4 Fishing and bycatch performance

Fishing and bycatch performance are characterized by several different measures: PSC amounts and rates by sector and season, rates and cumulative amounts by week by sector in September and October and finally rates by individual vessels by sector. All data is shown from 2003 through A-season 2013. B-season data for 2013 is not available for comparative purposes as the season is continuing through the end of October. Additional information is provided regarding voluntary use of salmon excluders by sector.

4.1 Overview of PSC by sector

In general PSC rates (Chinook salmon per t of pollock) have declined in all sectors since the 2004-2007 period (Figure 9).

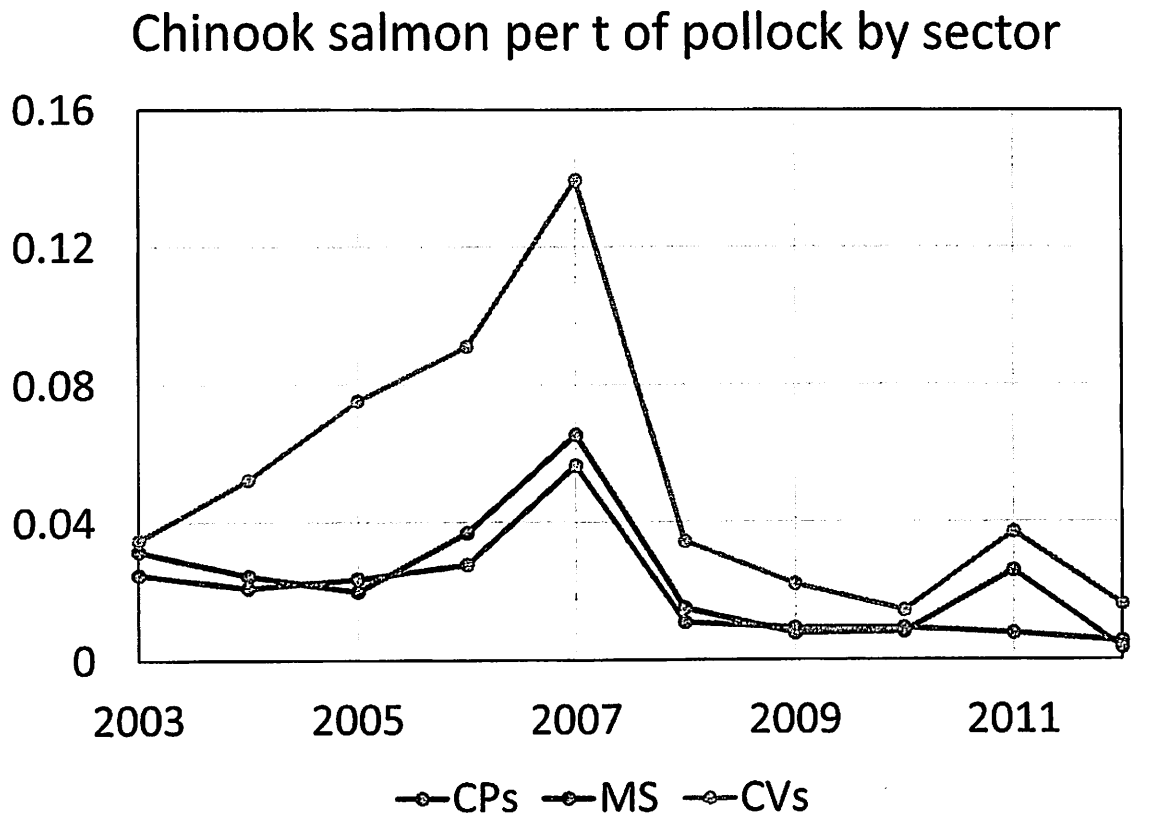


Figure 9. Trends in the annual bycatch rates by sector, 2003-2012.

Table 16 shows the Chinook salmon PSC in finer resolution by number of fish, by month, by sector from 2003 through A season 2013. Table 17 contains Chinook salmon PSC rates (Chinook /t pollock) by month, sector and year. By sector, highest numbers for CPs are in February and March and September and October. Interestingly numbers in October 2011 were the second highest by month over the time period considered after 2007 while the rate for that month while highest for that year was lower in October of 2011 than in the same month in some previous years. For Motherships October of 2011 was also anomalously high over the 2003-2012 time frame for number by month. By rate October of 2011 was the third highest since 2003. Rates for the Mothership sector are generally highest in February and March as well as sporadically in October. For the Shoreside CV sector highest numbers are generally in January/February/March and September/October. By rate however October is high in many of the years

considered unlike some of the anomalies observed in 2007 and 2011 in the CP and M sectors. Typically rates in the shoreside sector are higher than in the Mothership or CP sectors over the time period considered.

