

## Discussion paper:

# Bering Sea Chinook bycatch Incentive Plan Agreement (IPA) feedback

May 2014<sup>1</sup>

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## 1 Introduction

In conjunction with the Council’s motion from October 2013, the Incentive Program Agreement (IPA) representatives were requested to provide feedback on mechanisms for addressing the modifications to Chinook bycatch management within their IPAs. Specifically they were to provide input on including the following five items within the IPAs for contrast to making these changes by regulatory means.

- 1) Requiring modification of IPAs to include restrictions or penalties targeted at vessels that consistently have the highest Chinook salmon PSC rates relative to other vessels fishing at the same time.
- 2) Requiring use of salmon excluder devices at times of year in which Chinook salmon encounter rates are relatively high (regulatory or through IPAs).
- 3) Requiring a lower base rate beginning September 1 (regulatory or through IPAs).
- 4) Provisions to shorten the pollock season to end when pollock catch rates significantly decline and Chinook salmon PSC rates increase in October (regulatory or through IPAs).

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<sup>1</sup> Prepared by: Diana Stram, Council staff, Alan Haynie and Jim Ianelli, NMFS AFSC. Note that these documents have been provided to the Council over the last week. This analysis is concise and is intended to provide the Council with some independent analysis of the measures proposed in the IPA documents.

- 5) Closing the fishery to a sector (or cooperative) if the sector's (or cooperative's) weekly Chinook salmon PSC rate exceeds a specified rate in September and/or October (regulatory or through IPAs).

Each IPA (Inshore Catcher Vessel Salmon Savings Incentive Plan (CV SSIP), Mothership Salmon Savings Incentive Plan (MSSIP) and Catcher Processor and CDQ Incentive Plan Agreement (CP IPA) provided a written summary of feedback on these issues. The submitted documents are attached as Appendix 1 and are summarized in Section 2.

Additional information is provided by staff to estimate the efficacy of various modifications within and across IPAs. However, because a complete analysis of the efficacy of each IPA has not yet been conducted, our discussion is focused only on whether an individual modification is likely to have an impact on bycatch reduction and influence existing vessel-level incentives. To the extent possible, additional issues in need to clarification or further consideration are noted.

All of the IPA documents raise important issues about the suggested changes within the IPAs. This second salmon bycatch paper is intended to augment the discussion and analysis in the first discussion paper prepared for the June 2014 Council meeting (available under C-5 at [http://legistar2.granicus.com/npfmc/meetings/2014/6/893\\_A\\_North\\_Pacific\\_Council\\_14-06-02\\_Meeting\\_Agenda.pdf](http://legistar2.granicus.com/npfmc/meetings/2014/6/893_A_North_Pacific_Council_14-06-02_Meeting_Agenda.pdf)). Discussion Paper 1 notes the low bycatch rates observed in recent years as well as some analysis of modifications in vessel behavior since 2011, however a more detailed analysis of changes in vessel behavior is being conducted and will be available as part of subsequent analyses. This second paper is meant to complement the broader discussion and analysis for consideration by the Council in the first paper, and as such, focusses only narrowly on those aspects put forward by the IPAs, specifically addressing primarily the provision to include vessel restrictions or penalties on vessels with consistently high Chinook PSC rates and issues related to requiring salmon excluder usage. Other provisions of the Council request are covered in conjunction with the Discussion paper 1 analyses and regulatory modifications. Should the Council move forward with modifications to the IPAs or bycatch management under Amendment 91, staff will prepare a more detailed analysis of alternative management measures for further review. This evaluation serves mostly to inform which of the actions considered (both in Discussion Paper 1 as well as within this paper) are most likely to achieve goals and objectives for Council intent in reviewing at this time in order to best inform any subsequent action.

## **2 Description of proposed revisions by IPAs to address Council request**

A summary of the feedback and proposed changes provided from each IPA letter is provided below. A table comparing and contrasting the 5 items requested for feedback and the associated modifications proposed under each IPA is shown below. Appendix 1 contains all three feedback letters with more detail on comments and proposed changes. Common issues expressed by each of the IPAs include how to identify an outlier vessel, what the definition of 'fishing at the same time' entails and how many of the provisions requested by the Council are not supported by the IPAs and thus no provisions to address them are suggested.

Modification requested by Council	Feedback from IPAs: ('No' indicates no proposed change to IPA was noted)		
	Inshore CV SSIP	MSSIP	CP IPA
Restrictions/penalties for highest rates relative to other vessels at same time (IPA only)	<p>Define outliers as greater than 1 standard deviation above mean by season for 3 consecutive A or B seasons over 3 years and annually as the annual average for 3 consecutive years.</p> <p>Seasonal penalty is that RHS applies for the A or B season in the 4<sup>th</sup> year even if RHS suspended, regardless of vessel's tier.</p> <p>Annual penalty = 50% reduction in savings credits earned from third year (1 credit per 6 Chinook as opposed to standard 1 per 3 Chinook credits not used).<sup>2</sup></p>	No	<p>Define consistent outliers as greater than 1.5 standard deviations above mean by season for 3 consecutive seasons (A- or B seasons)</p> <p>Penalty = RHS closures regardless of current bycatch rate in 4<sup>th</sup> and subsequent seasons</p> <p>If 4<sup>th</sup> season is a B season, CSSA October closures in B season will also apply.<sup>3</sup></p> <p>Names on sector CP-CDQ IPA weekly SeaState reports</p>
Require excluder use when rates are high	No, require reporting only	Using sector-wide; existing provisions in MSSIP to mandate	Yes, propose certain time frames for mandate
Lower Base Rate starting Sept 1	No. Propose 20% collar on Base Rate increases	No	No
Shorten season (Oct)	No	No	No
Closure when over threshold rate September/October	No	No	No

## 2.1 Inshore SSIP feedback

The Inshore SSIP responses to the Council's request focusses primarily on identification of high Chinook bycatch vessels and creating additional penalties for application to those vessels as well as a limitation on the ability to increase the Base Rate employed in latter part of the B season. Penalties once high bycatch

<sup>2</sup> Clarified by J. Gruver, pers. comm.

<sup>3</sup> Clarified by Amanda Stern-Pirlot, pers. comm.

vessels (or ‘outliers’) have been identified are structured under two tiers: seasonal and annual penalties. Additional information on the identification and penalty structure for these vessels is described in Section 3. The CV SSIP IPA does not propose to require excluder usage but would include a reporting requirement in order to better estimate usage if requested by the Council.

The CV SSIP IPA states: *“A retrospective of both seasonal and annual individual vessel Chinook bycatch revealed that vessels with bycatch one standard deviation above the mean were likely candidates for consideration as high bycatch vessels. However, on a single year basis, there are overwhelming examples of vessels that ended up in this category not because of bad behavior, but simply due to bad luck. Going from a single year basis to a 2 year period greatly reduced the number of vessels that met this qualification purely by chance, but still left a strong possibility for misidentifying vessels that are truly the desired targeted “behavior based” class of vessels. Once a 3 year analysis was implemented the odds of a vessel being identified due to chance were all but eliminated”*

The CV SSIP IPA document argues strongly against adjusting the minimum bycatch rate for a closure: *“Rolling Hot Spot (RHS) rules are best dealt with by IPAs, the inflexibility of managing RHS programs by regulation has proven to be a less than ideal method. Specific to Item 3, lowering the Base Rate beginning September 1st would have negligible benefits towards reducing Chinook bycatch. It would only result in additional closures occurring when Chinook salmon are just beginning to show up on the pollock grounds. Implementing closures at this point in time under a lower Base Rate would, at best, save only a few Chinook and could very easily result in increased Chinook bycatch due to 1) shifting fishing effort into areas of lower pollock harvest rates, thereby extending the season into days with overall higher Chinook rates; 2) may easily result in moving vessels into areas with comparable low, or higher, Chinook rates.*

*The .035 Base Rate (currently in the SSIP) was originally chosen because it is at a level that does an effective job at both recognizing the presence of Chinook on the grounds and establishing meaningful RHS closures.”*

As discussed below, the CV SSIP IPA document proposes a 20-percent collar on base rate increases.

## **2.2 Mothership SSIP feedback**

The Mothership SSIP feedback focuses on the structure of their IPA incentives and provides input on why their incentives are already sufficiently strong to address concerns with overall bycatch performance. The document argues that it is inappropriate to impose similar increases on the existing program because the MSSIP has stronger incentives than any of the other IPAs. No modification to the MSSIP program is proposed in the document. The MSSIP has previously voluntarily employed excluders sector-wide and have modified their MSSIP pending contract accordingly. The MSSIP feedback raises issues similar to other IPAs regarding how to identify vessels with high Chinook bycatch rates as well as the potential pitfalls of creating perverse incentives by imposing specific penalties and punitive mechanisms.

The Mothership SSIP makes the following point: *“For any IPA, comparison of high bycatch rates to average performance should be just one metric to identify vessels that would be restricted. Comparatively high bycatch rates should be considered in combination with a trigger, such as exceedance of the vessel’s own pro rata share of the Annual Threshold, or some fraction thereof. Otherwise, use of this “ranking” methodology will unfairly penalize vessels that have taken steps to reduce their salmon bycatch. For instance, a vessel that experiences a significant bycatch encounter early in its fishing year may decide to “stand down” and transfer its remaining pollock and Chinook PSC to a vessel able to avoid bycatch by fishing at a later time, after bycatch conditions have improved. If, however, the vessel is concerned about*

*being designated an outlier status and subjected to additional restrictions and penalties in future years, that vessel may feel pressured to continue fishing during a time of high bycatch in the hopes that it will avoid bycatch and lower its rate, or at least harvest more of its pollock quota before being impacted by further restrictions and penalties. Bycatch rate ranking alone diminishes the effectiveness of the incentives in an IPA.”*

This is a good point that a vessel may engage in strategic behavior to avoid penalties for subsequent years. If the penalty is very large, this becomes more likely. This specific example could be alleviated by assigning a vessel the rate of the vessel to which the pollock are transferred, which would provide additional incentives to exchange salmon to low-bycatch vessels. But the general concern is valid and care should be taken to consider possible consequences of any measures considered.

*“Further, shifting the focus from overall salmon bycatch reduction to a ranking of vessels defeats the incentives to share salmon bycatch information in order to reduce salmon bycatch overall.”*

A system based on relative bycatch rates does have the potential to have information less sharing. However, there are gains as well as losses from information sharing. On the West Coast, vessels in some cooperatives have agreed to share all information on bycatch rates across species and IPAs could require that actual catch would be reported, although vessels might do less to “go the extra mile” to let other people know about their bycatch encounters.

*“Ranking vessels relative to other vessels in the same IPA contradicts incentives for an IPA to reduce its salmon bycatch.”*

Punishing selected vessels has the potential to undermine information sharing, but this occurs in the context of other incentives that encourage information sharing. The Council could recommend additional action be taken to provide IPAs or cooperatives to reduce bycatch. For example, the rate of the relative performance of the sector could be multiplied by the vessel rate so that vessels would continue to have an incentive for their sector to do well.

*“For finer time scales within seasons, moving averages should be used rather than month-by-month or week-by-week performance... Moving averages, by contrast, remove the misleading influences of short-term fluctuations and highlight longer-term trends that inform meaningful actions.”*

Weekly or monthly rules do create an arbitrary timeline for calculating bycatch rates. A moving average would (presumably) calculate the bycatch rate over a window of time. This arbitrariness is not completely avoided by a moving-average, as it would depend on how a trip ended relative to the moving-average window, for example. This raises an important point though, that great care should be given to how the time frame of any bycatch rate is calculated.

