down
Executive Director
Freezer Longline Coalition

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Freezer Longline Coalition
Report on the Pacific cod November 2011 Plan Team Meeting

Prepared by Dr. Mark Maunder
Quantitative Resource Assessment LLC
San Diego, CA

BSAI

Overview

The stock assessment author put forward five alternative assessment models based on advice from the Plan Team and the SSC. Model 1 is the same model as used in 2010 with new and updated data. The other four models are cumulative modifications of Model 1. The assessment author made a few additional changes to all the new models (except Model 1). The temporal variability in selectivity for one fishery was reduced, the age used for the definition of one of the growth parameters was increased, and age zero composition data were added (no age zero fish were observed). Model 2b excluded the pre-1982 survey data; Model 3 estimated the aging bias internally; Model 3b estimated the variation of length-at-age internally, included all the size-composition data, and excluded the mean-length-at-age data; Model 4 did not estimate aging bias and excluded the age-composition data.

The stock assessment author recommends using Model 3b for management advice. Several of the models were excluded from selection automatically. Model 4 was excluded because it did not use the age data. Models 1 and 2 were excluded because they did not estimate the aging bias internally. Model 3b was selected over Model 3 because the derived catchability (product of catchability and selectivity) was closer to that estimated by Nichol et al. (2007), variability in length at age takes inter-cohort variation into consideration, and it has better retrospective performance.

The authors recommended model (Model 3b) has several characteristics that the Freezer Longline Coalition supports. These include the exclusion of the pre-1982 survey data, dealing with the aging error most effectively (when age data is used), estimating the variation of length-at-age internally, excluding the mean-length-at-age data, and includes both age and length composition data for all years (when aging data is used). The Freezer Longline Coalition also continues to support Model 4, which excludes the age data. We recommend that Model 4 continue to be one of the alternative models presented for the assessment of BS cod.

Uncertainty in the stock assessment is already accommodated by the use of a conservative harvest rule and conservative proxy reference points. The spawning biomass that produces maximum sustainable yield is closer to 25% (SPR = 31%) of the unexploited level than the 40% used for the reference points. In addition, the survey estimates that the population biomass in 2010 and 2011 is double that in 2006-

2008, while the catches since 2007 have been around 175,000 t indicating that a doubling of the biomass would support catches of 350,000 t, which is higher than the recommended ABC.

In conclusion, if aging data is to be included, we recommend adopting the ABC from Model 3b because it has several characteristics that the Freezer Longline Coalition supports and the harvest rule is already precautionary.

Model choice rationale

The assessment author argues that one reason Model 3b is preferred over Model 3 is because it estimates the variation of length-at-age internally and therefore accommodates both intra- and inter-cohort variation of length-at-age. This may be true, but a more appropriate approach to deal with inter-cohort variability might be to model the temporal variation in mean length-at-age and/or the standard deviation of length-at-age.

The results of the assessment are positive in terms of stock status and yield because there have been two large cohorts recruited in recent years and the new data confirms that these recruitments are large. The most recent recruitment is estimated to be large as well, but future data is needed to confirm the size of this recruitment. The main difference in the ABC among the five models is due to the estimate of the current biomass since the fishing mortality reference points are similar among models and all models estimate the population to be above the B40% biomass reference point.

The Plan Team agreed to recommend Model 3b and that an attempt should be made to estimate the survey catchability in next year's assessment. They agreed that integrating the aging error estimation and the variation of length-at-age estimation into the stock assessment model was a good idea. The catchability assumption and the resulting product of catchability and selectivity, which was based on last year's estimate, was not contradicted by the Nichols et al. data. More field work (e.g. archival tagging and survey net comparisons) is needed to estimate catchability.