Table 16. Chinook salmon PSC (by sector and month, 2003-2013). Source NMFS Regional Office through August 23 2013.

	Catcher processors										
Month	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
1	1,193	1,766	1,912	2,909	5,872	392	1,188	365	185	290	388
2	9,824	3,533	6,855	7,350	15,674	3,150	859	1,659	1,116	1,055	1,833
3	3,340	4,154	2,617	6,955	6,363	1,009	995	1,312	795	1,483	1,783
4	4	0	0	46	0	0	0	65	140	0	31
6	43	385	203	37	36	16	30	1	32	42	31
7	119	435	179	154	52	12	14	6	75	10	12
8	907	881	1,370	149	516	126	121	18	115	19	31
9	1,980	1,974	2,171	729	2,342	106	155	18	572	26	0
10	990	613	393	462	3,854	149	13	8	1,158	0	0
	Mother ships										
Month	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
1	375	203	477	933	1,985	310	99	0	56	110	89
2	1,449	1,233	1,221	3,450	3,092	726	321	220	216	119	212
3	1,056	640	409	1,011	784	236	181	273	183	83	245
4	0	0	0	0	0	0	0	0	4	0	11
6	3	15	90	0	5	0	27	55	7	18	8
7	14	83	63	11	16	6	31	11	17	16	11
8	157	130	160	29	152	8	58	12	30	8	6
9	434	702	432	112	895	71	36	6	72	7	0
10	1,332	977	143	24	2,317	86	0	0	2,297	0	0
	Shore-based Catcher Vessels										
Month	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
1	1,253	1,952	1,856	4,650	14,004	2,949	3,695	875	187	505	566
2	8,118	4,538	9,023	26,004	18,228	6,313	1,427	2,010	2,173	2,532	533
3	5,959	5,086	2,918	4,982	4,231	1,430	1,082	663	1,458	1,470	2,342
4	36	0	0	2	0	0	37	186	623	117	199
6	29	79	551	1,414	545	199	737	434	85	136	237
7	57	208	1,137	994	224	295	249	118	248	55	155
8	171	1,848	3,028	771	697	141	218	110	360	183	318
9	1,830	5,585	4,894	7,019	9,092	1,076	841	453	3,674	990	0
10	4,911	14,275	25,216	12,105	23,268	2,381	162	817	9,584	1,801	0

Table 17. Chinook bycatch rates (number per ton of pollock) by sector and month, 2003-2013). Source NMFS Regional Office through August 23 2013.

CP	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
1	0.055	0.030	0.035	0.057	0.137	0.018	0.070	0.042	0.013	0.019	0.030
2	0.103	0.030	0.054	0.057	0.141	0.036	0.014	0.028	0.012	0.011	0.023
3	0.038	0.049	0.034	0.083	0.072	0.016	0.017	0.021	0.008	0.014	0.014
4	0.002	0.000	0.000	0.082	0.000	0.000	0.000	0.005	0.006	0.000	0.003
6	0.001	0.008	0.006	0.002	0.001	0.001	0.001	0.000	0.001	0.001	0.000
7	0.001	0.003	0.001	0.001	0.000	0.000	0.000	0.000	0.001	0.000	0.000
8	0.007	0.008	0.012	0.001	0.005	0.001	0.001	0.000	0.002	0.000	0.000
9	0.054	0.025	0.027	0.007	0.035	0.002	0.004	0.001	0.011	0.001	0.000
10	0.154	0.049	0.026	0.014	0.120	0.010	0.004	0.004	0.023	0.000	0.000
M	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
1	0.072	0.015	0.035	0.085	0.210	0.110	0.050	0.000	0.022	0.047	0.027
2	0.055	0.037	0.040	0.097	0.099	0.025	0.020	0.017	0.012	0.006	0.015
3	0.052	0.046	0.031	0.088	0.049	0.029	0.012	0.018	0.009	0.004	0.010
4	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.006
6	0.001	0.007	0.010	0.000	0.003	0.000	0.002	0.009	0.001	0.001	0.001
7	0.001	0.004	0.002	0.000	0.001	0.001	0.002	0.001	0.001	0.001	0.001
8	0.005	0.006	0.007	0.001	0.006	0.001	0.003	0.001	0.002	0.000	0.000
9	0.022	0.023	0.022	0.005	0.037	0.005	0.012	0.001	0.008	0.001	0.000
10	0.145	0.077	0.018	0.002	0.183	0.009	0.000	0.000	0.176	0.000	0.000
S	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
1	0.052	0.040	0.039	0.115	0.409	0.117	0.322	0.148	0.012	0.019	0.025
2	0.065	0.036	0.072	0.192	0.160	0.072	0.030	0.051	0.024	0.030	0.007
3	0.055	0.059	0.034	0.059	0.044	0.023	0.014	0.010	0.019	0.017	0.025
4	0.054	0.000	0.000	0.006	0.000	0.000	0.007	0.007	0.018	0.009	0.007
6	0.001	0.003	0.011	0.032	0.009	0.003	0.013	0.009	0.001	0.002	0.003
7	0.001	0.002	0.009	0.010	0.003	0.004	0.004	0.001	0.002	0.001	0.001
8	0.001	0.019	0.033	0.009	0.009	0.002	0.003	0.002	0.006	0.002	0.004
9	0.018	0.064	0.069	0.072	0.143	0.034	0.052	0.029	0.099	0.020	0.000
10	0.135	0.349	0.485	0.200	0.456	0.220	0.045	0.191	0.238	0.084	0.000