### **2.3 Catcher Processor IPA feedback**

The CP IPA feedback also focuses primarily on identifying vessels with the highest Chinook bycatch rates and imposing additional penalties or restrictions on those vessels once identified. Identification of seasonal ‘consistent outliers’ and associated penalty structure are described in Section 3. Any vessels subject to the penalty would also appear on the weekly CP IPA/CDQ Report from Sea State. The CP IPA proposes to augment their agreement to include provisions to require excluder usage during the A season between January 20<sup>th</sup> and March 31<sup>st</sup> and the B-season starting September 1.

The CP IPA notes: “During times of year when salmon are not present on the pollock fishing grounds in substantial numbers, using salmon excluders is more likely to reduce pollock CPUE and prolong pollock fishing into times of higher salmon abundance, which increases the risk of catching more salmon than can be saved due to the excluder. Therefore, mandating their use at these times did not appear effective.”

Excluders have improved and technology is expected to continue to improve. How the technological improvements lead to lower bycatch is less certain. Vessels make choices based on the incentives they face to trade off expected revenue, costs, and bycatch constraints. It is reasonable that mandating the use of salmon excluders during a low-bycatch period would be counter-productive because it could slightly slow pollock fishing in a manner that would lead to fishing at the end the B-Season. It would also be a waste of fuel and unnecessary increase in pollock fishing costs.

### **3 Estimates of outlier vessels**

All three IPA reports discuss proposed methodology to determine high bycatch vessels using the standard deviation of the seasonal and annual vessel bycatch rate compared to the mean over a period of three consecutive years (seasonally) or three consecutive seasons as a benchmark.

#### **3.1 CP IPA**

The CP IPA proposes to identify vessels with highest bycatch based on 3 consecutive seasons (A season to B season and thereafter or, ABA, or B season to A season and thereafter, BAB) with a standard deviation of bycatch rate greater than 1.5 standard deviation threshold for each of the three seasons. Table 1 in the CP IPA document provides this information for that sector by year and season. Based upon their proposed definition, one vessel in the CP sector would have exceeded this threshold by rates higher than 1.5 SD of the seasonal mean in three consecutive seasons (V04, B season in 2012 and A and B season in 2013). Thus had the program been in place the RHS closures would have applied to this vessel in 2014 A season regardless of its bycatch rate within that season and the vessel would appear on the weekly CP IPA/CDQ Report distributed within the sector.

##### *3.1.1 Seasonal penalty on outliers*

*RHS closures regardless of current bycatch rate in 4<sup>th</sup> and subsequent seasons after 3 seasons above 1.5 standard deviations above the IPA seasonal mean. If 4<sup>th</sup> or subsequent high-bycatch season is a B season, CSSA October closures in B season will also apply.*

It is unclear how likely the rolling hotspot closures would be to change behavior. Since Amendment 91, the RHS closures for the CP sector have been based on the bycatch rates and locations of all fishing sectors so at different times impact a greater or lesser percentage of the fleet. The CSSA October closures would apply even in lower PSC conditions.

*Provision: Any vessels subject to the penalty would appear on the weekly CP IPA/CDQ Report from Sea State.*

It is difficult to estimate the exact incentive from making a “Dirty 1 or 2” list, but past discussions with captains have indicated that they were affected by the desire to not be on the “Dirty 20” / “vessel performance” lists. Additional consideration could be given on ways to provide more publicity about high bycatch vessels.

#### **3.2 CV SSIP**

The Inshore SSIP proposes to identify vessels with the highest bycatch based on a 3-year consecutive A- or B-seasonal (and annual) standard deviation of bycatch rate greater than a threshold greater than one

standard deviation from the mean by season (or year). The SSIP penalty provision contains two tiers of penalties possibilities, both a seasonal and an annual component.

To calculate similar vessel performance over seasonal periods for CVs, the years 2003-2013 data were compiled and the standard deviation of vessels by season were compared (Table 1 and 2). Based on the seasonal outlier definition proposed in the SSIP, no vessels in recent (2011-2013) years would have qualified in the A-season (only one vessel, vessel '1' would have qualified over the whole set of years based on rates from 2003-2005) (Table 1). For the B season, 3 vessels (vessels '3', '8', and '13') would have qualified for the penalty based on rates from 2010-2013 above the standard deviation cut-off threshold while several other vessel '2' (2007-2010), vessel '5' (2006-2009), and vessel '7' (2006-2008), would have qualified in previous years. For the annual component, Table 8 of Discussion Paper 1 is referred to which shows the annual standard deviation in bycatch rates by CV vessels from 2003-2013. Based on the annual outlier definition, three vessels would have qualified between 2003-2013. Vessel 1 exceeded the threshold in each year from 2010-2012. It did not exceed it in 2013 however so while restrictions would have applied to that vessel in 2013, after that year the vessel would have reset their standing and would need an additional 3 consecutive years from 2014-2016 to be subject to additional annual penalties outside of that year.

### 3.2.1 Seasonal penalty on outliers

Once a vessel is identified as a seasonal penalty, the penalty is imposed for that season (A or B) the subsequent year. The CV SSIP IPA proposes to make hotspot closures apply to a vessel after a third A or B season in a row as an outlier regardless of the vessel's tier status in that season. This would require that closures be implemented by Sea State even after the 25 percent seasonal threshold was exceeded and RHS closures are suspended for the rest of the fleet. In 2011 and 2012 the 25% Base Cap threshold was reached in the B-season and thus RHS closures ceased for all vessels when the threshold was met. In 2011, the closures were suspended on September 15 and in 2012 on October 11. Under this program those 3 vessels would have been be subject to additional closures in those years.

Prior to Amendment 91, cooperative-level RHS closures were not deemed sufficient to reduce Chinook PSC to an acceptable level. These newly proposed closures would apply to individuals based on their own bycatch. But the closures might apply to them anyway, depending on whether they are suspended, at what date, and whether they are in Tier 2 in their penalty year. The closures also might or might not be important to different vessels, depending on how their ability and preference to fish in different locations.

### 3.2.2 Annual penalty on outliers-Savings credit

Amendment 91 allocates 70 percent of Chinook PSC to the A-season and then allows carry-over to the B-season. Thus typically vessels do not use all of their A-season credits. This would allow for any vessels penalized in the A-season to have a Chinook bycatch rate comparable to the annual average for the season. If a vessel is subject to the penalty in the B-season, this incentive would also give those vessels an additional incentive to reduce their Chinook bycatch in the A season of their penalty year.

The CV IPA document notes: *“The annual penalty is assessed at the vessel account level. Therefore, this penalty will have a direct effect the available savings for each vessel regardless if the vessel directly harvested its own pollock or transferred its pollock to another vessel for harvest. For transferred pollock, this penalty will incentivize owner/managers to put their pollock into the hands of cleaner fishing vessels and also incentivize vessel operators to keep their bycatch low in order to be considered for harvesting*

*other vessel's pollock in future years.*" Additional analysis could be conducted to evaluate how significant this effect is likely to be.

### 3.2.3 20 percent "collar" on weekly base rate increases

The CV SSIP IPA document states: "*A better method for limiting bycatch during an upwards trending time period as found later in the B season is the addition of a 20% "collar" on weekly Base Rate. Limiting Base Rate increases will both identify a larger range of area eligible for closure and increase the number of vessels assigned to Tier 2 status.*"

The 20 percent collar would make more vessels and areas subject to the closures. How significant of a feature this would be would depend on a variety of factors, including when Chinook arrived on the grounds, the number of vessels that would be in Tier 2, the concentration of Chinook across the grounds, and if and when the 25 percent threshold leads to the suspension of the RHS program.

### 3.3 Time frame for determination of outlier vessels

It was not clear from either SSIP or CP IPA when the starting point for estimating an outlier would be, i.e., would the program consider 2012 (or later) as the starting point to determine a qualifying seasonal deviation by a vessel or would these changes only take place beginning with revised IPA agreements in 2015? If the changes would only begin in 2015 then the earliest a vessel penalty would be imposed would be B Season 2016 for the CP sector or in A-Season 2018 if any vessel was above the threshold as an outlier in three consecutive seasons of the next three years (or annually per CV 'annual outlier' provision).



Table 1. Standard deviation of shore-based catcher vessels bycatch rate by year for the **A season**. Note that the vessel ID is the original ranking which was by 2003-2013 total Chinook salmon bycatch divided by total pollock (with higher values meaning higher bycatch rates)

Vessel	A season										
	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
1	3.913	2.915	1.467	-1.083	0.976	-0.170	2.093	4.437	-0.975	1.155	-0.012
2	0.210	-0.513	-0.775	0.490	-0.228	-0.464	-0.416	0.343	-0.800	1.604	-0.243
3	-0.434	2.190	0.945	-0.545	-0.509	0.066	3.868	0.118	-0.001	-0.624	1.048
4	0.803	-0.381	2.424	0.306	1.232	-0.268	0.208	-0.668	0.548	-0.175	-0.857
5	0.553	0.200	0.287	-0.282	-0.909	0.102	0.283	0.649	-0.745	-0.492	-0.049
6	-0.368	0.268	1.304	1.947	0.291	-0.299	-0.113	0.821	3.402	-0.893	0.204
7	0.440	-0.042	-0.415	0.820	0.496	-0.210	0.588	3.215	0.687	-0.943	-0.229
8	-0.540	0.264	-0.867	0.336	0.248	0.151	0.691	0.382	0.124	-0.750	-0.538
9	-0.590	-0.335	1.805	2.685	1.037	0.929	-0.475	-0.307	0.627	2.861	
10	1.188	0.669	1.104	-1.011	3.326	-1.128	0.413	-0.006	-0.294	1.028	1.320
11	-0.820	2.503	-1.080	0.514	-0.278	0.473	0.303	-0.529	0.193	-0.679	1.186
12	-0.753	0.375	0.177	0.887	0.502	-0.389	1.419	0.473	0.533	-0.488	-0.844
13	-2.580	-1.854	-0.571	-0.181	1.555	-0.501	1.105	-0.465	0.040	-0.798	-0.212
14	2.986	-0.049	-0.462	-0.061	-0.765	-0.266	0.148	-0.474	1.252	0.875	0.792
15	-0.407	-0.271	-0.041	0.759	-0.163	-0.486	-0.717	-0.221	-1.266	-0.120	-0.490
16	0.145	0.184	1.162	-0.434	0.852	0.814	-0.572	0.743	-1.153	0.733	5.121
17	0.661	-1.910	-0.664	2.088	-0.635	-0.059	0.798	-0.355	-0.254	0.179	0.774
18	-1.137	-0.608	-0.051	0.311	-0.859	-0.364	-0.535	1.200	-0.083	2.267	-0.793
19	-0.246	-1.151	-1.546	0.129	-1.181	-0.843	-0.777	0.089	-1.701	-0.401	-0.801
20	1.156	-1.402	-0.880	-0.890	-1.445	-0.699	-0.680	0.155	-1.190	0.652	-0.406
21	-0.847	-0.314	0.862	0.865	0.819	0.288	2.252	-0.563	-0.737	-0.815	-0.094
22	-0.363	-0.387	0.485	-0.591	-0.137	0.146	0.017	-0.062	-1.035	0.379	-0.953
23	-0.417	-0.037	-0.296	0.369	-0.048	-0.215	0.080	1.533	0.059	-1.606	-0.450
24	-0.275	-0.147	0.257	0.097	0.531	-0.865	0.721	0.252	-1.569	-0.215	-0.180
25	1.266	-0.154	-0.759	-1.404	0.068	-0.357	-0.259	-0.453	0.150	0.937	0.970
26	0.027								-0.590		
27	-0.095	0.868	-1.117	-0.334	-0.635	5.717	-0.712	-0.815	-0.055	-0.324	-0.061
28	0.047	-0.357	-0.005	-1.124	-1.701	-0.406	-0.594	-0.243	-0.575	-1.515	0.601
29	-0.757	0.193	0.406	1.239	0.131	-0.352	-0.659	-0.676	-0.254	0.854	-0.372
30	0.475	-0.707	-0.988	-0.395	-0.685	-0.294	0.143	0.338	1.330	-0.667	1.521
31	-0.161	3.148	-0.697	-0.812	-0.142	0.089	2.460	-0.458	-0.360	-0.850	0.397
32	0.115	-0.056	-1.376	-0.701	0.213	-0.308	-0.618	0.287	2.151	-1.087	-0.160
33	-0.079	0.032	-2.558	-0.933	1.451	-0.439	-0.531	1.036	-0.958	0.847	0.347
34	-0.529	0.143	1.451	0.706	0.662	1.759	-0.739	-0.591	-0.606	-0.501	-0.676
35	-0.204	0.242	0.171	1.082	0.355	-0.393	-0.506	-0.524	0.093	1.061	-0.059
36	1.132	-0.385	-0.154	1.351	0.986	-0.004	-0.693	-0.317	0.642	-0.008	-0.816
37	-0.709	0.311	0.063	0.350	0.967	-0.379	-0.640	-0.508	-0.470	0.915	-0.857
38	-0.463	-0.338	1.201	-0.184	1.129	0.035	-0.681	-0.559	0.701	-1.069	-0.347
39	-0.770	-0.356	0.619	-0.183	0.453	-0.297	-0.588	-0.738	-0.353	0.275	-0.432
40	-0.148	-0.118	0.325	-0.916	-0.783	-0.237	-0.658	-0.809	1.780	-1.342	-0.274
41	-0.222	-0.208	-0.306	0.223	-0.786	1.140	-0.652	-0.765	1.414	-0.236	-0.759
42	0.181	0.333	0.363	1.019	-0.816	0.151	-0.655	-0.916	1.143	1.431	0.180
43	-0.377	-0.414	1.123	-0.815	-0.570	-0.334	-0.626	-0.692	-0.220	-1.104	-0.731
44	-0.508	-0.906	0.390	-0.887	0.048	0.042	-0.416	-0.417	0.824	-0.143	-0.524
45	-0.087	-0.829	-0.522	-0.528	-0.551	0.378	-0.659	-0.542	0.822	0.406	-0.455
46	0.254	-0.959	-1.157	-2.701	-2.061		-0.561	-0.483	-1.031	-0.099	0.807
47	-0.701	-0.079	0.351	-0.862	-0.713	-0.048	-0.630	-0.584	-0.813	-0.712	-0.358
48	0.873	0.562				-0.938	-0.552	-0.650	-0.530	-1.070	-0.442