One Plan Team member noted that they were concerned with such a large increase in the ABC and to a level that has not been caught in recent years. One of the Plan Team members raised concern that the estimated biomass in 1985 is at the unexploited level. However, this is not unexpected from a relatively short lived species that has high recruitment variation that may be driven by regime shifts. The recruitment was high and the catch low prior to 1985 and the model should appropriately take this into consideration. This observation suggests that dynamic reference points that take the times series of recruitment into consideration should be considered for managing this stock. Fisheries impact plots (comparison of biomass with and without fishing) would nicely illustrate this concept.

One of the Plan Team members suggested that the Plan Teams advice should include recommendations that the TAC be lower than the ABC due to uncertainties (particularly the above concern) in the stock assessment and the fact that the population is very "young" due to the increase in abundance being based on recent high recruitment. This was paralleled with the recent pollock dynamics. Due to the high assumed natural mortality rate for this species, the population will always be "young" and a high proportion of fish that are not caught will be lost due to natural mortality. Uncertainty in catchability and natural mortality, which are fixed in the model, and uncertainty indicated by the retrospective bias, should be considered when making management decisions. However, it should be noted that the harvest rule used for managing cod is already precautionary in that the harvest rate reference point proxy is conservative and is further reduced when the stock is below the conservative biomass reference point proxy (see below).

One of the Plan Team members noted that large increases in catch, which are later found to be inappropriate, can cause ecosystem impacts that are difficult to reverse. There was suggestions that the Halibut fast down-slow up harvest strategy should be used. However, cod is much shorter lived than halibut and slow up strategies risk large losses in catch due to natural mortality.

Issues

Catchability

There are two main issues with catchability: estimating average catchability and temporal changes in catchability. Catchability was fixed based on last year's values. Changes in the model assumptions will influence the implied catchability (the product of catchability and selectivity) and it makes sense to re-estimate catchability for each assessment. Nevertheless, the product of catchability and selectivity were similar to the estimates from Nichols et al. There is also no evidence of herding or escapement that would invalidate the Nicholas et al. estimates. The Nichols et al. estimate is only based on a few archival tags and more tags or other studies (e.g. trawl net comparisons) are needed to reduce the uncertainty in catchability. It was also suggested that since the model has been improved over recent years it might be possible to estimate catchability within the assessment model.

The model still is unable to predict several large survey estimates of abundance indicating that the catchability changes over time. For example, the low head-rope of the trawl net may allow small changes in vertical distribution of cod to change catchability. Pollock may comprise 50% of the cod diet and cod tend to eat age one pollock, but not age 2. Cod eat more crab in BS compared to GOA indicating that the presence of crab versus age one Pollock may determine the vertical distribution, and therefore catchability, of cod in the BS. The Freezer Longline Coalition highly recommends analyzing the tow by tow trawl data to correlate the catch of cod with the catch of pollock and crab. The Freezer Longline Coalition also suggests that the residuals of the fit of the assessment model to the survey are compared to the abundance of crab and age one Pollock. Research should also be conducted to determine the relationship between bottom temperature and catch of cod in survey tows. In particular, the presence of the cold pool on the bottom should be considered as a factor influencing catchability.

Selectivity

The fishery selectivities are all length based while the survey selectivity is age based. This is not based on any logical rationale. In a previous analysis the predicted mean size-at-age fit the modes in the survey size composition data better if the survey was included in numbers and the survey selectivity was age based. With the recent changes in the model structure having a consistent definition of selectivity might be appropriate. However, it is not clear if age or length based selectivities should be used.

There may have been selectivity changes in recent years due to the fishery rationalization. These may be due to changes in the seasonal or spatial allocation of fishing effort. It was suggested that selectivity should be kept constant and only changed if a pattern in the length composition residuals is identified.

Fishery age data

The fishery age data was not used in the analysis because it was from a restricted range of seasons, area, and gears. An attempted to collect additional data failed to get a broader range of samples and the sampling design has been changed for future collections to ensure a broader range of samples.