4.1.1 Overview of PSC by week in September and October

Given the indication of higher rates annually in the latter part of the B-season, a more detailed consideration of PSC rates by sector are shown for September and October. Figure 10 shows the average weekly pollock catch compared to Chinook salmon PSC rate (salmon per t of pollock) by sector from September 1 to October 31st, 2003-2012. While all three sectors show some increase in Chinook salmon PSC rate for a decline in pollock catch over the weeks starting September 1st, the shoreside sector shows the most dramatic increase of the three sector, particularly around the middle of October to the end of the month. Annual cumulative Chinook salmon PSC and pollock from September 1 to October 31st, 2003-2012 for the shore-based catcher vessels is shown in Figure 11.

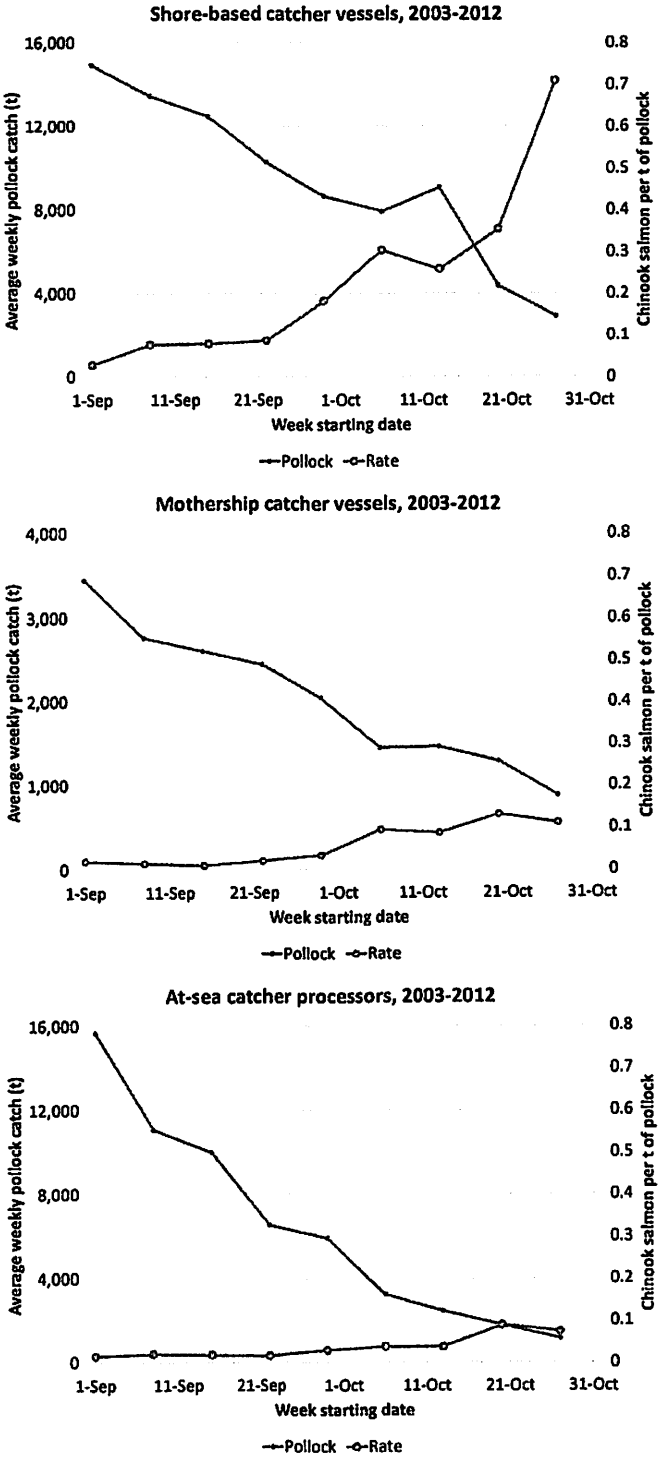


Figure 10. Average weekly pollock catch compared to Chinook salmon PSC rate (salmon per t of pollock) by sector from September 1 to October 31st, 2003-2012.