49 -0.838 -0.133 -1.454 -0.717 -1.728 -0.264 -0.678 -0.682 0.102 1.271 -0.796

Table 2. Standard deviation of shore-based catcher vessels bycatch rate by year for the **B season**. Note that the vessel ID is the original ranking which was by 2003-2013 total Chinook salmon bycatch divided by total pollock (with higher values meaning higher bycatch rates)

<b>B season</b>											
<b>Vessel</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>
1	1.384	0.548	3.234	2.299	0.031	-0.528	-0.510		-1.337	4.236	
2	-0.240	2.817	1.050	0.848	1.338	1.508	2.254	2.375	0.865	0.678	1.393
3	0.499	-0.349	1.731	2.385	0.746	1.612	0.326	1.256	1.003	1.166	1.182
4	0.211	2.072	3.479	0.094	0.114	3.131	-0.467	-0.585	0.496	-0.647	-0.667
5	-0.541	-0.271	0.903	2.737	2.240	3.373	1.397	-0.137	1.855	0.687	0.820
6	-0.982	-0.353	0.263	1.502	2.286	0.188	0.733	0.448	0.581	0.205	0.297
7	1.497	-0.221	-0.215	1.549	1.036	1.375	0.775	0.703	0.136	0.302	0.389
8	0.269	-0.481	0.618	0.374	0.122	1.448	0.496	1.360	1.678	1.057	3.979
9	0.231	0.159	0.318	-0.652	0.599	-0.388	-0.481	-0.589	0.282	-0.691	
10	-0.163	0.900	0.182	-0.766	1.594	-0.501	-0.427	-0.130	-0.482	0.792	0.647
11	-0.037	-0.301	0.649	0.834	0.393	-0.430	-0.454	0.058	0.854	0.715	-0.368
12	-0.090	-0.123	-0.714	1.386	1.448	-0.085	0.196	0.701	0.131	-0.132	1.615
13	-1.015	0.332	-1.014	-0.242	0.003	-0.452	-0.422	5.160	3.295	2.582	2.929
14	-0.719	-0.729	0.760	0.345	0.338	0.452	-0.156	-0.037	0.442	1.680	0.062
15	0.707	1.380	0.839	-0.762	0.693	-0.554	5.620	-0.412	-0.810	-0.700	-0.687
16	-0.070	-0.095	0.365	0.830	-0.213	-0.647	-0.162	-0.115	-1.259	-0.495	-0.522
17	-0.517	-0.680	0.010	0.679	0.280	-0.529	-0.375	-0.248	0.518	1.313	1.707
18	2.268	0.621	0.494	1.232	-0.657	-0.386	-0.266	-0.429	-1.319	-0.692	-0.650
19	3.268	1.257	0.724	0.003	0.440	-0.524	-0.490	-0.527	-1.322	-0.580	-0.671
20	2.641	0.040	1.423	1.148	-0.240	-0.480	0.191	-0.296	-0.938	-0.537	-0.569
21	-0.967	-0.874	-0.814	-0.007	0.858	-0.599	-0.050	0.023	0.610	-0.650	-0.316
22	-0.573	-0.724	-0.234	0.236	-0.079	1.502	0.384	0.978	0.201	0.622	-0.020
23	0.353	0.058	-0.160	-0.760	0.947	-0.490	0.001	0.070	-0.765	-0.550	-0.515
24	0.086	0.605	0.030	0.281	-0.415	-0.468	-0.338	-0.260	-0.899	-0.523	-0.569
25	-0.305	-0.803	0.035	0.147	-0.363	0.377	0.044	0.543	1.620	0.602	0.429
26	-1.016	-0.843	-0.369	0.385	0.879	0.420	0.834	0.998	0.024	0.482	-0.323
27	-0.832	-0.236	-0.695	-0.437	-0.812	-0.111	-0.487	-0.593	0.293	-0.700	-0.563
28	1.195	4.504	-0.210	-0.878	-0.290	-0.283	-0.411	-0.499	-0.771	-0.034	0.622
29	0.667	0.361	-0.120	-0.872	-0.979	-0.602	-0.429	-0.602	0.544	-0.696	-0.610
30	-0.056	-0.085	-0.338	-0.688	-0.044	-0.416	0.047	-0.192	0.056	1.122	0.323
31	-1.028	-0.675	-0.936	0.256	-0.113	1.714		-0.579	-1.207	0.370	0.172
32	-0.438	-0.412	-0.935	-0.865	0.963	-0.430	0.141	0.343	0.095	-0.180	0.705
33	-0.933	-0.827	-0.946	-0.906	1.733	-0.659	-0.483	-0.598	-0.784	-0.700	-0.647
34	1.203	-0.396	-0.300	-0.553	-1.185	-0.586	-0.483	-0.518	-0.317	-0.695	-0.664
35	0.980	0.151	-1.071	-0.844	-0.643	-0.696	-0.435	-0.558	-0.641	-0.700	-0.609
36	-0.863	-0.433	0.173	-0.941	-1.495	-0.672	-0.488	-0.599	-1.136	-0.700	-0.626
37	-0.787	-0.658	0.398	-0.679	-1.264	-0.657	-0.108	-0.375	-0.673	-0.700	-0.675
38	-0.843	-0.545	-0.828	-0.868	0.855	1.261	-0.455	-0.307	-1.314	-0.388	-0.563
39	0.526	0.160	-0.641	-0.853	-1.026	-0.691	-0.426	-0.628	0.164	-0.700	-0.625
40	0.583	-0.010	-0.946	-0.863	-0.804	-0.612	-0.455	-0.601	1.756	-0.700	-0.514
41	-0.141	-0.374	-0.912	-0.923	-0.552	-0.672	-0.459	-0.590	0.332	-0.700	-0.609
42	-0.948	-0.796	-0.913	-0.984	-1.495	-0.705	-0.479	-0.628	-1.222	-0.639	-0.626
43	-0.016	-0.274	-0.530	-0.733	-1.072	-0.635	-0.523	-0.374	-0.152	-0.695	-0.593
44	-0.914	-0.720	-0.586	-0.882	-0.500	-0.523	-0.378	-0.281	-1.324	-0.452	-0.530
45	-0.214	-0.462	-0.902	-0.899	-1.483	-0.665	-0.385	-0.623	0.391	-0.605	-0.518
46	-0.987	-0.777	-0.430	-0.072	-0.441	-0.544	-0.477	-0.289	0.240	-0.609	-0.645
47	-0.593	-0.283	-0.907	-0.621	-1.353	-0.628	-0.458	-0.602	-0.375	-0.494	-0.639

48	-0.808	-0.364			-0.868	0.166	-0.506	-0.586	0.041	-0.639	-0.589
49	-0.931	-0.788	-1.013	-1.001	-1.550	-0.679	-0.515	-0.628	0.545	-0.688	-0.548

#### 4 Discussion of impacts of outlier vessel penalties

Vessels have been repeatedly demonstrated to trade off the costs and benefits of fishing in different locations and at different periods (e.g., Eales and Wilen 1986, Haynie and Layton 2010, van Putten et al. 2012). Any incentive that significantly increases the cost of catching PSC would reduce the likelihood that vessels would choose to fish in high bycatch areas and/or at the highest bycatch time periods.

In evaluating different incentives, the question is whether they provide enough of an incentive to alter vessel behavior and if so, to what degree. Because these changes may be costly, the Council may also wish to consider whether additional avoidance and the fuel, time, and lost product value that may result are justified.

In all of IPA documents, there is a discussion that true outliers should be defined based on 3-years (or 3 seasons) of average behavior above the threshold. This is one definition among many of “consistently high bycatch.”

After 3 seasons of high bycatch under the CP IPA proposal or three consecutive A or B seasons under the Inshore SSIP IPA proposal, a penalty season/year would apply. Anytime a vessel is within 1 Standard deviation of the seasonal average for CVs or 1.5 standard deviations for the CPs, the vessel would have to be above these thresholds for 3 more seasons/years before an additional penalty would apply.

An important consideration is that this any penalty is relative to other vessels, and not absolute. Thus if one vessel has more difficulty avoiding bycatch, it could face penalties even if all vessels are working hard to avoid bycatch. However, because it is difficult to determine if a vessel is encountering bycatch based on chance, intent, or inherent vessel limitations, this may be an acceptable risk in the context of salmon PSC reduction. Chinook PSC rates from 2011-2013 have been low compared with historical rates. There has been a narrowing of vessel bycatch rates with the annual highest levels declining significantly. The impact of these measures based on standard deviations would change in periods of rare Chinook encounters.

Several factors combine to determine how much of an incentive a particular measure would imply:

- How hard or expensive is it to change behavior?
- What time frame of behavior modification is necessary to not be penalized?
- How large is the penalty?