Variation in length-at-age and temporal variation in mean length

The assessment author investigated the variation of mean length-at-age using several approaches and data sources. They all showed substantial variation in mean length at age one. To accommodate this variation, Model 3b estimates the variation of length-at-age inside the model. However, it is more appropriate to directly estimate the variation in mean- length-at-age. It is not clear if this should be modeled as annual variation or cohort specific variation. Modeling growth variation changes the whole growth curve so additional analysis is needed to identify the appropriate way to model the temporal variation in growth. It was suggested that the difference in length at age one is due to the time of the year in which the fish are caught, but this is unlikely given the range in variation and because the variation occurs at other ages as well. The variability in growth may be due to changes in temperature.

Jitters

The jitter analysis is used to provide (some) confidence that the assessment model has obtained the global optima. The performance of the jitter analysis is influenced by the bounds put on the parameters. The bounds for parameter estimates in which the data helps define correlations should not be the same as bounds used to randomly choose starting values independently for each parameter because the randomly chosen sets of parameters may fall in unrealistic parameter space even if the individual parameter values may be realistic.

An alternative method to evaluate if a global optima has been obtained is to use the Fballpark feature of Stock Synthesis. By making (penalizing) the fishing mortality in the final year equal to a predefined value in the first few phases of optimization and then freeing up the fishing mortality in the final phases allows the model to essentially start from different parameters sets that imply different management consequences. If the model returns to the same solution, then there is more confidence that alternative states of nature that relate to different management consequences are not supported by the data.

Reference points

The proxy reference points used for the Pacific cod harvest rules are not tailored for this species. For example, the same reference points are used for Greenland Turbot which has an assumed value of natural mortality one third of that assumed for cod. The spawning biomass that produces maximum sustainable yield using Model 3b and a reasonable (probably conservative) value of 0.75 for the steepness of the Beverton-Holt stock-recruitment model is 25% of the unexploited level (SPR = 31%; see figure 1). The fishing mortality rate is based on F40% and is reduced if the spawning biomass declines below 40%, which is substantially above the more appropriate value of 25%, indicating that the harvest rule and reference points (both fishing mortality and biomass) are extremely precautionary. In fact, the 40% reference point (*Smsy/S0*) implies a steepness of the stock-recruitment relationship *(h)* equal to 0.4 (or 0.65 based on SPR), which is more appropriate for a shark than for cod. More appropriate reference points based on Pacific cod biology should be developed.

GOA

Overview

The changes to the assessment models used for the GOA were similar to those used for the BSAI. The exceptions were that there was no Model 2, Model 3 had selectivity and catchability in the 27-plus trawl survey forced to be constant over time and catchability deviations in the sub-27 survey were given normal priors with mean = 0 and standard deviation = 0.46, and Model 4 had mean recruitment in the pre-1977 environmental regime constrained to be less than mean recruitment in the post-1976 environmental regime. The choice of model was less clear for the GOA assessment and the assessment author recommended Model 3, which differs from the choice for BSAI. It appears that the main reason that the results from Model 3b differ from the other models is due to constraining the survey selectivity and catchability to be constant over time. The survey catchability in Model 3b is much less than estimated by Nichol et al. (2007). If the survey catchability for Model 3b was adjusted so that the product of catchability and selectivity was similar to that estimated by Nichol et al. (2007), then the results from Model 3b would probably be more similar to Model 3. The "jitter" analysis suggests that the GOA models are poorly defined. Therefore, it is difficult to recommend any of the GOA assessment models. However, Model 3 appears to be a reasonable choice given the models presented.

One member of the Plan Team suggested that due to the better diagnostic performance of model 3b, there has to be a good reason to eliminate this model. The same Plan Team member argued that the retrospective pattern of overestimating biomass was one reason to keep the catchability high. However, retrospective bias is only an indication of model misspecification and does not necessarily indicate the direction of the bias (e.g. the most recent model may be more biased than the retrospective model). The Plan Team agreed that the difference between the estimated product of catchability and selectivity and the estimate of Nicholas et al. was adequate reason to reject model 3b. The Plan Team agreed to recommend model 3.