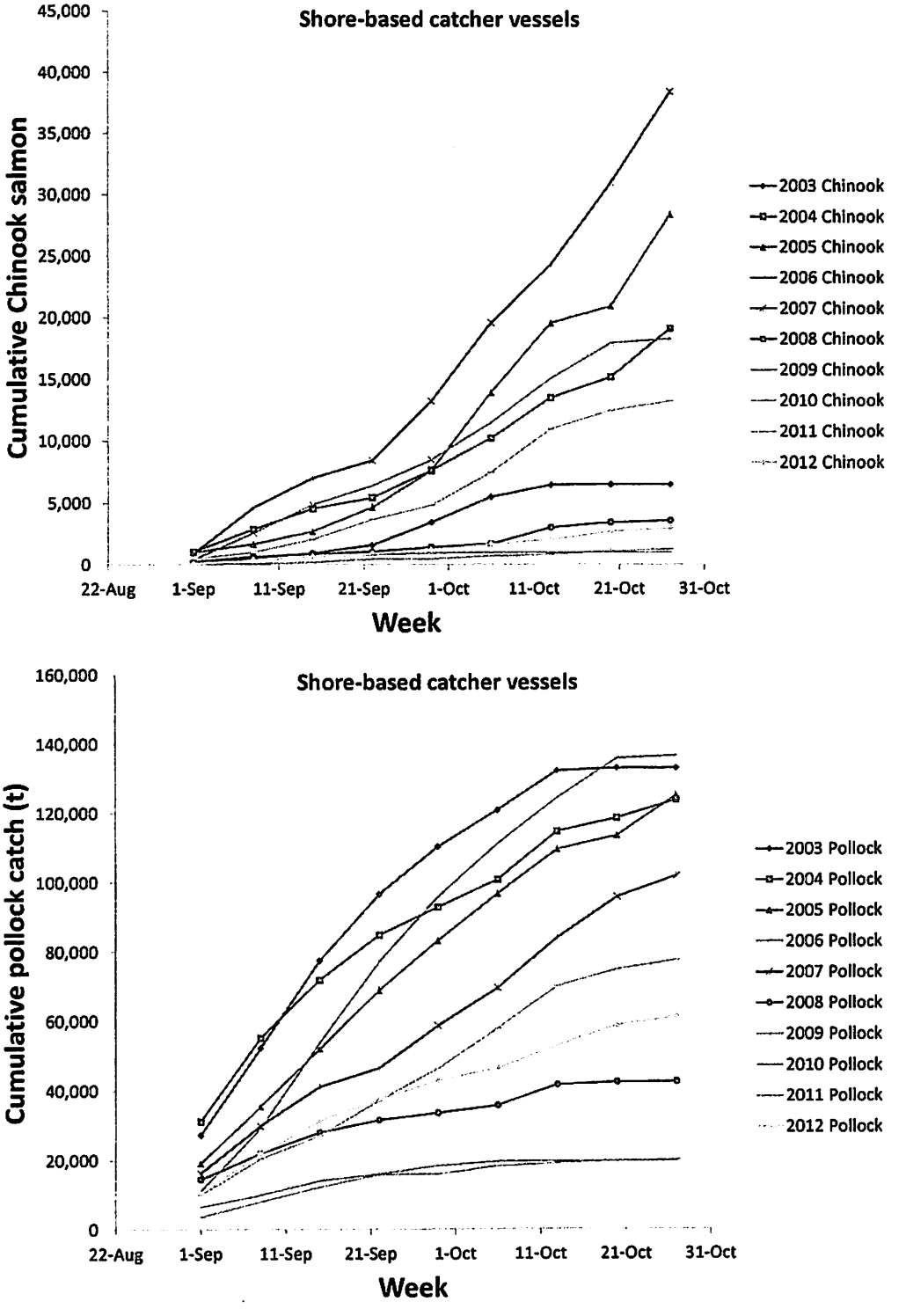


Figure 11. Annual cumulative Chinook salmon PSC (top) and pollock (bottom) from September 1 to October 31st, 2003-2012 for the shore-based catcher vessels.