As indicated in Tables 1 and 2 of this document, Table 1 of the CP SSIP IPA document (Appendix 1) and Table 8 of the June 2014 Salmon Bycatch Discussion Paper 1, this definition of “outlier” or “consistently high-bycatch” makes few vessels subject to the penalties. In general, vessels largely fall below the proposed standard of “outlier.” Because of the lack of persistence of vessels having high bycatch by this definition, it does not appear that it would be very burdensome for vessels to avoid the penalty. Largely, avoidance of the penalties will occur without changing behavior, but the few vessels that enter a third year with the potential to have a penalty apply would have additional incentives to avoid Chinook. In earlier years, vessels close to the threshold might perceive some additional incentive to avoid it.

Through these proposals, penalties would apply to vessels observing extreme behavior for a prolonged period of time. Thus vessels could have two high-bycatch seasons and then be within 1 or 1.5 standard deviations of the mean and then would not be subject to penalties.

As discussed in Section 7, this analysis is based on the current rules under Amendment 91. If penalties were very strong (e.g., stand down rules) then vessels would adjust their behavior to ensure that they are not in this group, which would be likely to shift the entire distribution of vessel bycatch rates downwards.

The magnitudes to the different penalties are discussed briefly under each individual plan, above. While the potential effectiveness of these proposed penalties requires further analysis, they appear to provide an additional nudge for high-bycatch vessels to avoid bycatch but the restrictions themselves do not seem exceptionally stringent, particularly in light of the time frame for an ‘outlier’ to be identified.

## **5 Requirement for Excluder usage**

The Council requested in October 2013 an informal assessment of the use of salmon excluders by sector. Voluntary reporting by sector representatives indicated a widespread (and increasing) use across all sectors. One of the Council’s requests was consideration of mandating the usage within IPAs themselves (or in regulation).

In the mothership sector, salmon excluders are already employed nearly 100% (with exceptions only for rare occasions such as torn nets, establishment of properly functioning nets, etc<sup>4</sup>) with a pending revision to MSSIP contract formalizing 100% usage (with exceptions as noted). Requirements for their usage in the CP IPA are proposed for January 20<sup>th</sup> to March 31<sup>st</sup> and again from September 1 to the end of the B season. Reporting requirements for usage are proposed by the Inshore SSIP but mandating usage is not proposed under that sector’s IPA. All three IPA’s feedback express concern regarding how requirements on excluder usage are imposed so as to not stifle innovation in design or penalize vessels for some instances where mandatory usage is not feasible (torn net etc). Many of these concerns were also noted in the previous Chinook salmon bycatch discussion paper under regulatory issues with mandating excluder use. This seems most practical under IPAs and not in regulation; however increased reporting requirements (regulatory or through IPAs) would provide additional data on the estimated usage on a haul-by-haul basis.

## **6 Discussion of regulatory changes to IPA requirements needed to impose penalty structures**

As noted in the previous discussion paper, the requirements of IPA applications are in § 679.21(f)(12)(B) (See Appendix 3 of Discussion paper 1: Bering Sea Chinook and chum bycatch discussion paper, June 2014 C-5). Any additional requirement that IPAs must contain could be added as an additional provision to the list of the “(3) Description of the incentive plan. The IPA must contain a written description of the following:...” If the Council’s intent was to mandate that certain specific provisions be included, then consideration should be given to the specificity of the request for inclusion in the requirements (i.e., general language to allow flexibility in modification versus explicit details to ensure consistency in compliance). The pros and cons of specificity in regulations as it relates to contractual agreements have been summarized in Discussion Paper 1 and continue to be the subject of policy-level consideration. No changes to the FMP itself would be needed to modify the IPA structure.

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<sup>4</sup> Letter to C. Oliver from J. Bersch, Mothership Fleet Cooperative (October 2013). Summary included in staff discussion paper: <http://www.npfmc.org/wp-content/PDFdocuments/bycatch/BSAChinookDiscPaper913.pdf>

## **7 Discussion of efficacy of overall proposals in effecting change in behavior/incentives/greater salmon savings**

The behaviors observed to date are a result of the varying bycatch conditions on the pollock fishing grounds and vessel behaviors. The observed vessel behaviors are the results of behaviors that conform to the regulations and incentives in the fishery. Prior to Amendment 91, there were some incentives in place to avoid Chinook through the tier system that was part of the rolling hotspot program (RHS). However, the Council deemed that these were not sufficient and passed Amendment 91 in April 2009.

Since Amendment 91 was implemented in 2011, the hard cap and performance standard have provided a strong incentive to avoid exceeding those aggregate levels. Because of the hard cap, all vessels have an incentive not to catch Chinook at a rate that was acceptable prior to Amendment 91. Each IPA has a different structure to encourage additional incentives intended to reflect bycatch reduction below the performance standard and at the individual vessel level.

Each of the sector-specific IPAs has different components beyond the hard cap. The CP IPA differs from the other two programs in its singular structure based upon area closures for additional bycatch reduction below the cap, relying upon a rolling hotspot system and fixed A-season (and triggered B-season) closures. In the CP IPA, the incentive mechanism below the hard cap is being subject to rolling hotspot closures, potentially for a longer period based on season-level performance. Thus there is an incentive to not be bad, but not a tangible incentive to reduce Chinook as low as possible. Given the trade-offs of catching Chinook and profitably harvesting pollock and the sector's very low Chinook bycatch rate the Council may conclude that this is optimal, but the lack of incentives to absolutely minimize bycatch could raise the mean bycatch rate and impact the definition of "consistently high bycatch." Because there are not strong incentives to have extremely low bycatch relative to the rest of the fleet, being 1.5 standard deviations above the mean will be slightly less common and therefore it is less likely any penalty will apply.

The Inshore Salmon Savings Incentive Program (CV SSIP) and the Mothership Salmon Savings Incentive Program (MSSIP) both have a program to earn credits to be able to use in potential high-bycatch years as well as rolling hotspot programs. However, the nature of these programs is different, with the CV SSIP rolling hotspot program being suspended by design in higher bycatch periods in which the hard cap and performance standard are assumed to provide a sufficient incentive to avoid Chinook. Additionally, the earning and duration of credits is different between the two programs. One credit is earned for each 2.29 salmon saved in MSSIP whereas it takes 3 salmon saved to earn a credit in the CV SSIP. However, credits expire after only three years in the MSSIP versus 5 years in the CV SSIP.

There are additional differences in the existing programs as well as different current bycatch rates and abilities to travel to avoid Chinook. These should be taken into consideration by the Council when imposing modifications to these programs, particularly in a 'one-size fits all' approach to changes which does not best reflect the differential incentives in the three IPAs as well as the relative performance of each sector since 2011. The current documents discuss potential changes to these existing incentives. To fully evaluate the impact of these incentives, they must be considered in the context of the complete range of incentives. These measures are expected to address only very consistent high-bycatch behavior.

All three of the IPAs work to identify "true outliers" or examples of bad behavior. It's debatable to what degree. The choice of a 1 standard deviation or 1.5 standard deviation cut-off is arbitrary and serves simply as a way to categorize performance. There is definitely a random element to bycatch as well as one that result from choices made on the fishing grounds. Should the Council choose to weigh-in on the selection of a cutoff, it should be considered as a policy choice rather than a strict statistical

justification. As a high-bycatch vessel becomes more and more unlike other vessels, the likelihood that its bycatch is the result of chance decreases. However, if some vessels know that they have no chance of being below the point that a penalty is implemented, a lower penalty level (e.g., SD cut-off) could actually reduce the incentive for bycatch reductions among the worst performers. The closer a penalty is to the mean, the more people who would be impacted by the penalty, and in some cases this will be more the result of bad luck rather than intent.

In general, the changes appear to be relatively minor, potentially applying to a small number of vessels, although the incentives could change the behavior of a slight number of vessels that could be subject to penalties. These penalties may serve to increase the incentives on those targeted vessels and poorer performers but it is not clear that this would result in substantial bycatch reduction over the current programs. It is also not clear yet how substantial these penalties might be at the vessel level to determine the likelihood of vessel-level behavioral change.

The time frame over which consecutive years are set for a penalty to be imposed is a policy/judgment call. Requiring three seasons or three years of high bycatch for penalties to apply allows lots of flexibility for vessels to have high bycatch for a period and then adjust. The manner in which both the CP and CV IPA changes are designed would mean that unless a vessel is more than 1 or 1.5 standard deviations above the mean in a season, the vessel could have 2 seasons of high-bycatch behavior before changing their behavior without penalty.

### **Questions for Council Consideration**

This is a rapid analysis of the three proposals based on the condensed time frame available. As the Council goes forward, analysts can better discuss potential incentives by understanding the Council's intent regarding the following questions.

- The Council should determine the purpose and need for modifications to the current bycatch management system for Chinook under Amendment 91: Is the purpose of the Council's request to increase vessel-level incentives, to be more responsive to bycatch levels in years of low encounters or both?
- Does the Council wish to define "consistently high bycatch"?
- Should there be commonly adopted changes to IPAs even if they have different starting points?
  - If so how much specificity does the Council wish to engage in consistent treatment of penalties, bycatch rate time frames, thresholds for defining high bycatch?
  - How would the Council impose specificity? By modifying the 'required elements of the IPAs' in regulation or by alternative means? How does this dovetail with issues raised previously (see Discussion Paper 1) in removing unnecessarily specific regulations for the chum-only Inter-cooperative Agreement (ICA)?
- Are there changes outside of the IPA incentive structure that the Council wishes to evaluate?
- Is the Council satisfied with the proposed additional measures or what changes would it recommend?
- Is the 3-year or 3-season time-frame for identifying vessels with persistently high PSC acceptable?
- Does the Council wish to incentivize bycatch reduction through the threat of punishing a small number of high-bycatch vessels or by providing additional incentives to the entire fleet?
- The MSSIP points out concerns that could come from vessels competing with each other and potentially withholding information on bycatch rates. The Council could consider whether bycatch information sharing should be mandated or whether this could be more effectively written into IPA requirements.

## 8 References

Eales, J. and J.E.Wilen.1986. “An examination of fishing location choice in the pink shrimp fishery,” *Marine Resource Economics* 2: 331–351.

Haynie, A. and D. Layton. 2010. “An Expected Profit Model for Monetizing Fishing Location Choices.” *Journal of Environmental Economics and Management* 59(2): 165-176.

Van Putten, I. E., et al. 2012. “Theories and behavioural drivers underlying fleet dynamics models,” *Fish and Fisheries* 13 (2): 216–235.

**9 Appendix 1: Feedback from IPAs**



May 21, 2014

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**Via E-mail** [[chris.oliver@noaa.gov](mailto:chris.oliver@noaa.gov)]

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Re: Mothership Salmon Savings Incentive Program IPA Representative Feedback  
Re 5 Items for Council Consideration, NPFMC October Council Meeting Agenda Item C-6

Dear Mr. Oliver:

In October 2013, under Agenda Item C-6, the North Pacific Fishery Management Council requested a discussion paper to evaluate several possible measures to refine Chinook salmon bycatch controls in the Bering Sea pollock fisheries. Council staff subsequently requested input from the IPA representatives regarding the potential revisions to individual IPAs to address the Council's suggestions. This memo is prepared on behalf of the Mothership Salmon Savings Incentive Plan (MSSIP) to provide such feedback with regards to the MSSIP. Specific provisions on which such feedback was requested are each addressed in turn.