Issues

Selectivity

One major issues in the GOA assessment is the lack of age 2 fish seen in the data. Research should be conducted to determine the location of these fish. Length-composition for other fisheries where cod are bycatch or other surveys (e.g. state inshore survey) should be evaluated to determine if they catch age two cod. It is now accepted that there is substantial aging error in the aging of cod and it is possible that the lack of age two cod is due to aging error. However, the current aging assumptions are consistent with the growth of BS cod when aging bias is taken into account.

It should be noted that despite no age zero fish being observed in the aging data, some age zero fish are observed in the length composition data (an age zero mode) so selectivity at age zero is estimated to be greater than zero. This may be restricted in time and care needs to be taken so that the estimated selectivity curve does not cause retrospective patterns in estimated recruitment (e.g. by modeling temporal variability in selectivity or removing the length composition data corresponding to age zero).

The survey is split into two indices due to the lack of age two fish. If a more flexible selectivity curve is used, a single survey could be used in the assessment. The Sub-27 survey shows a predicted plus group at 26cm, presumably because the selectivity is age based. A length based selectivity should be added that is zero at 27cm and larger and one at 26cm and smaller.

Catchability

The GOA survey catchability is modeled with a substantial amount of variability compared to the BS survey. This appears to be inconsistent since the GOA survey gear has a much higher head rope. However, GOA cod eat less crab and may be higher in the water column more often and there is more untrawlable ground in the GOA.

The catchability used in the current assessment is based on a model from two years ago that has more variability in catchability and selectivity compared to model 3b. Therefore, catchability should be re-estimated in new models.

Aging error

Estimation of aging error internally inside the GOA assessment model was problematic. It might be appropriate to use the aging error from the BS assessment for the GOA assessment. However, different technicians age the fish from each area. The environmental conditions and prey in the two areas also differ.

In Closing

The Freezer Longline Coalition wishes to thank and compliment the SSC, the Bering Sea and GOA Plan Team, and especially the assessment author Grant Thompson for the hard work and years of research put into producing models of such high caliber and reliability. The Freezer Longline Coalition desires as well to avail itself to furthering the science necessary to continue producing models of such high merit.

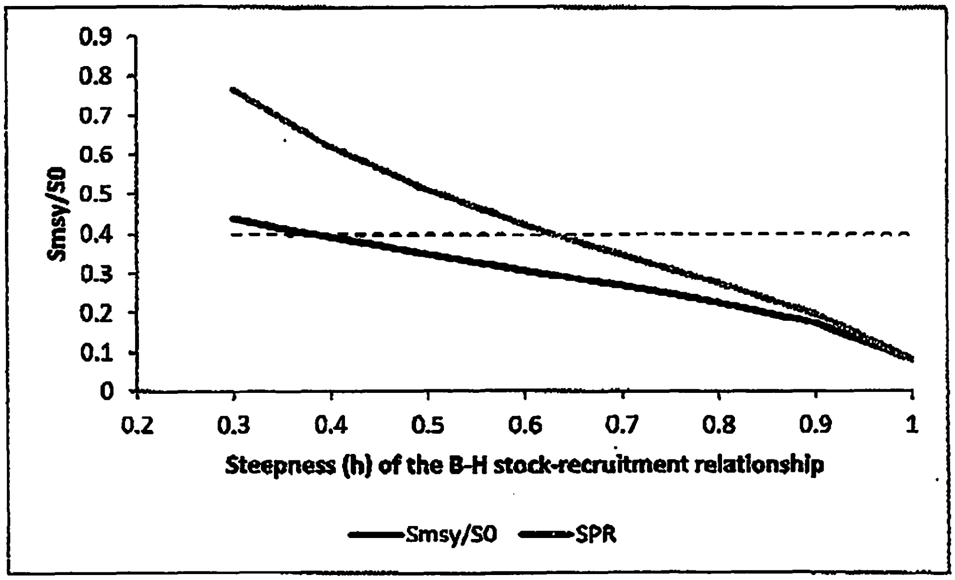

Figure 1. Spawning biomass corresponding to maximum sustainable yield as a fraction of spawning biomass without exploitation (SMSY/S0) and spawner per recruit (SPR) at MSY for different steepness of the Beverton-Holt stock-recruitment relationship for the BS calculated using model 3b.