- 1)** *“Requiring modification of IPAs to include restrictions or penalties targeted at vessels that consistently have the highest Chinook salmon PSC rates relative to other vessels fishing at the same time.”*

For the reasons set forth, we do not believe it is necessary or appropriate to apply additional restrictions or penalties to the mothership sector. The mothership sector received the lowest allocation of Chinook salmon PSC relative to its allocation of pollock. The result of this lower allocation is that MSSIP members are managing their fishery to a lower rate than the other sectors. Due to concern over the risk that its small allocation would prevent the sector from harvesting the sector's quota, the Mothership Fleet Cooperative adopted more stringent restrictions and penalties in the current MSSIP than required by regulation or adopted by other IPAs. Among other provisions, salmon savings credits have a short 3-year duration, which keeps up the pressure to always save salmon in order to replace expiring credits. The MSSIP also includes a year round Rolling Hotspot Closure (RHC) program which

responds to changing conditions on the grounds during the season. This RHC is never suspended irrespective of other factors. Review of the performance of MSSIP vessels operating under these measures shows that they consistently have lower bycatch rates than other pollock catcher vessels fishing at the same time, and that no vessels in the MSSIP consistently have the highest rates.

Modifying the MSSIP to include additional restrictions and penalties fails to acknowledge that the MSSIP already has more stringent restrictions and penalties than required. Additional restrictions and penalties would burden the IPA for no gain and be unlikely to result in any further salmon savings because mothership fleets already have bycatch rates consistently lower than other vessels fishing at the same time. Accordingly, we do not support application of this provision to the MSSIP. If, however, the Council is determined to pursue this approach further, for the sake of discussion, the Council should consider the following several issues, both generally and specific to application to the MSSIP.

- i. “Targeted at vessels . . .” – Bycatch rates in the mothership sector should be assessed at the fleet level, for vessels delivering to a particular mothership.*

As with other provisions of the MSSIP, application of vessel-specific measures should be applied at the mothership fleet level. When fishing in the mothership sector, catcher vessels do not make individual decisions about where and when to conduct their fishing activities, but rather, individual boats organized in a fleet coordinate their fishing activities with each other and with the mothership processor to which they deliver. As such, restrictions or penalties at a single fishing vessel impact the fishing activities of the fleet as a whole. This is why the MSSIP focuses on the fleet level for existing provisions, aggregating credits by fleet and applying Rolling Hotspot Closure program at the fleet level. Mothership fleets decide where and when to fish collectively, employing test tows and information-sharing protocols, so it is at the fleet level where measures are most effective. Fleet management with real-time information gathering, rapid communication, and quick avoidance in response to such information reduces salmon bycatch for the fleet overall. When making test tows, one boat sets out its net while the other boats in the fleet wait to set until the results of the test tow are known. If the test tow reveals high bycatch conditions, the fleet moves on to focus its fishing efforts in an area with lower bycatch rates. One boat that is unlucky to encounter high salmon bycatch is responsible for the rest of the boats in the fleet saving salmon overall. Penalizing this boat that helped save others from having similarly high rates is unjust. While we do not believe proposed additional restrictions or penalties are needed for the mothership sector, to the extent that they are imposed, targeting them at the fleet level is the appropriate way to manage bycatch in the mothership sector and would complement both the fleet management protocols and the existing provisions of the MSSIP.

- ii. “Consistently highest . . .” – Determinations of consistency should be made by comparisons over multiple years.*

High bycatch rates should not be characterized as “consistently highest” unless they occur over several years in a row (*i.e.*, more than two). A vessel’s high bycatch rate in an individual

year may be a function of an isolated occurrence of high bycatch, possibly even a single tow, such as a test tow or an event that leads to a vessel's premature departure from the fishery in that year. Because bycatch rates vary seasonally and from year to year, rates should be measured relative to the average bycatch in each year or season. Aggregating catch, bycatch, and/or rates over a series of years fails to show any consistency across years, as performance in a single year could lead to erroneous conclusions. For instance, if three years are lumped together, a vessel with poor performance in one year with high bycatch could be identified as having consistently high bycatch even if and when that vessel did not fish at all in subsequent years (in such a case, it would be more correct to identify that vessel as having an inconsistent pattern of participation in the fishery). Only those vessels that consistently deviate above a specified range from the average should be identified as "outlier" vessels that consistently have higher bycatch rates. Statistical methodology suggests that this measure should be greater than one standard deviation above the mean. To be fair, this measure should be a multiple of the mean if bycatch rates are distributed narrowly or are remarkably low; there is a big difference between an outlier vessel in a year where the average bycatch is sixty salmon and one in a year where the average bycatch is only six.

*iii. "Highest Chinook PSC rates . . ." – Use of a ranking method should be consistent with IPA incentives and not penalize reductions in bycatch.*

For any IPA, comparison of high bycatch rates to average performance should be just one metric to identify vessels that would be restricted. Comparatively high bycatch rates should be considered in combination with a trigger, such as exceedance of the vessel's own pro rata share of the Annual Threshold, or some fraction thereof. Otherwise, use of this "ranking" methodology will unfairly penalize vessels that have taken steps to reduce their salmon bycatch. For instance, a vessel that experiences a significant bycatch encounter early in its fishing year may decide to "stand down" and transfer its remaining pollock and Chinook PSC to a vessel able to avoid bycatch by fishing at a later time, after bycatch conditions have improved. If, however, the vessel is concerned about being designated an outlier status and subjected to additional restrictions and penalties in future years, that vessel may feel pressured to continue fishing during a time of high bycatch in the hopes that it will avoid bycatch and lower its rate, or at least harvest more of its pollock quota before being impacted by further restrictions and penalties. Bycatch rate ranking alone diminishes the effectiveness of the incentives in an IPA.

Further, shifting the focus from overall salmon bycatch reduction to a ranking of vessels defeats the incentives to share salmon bycatch information in order to reduce salmon bycatch overall. Instead, rankings create incentives to reduce salmon bycatch only more than the next guy. Rather than reporting high salmon bycatch conditions, vessels will have an incentive to competitively hoard such information, or even mislead others, in order for some other vessel to stumble into the same high bycatch area and be designated as the outlier. A perverse incentive to trip the other guy to get ahead is not an effective way to save salmon.

This provision would also penalize vessels or fleets that have dramatically reduced their bycatch. Reduction in rates should be encouraged, not punished. If, for example, the entire fishery were to reduce its bycatch rate to an average of 95% below the Annual Threshold, the highest bycatch rate could be only a 90% reduction, which itself is an exceptional reduction below the performance standard. Vessels or fleets that achieve remarkable reductions should not be restricted or penalized – they should be acknowledged for a demonstrated commitment to reducing salmon bycatch, and encouraged to continue their efforts as much as possible.

- iv. *“Relative to other vessels . . .” – Bycatch rates of should be compared against rates in the fishery as a whole.*

Ranking vessels relative to other vessels in the same IPA contradicts incentives for an IPA to reduce its salmon bycatch. For any IPA that has had success in reducing salmon bycatch, such as the MSSIP, it would punish improved performance and substantial reductions in bycatch rates. Punishing participants in an IPA with strong bycatch reduction performance would send a clear message to other IPAs that have yet to achieve the same reductions: “reduce bycatch and be penalized even more.” The resulting incentive is not to reduce bycatch, but rather to cluster bycatch performance among participants in an IPA as much as possible close to a mean, no matter whether high or low, in order to seek safety in the herd and avoid the dreaded outlier status. Moreover, comparing amongst an IPA rather than the fishery as a whole encourages adoption of strategies to mask consistently higher bycatch rates, reducing compliance with the IPA to a shell game rather than a program to align fishermen’s incentives with the goals of reducing salmon bycatch.

Comparison of vessels to determine which have “consistently highest” bycatch rates also necessarily depends on the number of the sample size amongst which the comparison is made. Calculation of a standard deviation from the mean is skewed by use of a smaller sample size. The smaller the sample size, the higher the likelihood that any individual member of the sample would appear to demonstrate a consistent pattern merely by coincidence. These issues affect all IPAs, but is most pronounced the smaller the sample, as in the case with three motherships. Unless each has exactly the same bycatch rate, one is statistically certain to exceed the standard deviation. Accordingly, performance of individual vessels and mothership fleets should be compared against the fishery as a whole, not against other participants in the same IPA.

- v. *“At the same time . . .” – Bycatch rates should apply moving averages, as shorter time periods would introduce errors and arbitrary divisions with misleading results.*

For rapid response to bycatch conditions on the grounds, such as in responding to test tow information, fleets rely on immediate reports from the mothership vessels. However, IPAs rely on observer data as the most accurate bycatch information. As observer information may change based on observer protocols and debriefing, this information is not immediately available in-season. Thus, season-by-season information should be used to calculate outlier

status to determine whether additional restrictions or penalties apply to outliers in future seasons.

For finer time scales within seasons, moving averages should be used rather than month-by-month or week-by-week performance. Calendar based time periods introduce arbitrary divisions, obscuring trends and reducing the utility of the bycatch information being reviewed. For instance, a mothership fleet may spend the majority of a week in town while the mothership offloads between trips, returning to the grounds on Friday or Saturday of the week. If the fleet encounters high bycatch in its first test tow, and moves to another location where its first tow is harvested on Sunday, a Sunday through Saturday weekly reporting period would artificially skew that fleets' prior week bycatch rate to appear to be high when overall, throughout the trip, it may achieve substantially lower rates by employing such precautionary methods. Moving averages, by contrast, remove the misleading influences of short-term fluctuations and highlight longer-term trends that inform meaningful actions.

**2) *“Requiring use of salmon excluder devices at times of year in which Chinook salmon encounter rates are relatively high.”***

Since 2010, the mothership sector has voluntarily adopted sector-wide use of salmon excluders at all times, as reported in its annual Coop reports and in response to a Council request for the October 2013 meeting, and as recently formalized in a pending revision to the MSSIP approved by the Mothership Fleet Cooperative Board of Directors as an additional measure beyond that required in current regulations. If made mandatory, required use of salmon excluders should make allowances for maintenance and testing of the salmon excluders (e.g., repairs, determining effectiveness and/or proper functioning, etc.). Salmon excluders should also not be defined in regulation, as effective designs vary depending on vessel and trawl configurations. While salmon excluders developed under EFPs have shown promise, the tests to which they have been subjected do not fully account for variability in vessel and trawl design, including vessel length and horsepower and different net or codend characteristics. Moreover, fixed definitions of salmon excluders stymie innovation, preventing the adoption of improvements that would continue reducing salmon bycatch rates, which is the more appropriate focus of evaluation. The Members of the MSSIP remain committed to the use of and seeking further improvements in the performance of salmon excluders in the mothership sector.

**3) *“Requiring a lower base rate beginning September 1.”***

This proposed provision appears to assume that all IPAs abide by a Rolling Hotspot Closure (RHC) program at all times, which is not the status quo. The MSSIP does include a full-time, responsive RHC program; however, assigning a base rate that does not reflect the conditions prevalent on the grounds would reduce the effectiveness of its functioning. A lowered base rate may result in assignment of more closed areas, but not appreciably change bycatch as fleets displaced by such closures find bycatch conditions outside of the closures higher than the arbitrarily assigned base rate. For an RHC program to be effective, it must be based on actual conditions in real time, not arbitrarily assigned.

**4) *“Provisions to shorten the pollock season to end when pollock catch rates significantly decline and Chinook salmon PSC rates increase in October.”***

Historically, the mothership sector has often fished through the end of the B season; shortening the season is highly likely to prevent the full harvest of the mothership sector allocation. While in the last couple of years the mothership sector has been able to finish well in advance of the end of the season, this has been through the good fortune of fishing conditions allowing for high pollock catches and low salmon bycatch conditions at the same time. Due to the interannual variability of fishing conditions, this cannot be relied on as predictive of future B seasons. Shortening the B season also reduces the effectiveness of the tools available to respond to salmon bycatch. Less time available to catch allocated pollock quota results in increased pressure to catch pollock regardless of bycatch conditions, removes the option to stand down in the face of high bycatch conditions, and reduces the time available to search for lower bycatch areas. Shortening the pollock B season is likely to simultaneously reduce the ability of the mothership sector to catch its quota and increase its salmon bycatch. This proposed provision does not appear to be consistent with the October Council motion in that it removes flexibility to harvest pollock in times and places that best support goals of salmon bycatch reduction.

**5) *“Closing the fishery to a sector (or cooperative) if the sector’s (or cooperative’s) weekly Chinook salmon PSC rate exceeds a specified rate in September and/or October.”***

This proposed provision presents several similar problems. For all sectors, data lags between triggering a closure and the closure going into effect will result in higher bycatch – if a coop or sector knows or suspects a total fishing closure is imminent, it will be pressured to fish as much as possible in the meantime to get as much pollock quota caught as it can before the closure goes into effect, regardless of bycatch conditions. Vessels would feel pressured by the limited time in which to catch their quotas; there would be no time to relocate to areas of lower bycatch rates or to wait for conditions to improve. This provision removes flexibility to harvest pollock in times and places that best support goals of salmon bycatch reduction and is inconsistent with the October Council motion.

Also, as discussed above, using a set weekly period is misleading and arbitrary. This is particularly a concern later in the B season when there may be only one or two vessels or fleets in a sector (or coop) that are still fishing. A sector or coop will be more at risk of closure if arriving on the grounds on a Saturday than on a Sunday, especially if the vessel or fleet encounters high bycatch rates and decides to move to find areas of lower bycatch. Use of a moving average would mitigate this; a threshold amount of pollock should also be considered to avoid isolated test tows with higher bycatch triggering a closure.

Allocations of PSC already establish a de facto annual bycatch rate that will result in closure to an entire sector. The MSSIP, with its smaller PSC allocations relative to its allocation of pollock is already bound by a more restrictive annual bycatch rate than the other sectors. Establishing another weekly bycatch rate limit on top of a cumulative annual bycatch rate would unjustly expose the sector (or coop) subject to the lowest cumulative annual bycatch rate to further jeopardy.

**Conclusion**

The mothership sector's experience under the MSSIP has demonstrated the effectiveness of an IPA to achieve salmon bycatch reductions. Motivated by the desire to earn salmon savings credits and informed by a robust RHC program, the members of the MSSIP have managed salmon bycatch to levels far below the performance standard. MSSIP members have worked hard under their low allocation of Chinook salmon PSC to develop additional measures, such as recently adopted Best Management Practices (BMPs), which further reduce salmon bycatch to the extent practicable. However, with the exception of the required use of salmon excluders (included in the BMPs), many of the provisions proposed in the Council's October motion undermine incentives in the MSSIP. With regards to the mothership sector, we do not believe they are necessary or appropriate. We urge the Council to recognize the differences between IPAs and to avoid adopting provisions that would interfere with the success of the MSSIP.

Regards,

A handwritten signature in black ink, appearing to read "James P. [unclear]". The signature is fluid and cursive, with a long horizontal stroke at the end.

MSSIP IPA Representative





## Inshore SSIP Response to October 2013 Council Motion

The Inshore SSIP has discussed the Council's October 2013 salmon bycatch motion and as a result is providing the following responses items 1 -5. (It didn't appear that item #6 was looking for a response from the IPA groups.)

- 1) "Requiring modification of IPAs to include restrictions or penalties targeted at vessels that consistently have the highest Chinook salmon PSC rates relative to other vessels fishing at the same time."

There are several ways to interpret this statement as to how an IPA should be modified. The Inshore SSIP group took it on from the perspective of 2 separate parts: 1) identify vessels that consistently have the highest Chinook bycatch rates, and 2) restrict or penalize those identified vessels relative to other vessels fishing at the same time.

The Inshore SSIP group wanted to be sure that high bycatch vessels are identified due to their behavior, not by chance. ("Chance" includes things like vessels that are the first to test tow an area with previously unknown high bycatch, vessels towing in an area thought to have low Chinook bycatch only to find out bycatch conditions have changed, etc.) To accomplish this goal the decision was made to use a typical statistical analysis of "standard deviation from the mean".

A retrospective of both seasonal and annual individual vessel Chinook bycatch revealed that vessels with bycatch one standard deviation above the mean were likely candidates for consideration as high bycatch vessels. However, on a single year basis, there are overwhelming examples of vessels that ended up in this category not because of bad behavior, but simply due to bad luck. Going from a single year basis to a 2 year period greatly reduced the number of vessels that met this qualification purely by chance, but still left a strong possibility for misidentifying vessels that are truly the desired targeted "behavior based" class of vessels. Once a 3 year analysis was implemented the odds of a vessel being identified due to chance were all but eliminated.

Based on those qualifications for establishing true bycatch outlier vessels, the Inshore SSIP IPA would be amended to address identified outlier vessels both seasonally and annually.

- 1) Seasonal outlier restrictions
  - a. A season outliers are identified by having a bycatch rating of 1 standard deviation or greater than the fleet Chinook bycatch mean for 3 consecutive A seasons. Once identified as an A season outlier, the vessel is assigned to tier 2 for the duration of the following A season with no suspension of RHS closures for outlier vessels despite the fleet having reached the 25% Base Cap threshold.

- b. B season outliers are identified by having a bycatch rating of 1 standard deviation or greater than the fleet Chinook bycatch mean for 3 consecutive B seasons. Once identified as a B season outlier, the vessel is assigned to tier 2 for the duration of the following B season with no suspension of RHS closures for outlier vessels despite the fleet having reached the 25% Base Cap threshold.

Application of the seasonal restrictions would be applied to the harvesting vessel, whether that vessel had met the outlier qualifications harvesting its own pollock or harvesting transferred pollock. In other words, this restriction is vessel specific and is intended to cause behavior changes at the wheelhouse level.

## 2) Annual outlier penalty

Annual outlier vessels are identified by having an annual bycatch rating of 1 standard deviation or greater than the fleet's annual Chinook bycatch mean for 3 consecutive years. Vessels identified as annual outliers will receive 1 Savings Credit for every 6 Base Cap Credits not used in the 3<sup>rd</sup> year of the 3rd consecutive year of each 3 year series.

If a vessel were to continue to be identified as an annual outlier in a 4<sup>th</sup> consecutive year that results in a new consecutive 3 year series and therefore the outlier vessel would receive the Savings Credit penalty for that year as well. And so on.

The annual penalty is assessed at the vessel account level. Therefore, this penalty will have a direct effect the available savings for each vessel regardless if the vessel directly harvested its own pollock or transferred its pollock to another vessel for harvest. For transferred pollock, this penalty will incentivize owner/managers to put their pollock into the hands of cleaner fishing vessels and also incentivize vessel operators to keep their bycatch low in order to be considered for harvesting other vessel's pollock in future years. For vessels harvesting their own pollock, they will avoid attaining outlier status in order to maximize their Savings Credit Account.

- 2) Requiring use of salmon excluder devices at times of year in which Chinook salmon encounter rates are relatively high (regulatory or through IPAs).

Chinook salmon excluders have come a long way towards reliability and performance, but are still experimental to some degree. As salmon excluder research and fleet use continues, improvements for salmon escapement will result from both small and large design flexibility. Assuming a regulatory mandate for excluder use would most likely require an excluder definition, future excluder refinements or improved designs would become too constrained.

The SSIP's vessel specific bycatch allocations and incentives promote excluder use and development as currently written and have resulted in wide-spread use. Salmon excluder use is best left to the IPAs, not regulation. Future Inshore SSIP annual reports will include excluder use information by its member vessels.

The Inshore SSIP Agreement would be amended to include the excluder reporting requirement if the Council elects to resolve this issue via IPAs.

**3) Requiring a lower base rate beginning September 1 (regulatory or through IPAs).**

Rolling Hot Spot (RHS) rules are best dealt with by IPAs, the inflexibility of managing RHS programs by regulation has proven to be a less than ideal method. Specific to Item 3, lowering the Base Rate beginning September 1<sup>st</sup> would have negligible benefits towards reducing Chinook bycatch. It would only result in additional closures occurring when Chinook salmon are just beginning to show up on the pollock grounds. Implementing closures at this point in time under a lower Base Rate would, at best, save only a few Chinook and could very easily result in increased Chinook bycatch due to 1) shifting fishing effort into areas of lower pollock harvest rates, thereby extending the season into days with overall higher Chinook rates; 2) may easily result in moving vessels into areas with comparable low, or higher, Chinook rates.

The .035 Base Rate (currently in the SSIP) was originally chosen because it is at a level that does an effective job at both recognizing the presence of Chinook on the grounds and establishing meaningful RHS closures.

A better method for limiting bycatch during an upwards trending time period as found later in the B season is the addition of a 20% "collar" on weekly Base Rate. Limiting Base Rate increases will both identify a larger range of area eligible for closure and increase the number of vessels assigned to Tier 2 status.

The 20% "collar" has been used for chum bycatch reduction over the past several years and is a component of the industry proposed chum salmon RHS IPA option at the 2013 October Council meeting. The Inshore SSIP would amend the SSIP Agreement for this change if an IPA solution for Item 3 is chosen by the Council.

**4) Provisions to shorten the pollock season to end when pollock catch rates significantly decline and Chinook salmon PSC rates increase in October (regulatory or through IPAs).**

The Inshore SSIP is designed to reduce bycatch at all levels of abundance as outlined in the Amendment 91 regulations and has to date done an outstanding job at accomplishing that

requirement. That said, future fishing conditions may, and most likely will, vary significantly from these recent trends. This variability for both pollock and Chinook salmon abundance and interaction exists is demonstrated by a long term retrospective of the fisheries. Predetermined season-ending provisions (essentially triggers) are an inappropriate management tool whether implemented by either IPA or regulation. Pollock catch rates will often vary with tidal weather conditions. Poor weekly catch rates in early fall are often followed by improved catch rates as tidal and weather conditions improve. Chinook bycatch rates will vary as well with rates improving as the fleet fishes later into the fall (as recently experienced in October of 2013).

- 5) Closing the fishery to a sector (or cooperative) if the sector's (or cooperative's) weekly Chinook salmon PSC rate exceeds a specified rate in September and/or October (regulatory or through IPAs).

As previously stated, the Inshore SSIP is designed to reduce bycatch at all levels of abundance as outlined in the Amendment 91 regulations and has to date done an outstanding job at reducing bycatch. Pre-established Chinook PSC rate based closures, implemented by IPA or regulation, will most likely result in the premature closure of the fishery to sectors and/or cooperatives. As well documented in the Amendment 91 analysis, and demonstrated once again by the 2013 fall fishing conditions, Chinook bycatch rates will vary over the course of September and October and across multiple years multiple years as well. Also as mentioned previously, exceeding a specific bycatch rate at one point in time does not indicate that same rate, or a higher rate, will result for the duration of September and October. The 2013 fall fishing season exemplifies this situation.