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To the members of the North Pacific Fishery Management Council regarding Pollock harvest specifications:

As an Alaskan fisherman of 24 years, I have directly and consistently been surveying the Pollock fish stocks of the Gulf of Alaska and Bering Sea with the most advanced technology and equipment the industry has had to offer over the past two decades. Scientists and fisherman have worked alongside each other to create an efficient, clean, sustainable industry for the harvest of this natural resource. This success has been unheard of in most any other wild-species' harvest in the world.

After more than two decades I have seen a lot happen within the Pollock fishery which brings me here today. I recall the abundance of Pollock in the Shelikof straits when I started my career-it was a staggering image for a farm boy from Idaho. Little did I know that the great Shelikof fishery was winding down. During my years fishing the waters around Kodiak, I watched the Shelikof fishery become a shadow of its former self. The Pollock stocks have never returned to the GOA in the numbers that it once was in that fishery. This is the story of all fisheries world wide and I cannot think of a single North American fishery that has not become a shadow of its formal self or been targeted to a point of collapse. I now feel the need to speak in behalf of many fisherman who are alarmed at the apparent downturn of the Pollock biomass alongside the increased quota allowances. We have learned that a conservative approach to fisheries management is the only one that can ensure future stocks, as the science behind wild fish stocks is complicated, mysterious, and ever-surprising.

There are many things to consider when trying to understand how we have gotten to the point where we have to embark on a meeting such as this. Scientists and Fisherman alike must work to be the watchdogs for the oceans, as industry has a very shortsighted approach to resource extraction. There are many explanations regarding the question as to why Pollock have become harder to catch, but there is no question that in regards to this trend, a 54% increase in the pollock quota for 2011 was irresponsible to the well- being of this fishery.

A very alarming trend I noticed in resent years is the amount of Pollock being turned to fish meal. Fish meal will never make it to the dinner table and being used for fish meal ensures they will not grow into a harvestable size or live out their lives breeding to create future stocks. I like to refer to this as the 3 for 1 flaw in the metric-ton system. Any fisheries biologist would agree alongside the industry that it would be best to harvest a 900 gram fish, usable for fillets, as opposed to 3- 300 gram fish, only to be ground into a very low-cost product. Small fish harvest means a very low value product alongside a raising mortality rate for our future stocks. As the fishing becomes slower and more desperate later in the season, what is deemed an "acceptable load of fish" becomes quite flexible.

I realize that the TAC quota is suppose to be set at a level as to not effect the biomass as a whole. And I realize that it must be a large and daunting job to determine this TAC. I do not take this job lightly and understand that the science is to be respected and is paid for by the citizens of this country. What I do know with certainty is that there is less pollock in the bering sea than there has been during the span of my career. Our technologies have only gotten better in terms of finding and catching fish, therefor the idea that somehow the industry has become worse at fishing as a whole is an unrealistic argument. Where the Pollock have gone is all speculation through my eyes. I also know that we will do our best to harvest what ever quota we are given. And if fishing is as poor in the future as it has been in the last months of our previous season, we can expect again to see increased numbers of non-targeted species caught and astronomical fuel expenses.I am an advocate for a conservative approach in setting the 2012 quota. I believe that it is imperative to prove our skeptics wrong and show that we will be good shepherds to this amazing resource. We owe a future generation of fisherman, consumers and the species itself to do what is right and protect the future. It is a time for caution.

Scott Bingen, F/V Starlite