## Pollock Conservation Cooperative Bycatch Committee

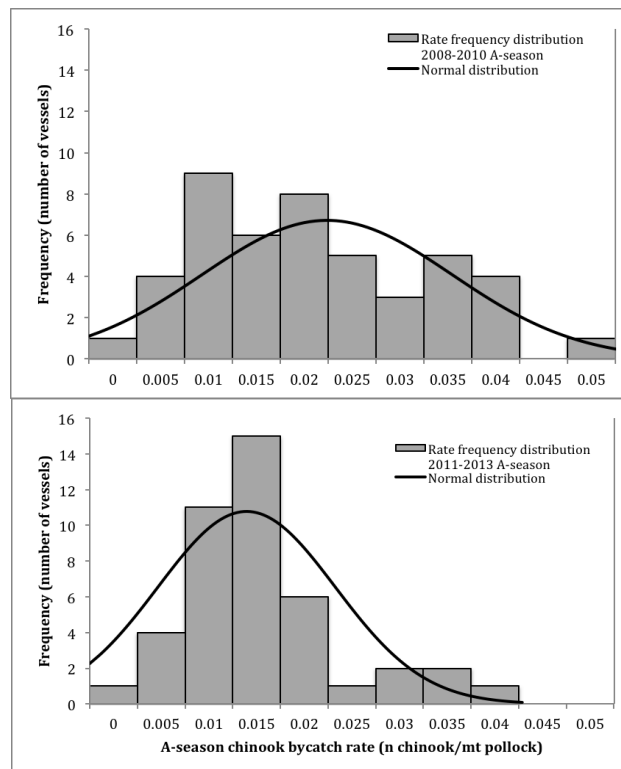
### Chinook salmon action

May 23, 2014

#### Background

Beginning in 2011, Amendment 91 to the Bering Sea and Aleutian Islands Groundfish Fishery Management Plan (BSAI FMP) established limits on Chinook salmon bycatch in the eastern Bering Sea (EBS) pollock fishery. Amendment 91 is an innovative approach to managing Chinook salmon bycatch in that it combines a prohibited species catch (PSC) limit on the amount of Chinook salmon that may be caught incidentally by the fishery with an incentive plan agreement (IPA) and performance standard requirement designed to minimize bycatch to the extent practicable in all years. The approach is designed to motivate fishery participants to avoid Chinook salmon bycatch at the individual vessel level under any condition of pollock and Chinook abundance in all years. The vessel-level incentives are created through contracts among the fishery participants.

This structure—providing industry with the flexibility to design and modify the best tools possible to achieve the regulatory objectives—enables adaptive management by the industry and has demonstrated success since its inception in motivating the CP fleet to minimize Chinook PSC (Figure 1).



**Figure 1. A-Season CP Vessel Chinook Bycatch Rate Frequency Distribution for 2008-2010 and 2011-2013. The normal distribution is shown on each panel to illustrate more easily the**

**narrower distribution and lower mean rate in the later years relative to the earlier years.**

Responding, in part, to higher Chinook bycatch rates by some fleets during the 2011 pollock B-season relative to the previous few years, the NPFMC passed a motion in October, 2013 requesting a discussion paper from council staff relevant to Chinook and Chum salmon bycatch in the Bering Sea. Part of the motion requested that the discussion paper evaluate a list of possible measures to refine Chinook salmon bycatch controls in the Bering Sea pollock fisheries, with a specific focus on the B-season:

The Council requests the discussion paper also evaluate possible measures to refine Chinook salmon bycatch controls in the Bering Sea pollock fisheries. These include:

- 1) Requiring modification of IPAs to include restrictions or penalties targeted at vessels that consistently have the highest Chinook salmon PSC rates relative to other vessels fishing at the same time.
- 2) Requiring use of salmon excluder devices at times of year in which Chinook salmon encounter rates are relatively high (regulatory or through IPAs).
- 3) Requiring a lower base rate beginning September 1 (regulatory or through IPAs).
- 4) Provisions to shorten the pollock season to end when pollock catch rates significantly decline and Chinook salmon PSC rates increase in October (regulatory or through IPAs).
- 5) Closing the fishery to a sector (or cooperative) if the sector's (or cooperative's) weekly Chinook salmon PSC rate exceeds a specified rate in September and/or October (regulatory or through IPAs).
- 6) Changing the accounting of the Chinook salmon PSC limit to begin with:
  - a. the start of the pollock B season (June 10) and continue through the A season of the subsequent year;
  - b. October 1 and continue through September 30th of the subsequent year; and
  - c. September 1 and continue through August 31st of the subsequent year.

In response to this part of the motion, the Pollock Conservation Cooperative has convened several meetings of its bycatch committee, and examined the CP fleet's Chinook bycatch data in detail to consider how to address the Council's stated concerns regarding controlling Chinook bycatch in the Bering Sea pollock fishery.

## Process

Data analysis used pollock catch and Chinook bycatch data from the CP fleet on record since 2000 to examine the fleet's performance in relation to each of the numbered bullets in the motion. Committee members discussed the issues in light of the data presented to them with the lens of determining which actions were likely to have the most influence on fleet behavior with respect to Chinook bycatch while not creating unintended consequences or complications, given that CP vessels have improved performance under the existing IPA. PCC staff then presented members with a series of alternatives and recommendations regarding each point, based on previous committee member discussions. This process was used to arrive at a set of suggested actions.

## Suggested actions and rationale

The PCC's suggested action in relation to Chinook salmon bycatch is to supplement the CP IPA, particularly to address years of low Chinook abundance, as follows to address council concerns:

### Topic: Vessels with consistently highest Chinook PSC rates

*"Requiring modification of IPAs to include restrictions or penalties targeted at vessels that consistently have the highest Chinook salmon PSC rates relative to other vessels fishing at the same time."*

On the topic of vessels with consistently highest Chinook PSC rates relative to other vessels fishing at the same times, the following questions were identified:

1. What is a vessel outlier?
2. What constitutes a "consistent outlier?"
3. What incentives should be employed to deter consistent outliers?

The committee recommends:

A "**vessel outlier**" in any given pollock fishing season would be defined as a vessel whose performance (bycatch rate) is greater than 1.5 standard deviations from the mean of the fleet performance distribution by season. This means that the worst 10% of vessels in the CP fleet would be considered outliers each season.

A "**consistent outlier**" would be defined as three consecutive seasons as a vessel outlier for any one vessel.

The following **penalty structure** would apply for consistent outliers:

- a. After 3 consecutive seasons as an outlier, for the 4<sup>th</sup> season, and all subsequent seasons until the vessel is no longer an outlier, the vessel will be subject to designated hotspot closures defined under the current Rolling-Hotspot program for the entire season, irrespective of their in-season Chinook bycatch rate.
- b. If the 4<sup>th</sup> or subsequent season as an outlier is a B season, Then (a) above shall apply, and in addition, the vessel will be subject to B-season conditional Chinook Salmon Savings Area closures from October 1<sup>st</sup>, regardless of their own or the co-op-wide in-season Chinook bycatch rate.
- c. The vessel will be named on the fishery-wide weekly CP/CDQ IPA report from SeaState Inc.

Information on relative CP vessel performance throughout the season will be communicated to the fleet on a weekly basis.

Rationale:

Examination of relative vessel performance on CP Chinook bycatch shows that, although the fleetwide performance has improved since the IPA has been in place, there are vessels which have been performing consistently better, and those which have been performing consistently worse, over the past 13 years, including recent years (See Table 1). Thus, it is reasonable to create incentives for those consistently worse performing vessels to improve.



**Table 1. CP Vessel Standard Deviations from the mean vessel performance (number of Chinook per ton pollock) by season in each year 2000-2013. Darker green indicates better performance (more than 1.5 standard deviations below the mean in a given season), and darker reds indicate worse performance (more than 1.5 standard deviations above the mean in a given season). Vessel numbers are assigned randomly and are listed in order of their mean deviation over all years (worst to best).**

Vessel	Average deviation (annual)	2000		2001		2002		2003		2004		2005		2006	
		A	B	A	B	A	B	A	B	A	B	A	B	A	B
V04	0.84	-0.97	1.24	1.21	1.78	-0.45	0.33	-0.05	2.86	1.49	-0.53	0.82	1.23	2.58	1.73
V15	0.76					-0.63	-0.14	2.89	-0.17	1.20	0.08	0.24	0.54	0.81	-0.20
V09	0.41	-1.01	1.15	0.86	2.07	0.14	3.23	0.58	0.90	-0.85	-0.97	-0.21	1.79	-0.17	0.90
V05	0.24	-0.97	1.83	1.56	-0.09	0.28	-0.29	-0.46	-0.98	-0.46	1.68	0.56	-0.20	0.53	0.10
V10	0.21	1.08	0.69	0.11	-0.65	3.05	-0.51	-0.21	-0.05	0.29	-1.46	-1.32	-1.50	-1.17	-1.35
V07	0.20	1.73	0.14	-0.64	-0.73	-1.29	-0.31	0.56	-0.12	1.61	0.19	1.95	0.24	-0.18	0.70
V11	0.05	0.86	-0.96	-0.98	-0.21	-0.70	-0.40	0.17	0.54	1.23	-0.55	1.60	0.46	-0.83	-0.44
V12	-0.10			0.02		0.43		0.13		-0.43		-0.19		0.59	
V08	-0.15	-0.99	-0.66	-1.11	-0.72	0.25	0.08	-0.58	-0.60	-0.96	-0.14	-0.49	-1.20	-1.06	-1.13
V03	-0.25	-0.83	-1.13	-0.38	0.79	0.12	-0.30	-0.17	-0.22	0.10	2.09	-0.03	-0.76	-0.24	-1.14
V01	-0.33	-0.53	-0.79	0.04	-0.62	-0.09	-0.33	-1.45	-0.46	-0.22	0.77	-1.11	0.80	0.20	-0.31
V06	-0.51	0.95	-0.26	1.43	-0.82	-0.34	-0.40	-1.00	-0.73	-1.00	-0.64	-1.05	-1.11	-1.10	-0.88
V13	-0.62	0.14	-0.34	-0.67	-0.46	-0.13	-0.44	-0.49	-0.25	-0.88	-0.26	0.28	-0.64	-0.48	1.31
V02	-0.75	0.54	-0.91	-1.44	-0.34	-0.65	-0.53	0.08	-0.72	-1.13	-0.24	-1.07	0.37	0.52	0.71

Vessel	Average deviation (annual)	2007		2008		2009		2010		2011		2012		2013	
		A	B	A	B	A	B	A	B	A	B	A	B	A	B
V04	0.84	0.44	-0.07	1.73	0.24	0.36	-0.61	1.08	2.33	1.01	0.46	0.75	2.84	1.71	2.51
V15	0.76	1.34	1.47	0.10	2.97	-1.07	2.78	-0.24	-0.01	1.11	-1.21	2.32	1.40	1.02	0.86
V09	0.41	1.19	-0.68	0.44	-0.66	-0.18	-0.09	1.80		1.40	1.07	1.08	-0.03	0.71	0.82
V05	0.24	0.85	-0.23	-0.55	-0.46	0.73	-0.73	-0.41	-0.19	1.05	-0.01	0.66	-0.43	0.06	0.20
V10	0.21	0.15	-1.67	0.68	-0.62	-0.84	-0.92	1.79	-0.41	0.52	-0.36	-0.82	-0.47	-0.37	-0.72
V07	0.20	0.01	0.06	0.82	-0.54	-0.92	0.08	-1.00	-0.74	-0.37	-0.45	0.58	-0.57	0.00	-0.83
V11	0.05	-0.90	0.45	0.59	-0.41	1.53	0.45	0.13		-0.88	-0.21	-0.53	-0.56	-0.63	-0.81
V12	-0.10	-1.14		-0.57				-0.11		1.04		-0.89		-0.12	
V08	-0.15	-1.15	0.28	1.12	-0.38	1.74			-0.36	-0.97	-0.59	0.39	-0.10	1.91	-0.65
V03	-0.25	0.46	-1.17	0.52	-0.19	-0.85	-0.76	-0.99	-0.59	-0.16	0.54	-0.34	-0.57	-0.78	0.25
V01	-0.33	1.56	-1.21	-0.82	-0.48	0.18	0.47	-0.23	-0.21	-0.57	-1.18	-1.34	-0.35	-0.28	
V06	-0.51	-1.22	0.33	-1.47			-0.71	0.21	-0.74	-0.80	-0.56	-0.29	-0.45	-0.91	-0.50
V13	-0.62	-0.89	0.86	-1.20	0.44	-0.68	-0.05	-0.97	-0.61	-0.63	2.54	-0.74	-0.22	-1.41	-0.44
V02	-0.75	-0.71	1.60	-1.38	0.08		0.08	-1.06	1.54	-1.76	-0.04	-0.84	-0.50	-0.91	-0.68

Statistical data exploration and analysis of vessel performance over time shows that a reasonable definition of a vessel outlier is a vessel whose performance (bycatch rate) is greater than 1.5 standard deviations from the mean of the performance distribution. This represents roughly 10% of vessels in any given season. In addition, the above definition of a vessel outlier applies at all levels of Chinook and pollock abundance, and all levels of fleetwide Chinook bycatch performance. In other words, even as the fleet as a whole gets better and better at avoiding Chinook, there will always be a worst 10%.

Three consecutive seasons were chosen to define “consistent outlier” because it’s the shortest possible timeframe over which to reasonably establish consistency. This is because it covers two of the same pollock fishing season (i.e. two A-seasons or two B-seasons). Because the pollock and Chinook environment is very different in these seasons, it did not make sense to define consistent outlier on any timeframe shorter than this. For these reasons, the committee saw this as a meaningful definition of “consistent outlier”.

PCC companies also looked at annual performance (in addition to seasonal), but decided that a seasonal timeframe would create a stronger incentive in both pollock fishing seasons, and would act more quickly. The committee also considered excluding from the three consecutive seasons test seasons where total co-op Chinook bycatch is very low (e.g. less than 250 fish), however decided against this exclusion to maintain a stronger incentive.

Data shows that, since Amendment 91 and the corresponding IPA have been in place, one vessel would have qualified as a consistent outlier if the measure were defined as 3 consecutive seasons as a vessel outlier. This activity appeared to be non-random and was the behavior this measure is designed to discourage.

Losing access to good pollock fishing grounds is a particularly strong incentive for CP vessels because of their need for consistent supply of fish to ensure full and efficient operation of the factory. Being forced to relocate increases vessel operating costs and reduces the amount of products that can be produced during a day of fishing. A vessel that retains nearly unrestricted access to good pollock fishing opportunities avoids costs associated with moving and finding pollock in other areas, and so the vessel can produce higher volumes of higher valued products each day.

The penalties described above are seen as meaningful because they create an incentive to avoid limits to pollock fishing opportunities for consistently poorer performing vessels in areas and at times where Chinook bycatch would be expected to be highest during a given season (designated Bycatch Avoidance Areas). In addition, they function using the existing rolling-hotspot avoidance program, therefore additional structural changes to the IPA would not be required to enforce these penalties.

## **Topic: Mandatory use of salmon excluders**

*"Requiring use of salmon excluder devices at times of year in which Chinook salmon encounter rates are relatively high (regulatory or through IPAs)."*

On the topic of mandating use of salmon excluders at times of year when Chinook abundance is expected to be highest on the pollock fishing grounds, the PCC bycatch committee decided the following:

The CP IPA agreement should be supplemented to require vessels to use a salmon excluder while pollock fishing during the A season between January 20<sup>th</sup> and March 31<sup>st</sup>, and during the B-season from September 1<sup>st</sup> through the end of the season. This requirement, similar to the other CP IPA requirements, would be implemented through a signed agreement by CP IPA member companies.

### Rationale:

Salmon excluders now exist that have been shown to be effective at times when Chinook salmon are relatively abundant on the pollock grounds, without significantly compromising the retention of pollock. These excluders are widely available to and in use by the CP fleet already, and discussions with vessel captains and other operational staff revealed that there are not significant operational concerns with complying with such a requirement.

The time periods chosen correspond with the dates within each season where the Chinook bycatch base rate begins to increase or decrease rapidly, as determined by examining this data over the past 13 years. During times of year when salmon are not present on the pollock fishing grounds in substantial numbers, using salmon excluders is more likely to reduce pollock CPUE and prolong pollock fishing into times of higher salmon abundance, which increases the risk of catching more salmon than can be saved due to the excluder. Therefore, mandating their use at these times did not appear effective.

We do not mandate the type of salmon excluder that must be used in order that development and innovation in effective excluder devices can continue in different operational contexts.

### **Other measures:**

*"Requiring a lower base rate beginning September 1 (regulatory or through IPAs)."*

*"Provisions to shorten the pollock season to end when pollock catch rates significantly decline and Chinook salmon PSC rates increase in October (regulatory or through IPAs)."*

*"Closing the fishery to a sector (or cooperative) if the sector's (or cooperative's) weekly Chinook salmon PSC rate exceeds a specified rate in September and/or October (regulatory or through IPAs)."*

*"Changing the accounting of the Chinook salmon PSC limit to begin with:*

- a. the start of the pollock B season (June 10) and continue through the A season of the subsequent year;
- b. October 1 and continue through September 30th of the subsequent year; and
- c. September 1 and continue through August 31st of the subsequent year. “

No recommendations were provided on these issues.

Rationale:

The PCC favors changes that are likely to have the most impact on vessel behavior and which also do not significantly change or complicate the existing IPA provisions, since analysis shows that the existing CP IPA is functioning well. PCC vessels are already performing well in their efforts to avoid Chinook salmon as a whole, and relative to other pollock sectors (Figure 2). Because of this, measures that would penalize the entire sector or a specific co-op as a whole, such as ending the pollock season or closing the fishery early, were not favored.

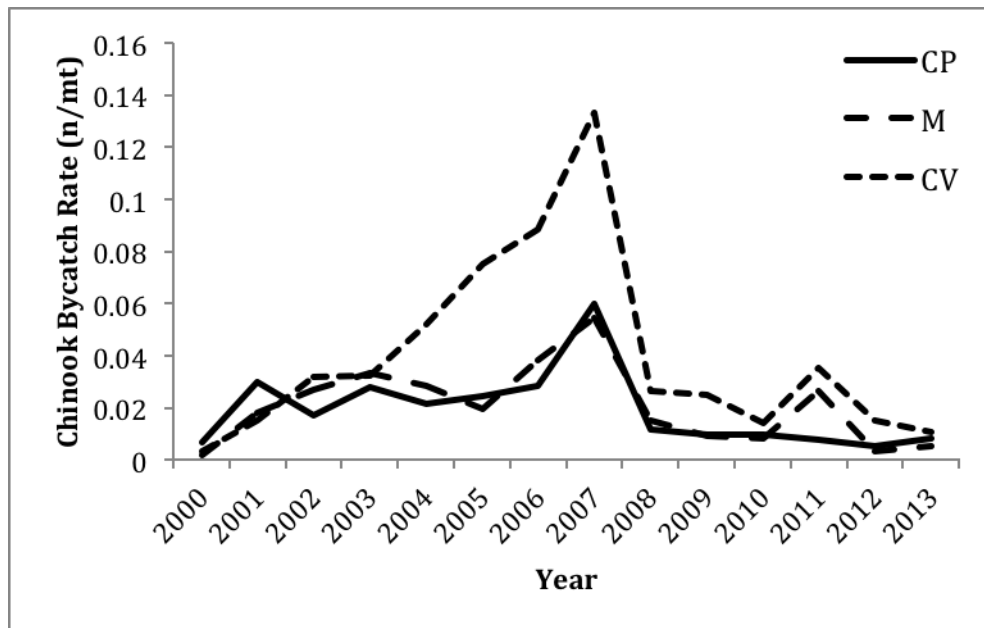


Figure 2. Chinook bycatch rates by year for the Catcher Processor (CP), Catcher Vessel (CV), and Mothership (M) pollock fishing sectors in the Bering Sea.

The IPA measures were designed after looking at 10+ years of data, to provide incentives to avoid Chinook bycatch at times of low, medium, and high abundance on the pollock fishing grounds. For example, while reviewing all of the existing IPA measures, committee members explored the appropriateness of the September Chinook bycatch rate that is used to trigger conditional October Chinook Savings Area closures and found that, although in recent years co-op level average rates have not triggered these closures, they would have been triggered in all years of medium or high Chinook abundance since 2000 (Table 2). As this measure was designed to function in times of medium to high abundance, it was determined that no action was necessary regarding this measure.

**Table 2. September chinook bycatch rates (n Chinook/mt pollock) for 2000-2013. Red cells indicate a rate of at least 0.015, needed to trigger October conditional Chinook Savings Areas identified in the CP IPA agreement.**

Vessel	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
V01	0.002	0.019	0.005	0.018	0.038	0.031	0.018	0.050	0.000	0.005		0.003	0.000	
V02	0.002	0.019	0.001	0.007	0.019	0.030	0.014	0.035	0.005	0.003	0.001	0.004		0.000
V03	0.001	0.004	0.005	0.018	0.062		0.001	0.036		0.000	0.000	0.005	0.000	0.003
V04	0.003	0.016	0.016	0.044	0.016	0.070	0.012	0.036	0.002		0.003	0.006	0.001	0.006
V05	0.005	0.005	0.005	0.002	0.060	0.031	0.011	0.052	0.000	0.000		0.006	0.000	0.005
V06	0.004	0.000	0.005	0.017	0.025	0.015	0.003	0.038		0.001		0.009	0.000	0.002
V07	0.004	0.007	0.009	0.041	0.028	0.046	0.005	0.025	0.000	0.003		0.010		
V08	0.002	0.000	0.007	0.018	0.025	0.010	0.000	0.010	0.002		0.000	0.010	0.000	0.001
V09	0.001	0.046	0.014	0.029	0.013	0.025	0.017	0.060	0.000			0.012		0.007
V10	0.004	0.011	0.001	0.044					0.001		0.000	0.012		0.000
V11	0.001	0.035	0.005	0.039	0.018	0.048	0.003	0.010	0.002	0.009		0.012		
V12							0.002					0.013	0.000	0.000
V13	0.001	0.026	0.004	0.016	0.021	0.020	0.013	0.046	0.001	0.004	0.000	0.031	0.001	0.006
V14	0.002	0.000	0.007	0.003	0.038	0.019	0.010	0.087	0.000					
V15			0.007	0.038		0.061		0.127	0.005	0.018			0.002	0.011
Co-op total	0.0024	0.0137	0.0063	0.0228	0.0291	0.0305	0.0085	0.0431	0.0015	0.0044	0.0013	0.0100	0.0006	0.0046

Changing the Chinook bycatch accounting year to begin any time in the pollock B-season was also discussed, but this was seen to have the potential to create perverse incentives in terms of avoiding Chinook during the A-season, when Chinook bycatch is higher. This is because vessels could feel less need to avoid Chinook in the A-season, knowing already what has been taken in the previous B-season.

### Conclusion

The pollock CP IPA member companies are committed to ensuring their vessels minimize Chinook bycatch to the extent practicable while fishing for pollock, and evidence has shown the CP IPA designed in accordance with Amendment 91 has been successful in this effort thus far. However, members are also open to reexamining the functioning of the existing IPA at appropriate intervals, and adjusting as necessary to address new situations or concerns, such as prolonged times of low Chinook abundance. The actions described above are an example of a thorough reexamination in response to the October council motion and in recognition of the continuing Chinook crisis in Western Alaska.