4.2 Vessel bycatch rates

One aspect of the Council's motion was to specifically evaluate changes over time in individual vessel bycatch rates in order to best evaluate to what extent the management program is affecting individual vessel behavior. The ability to display confidential vessel-specific bycatch is limited, thus some grouping of vessels was required. For this reason, we selected vessels that were among the five highest and five lowest bycatch rates and tracked their changes over time.

For shoreside CVs from 2003-2012 the poorer performers (high bycatch) exhibited some variability but less than the better performers (Figure 12). Less consistency was observed in the trends for CP vessels and Mothership vessels between highest and lowest bycatch vessels however (Figure 13 and Figure 14). These figures indicate that comparing rank within the fleet and how they are changing over time, even averaged over vessels, may be a poor metric of the measures being undertaken to reduce Chinook salmon bycatch.

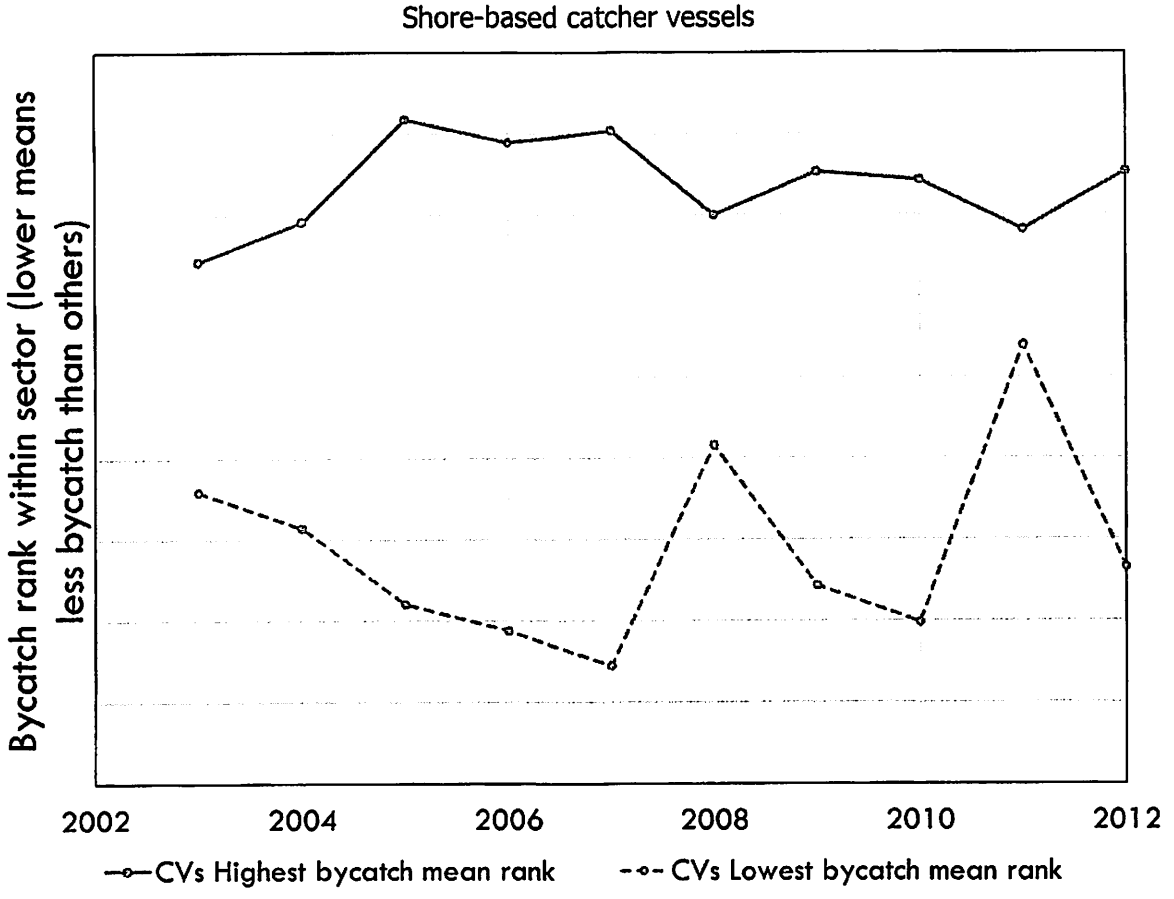


Figure 12. Trend in the performance for the catcher vessels delivering to shore-based plants for 5 of the highest bycatch vessels (top line) compared to 5 vessels with the lowest bycatch rates, 2003-2012.

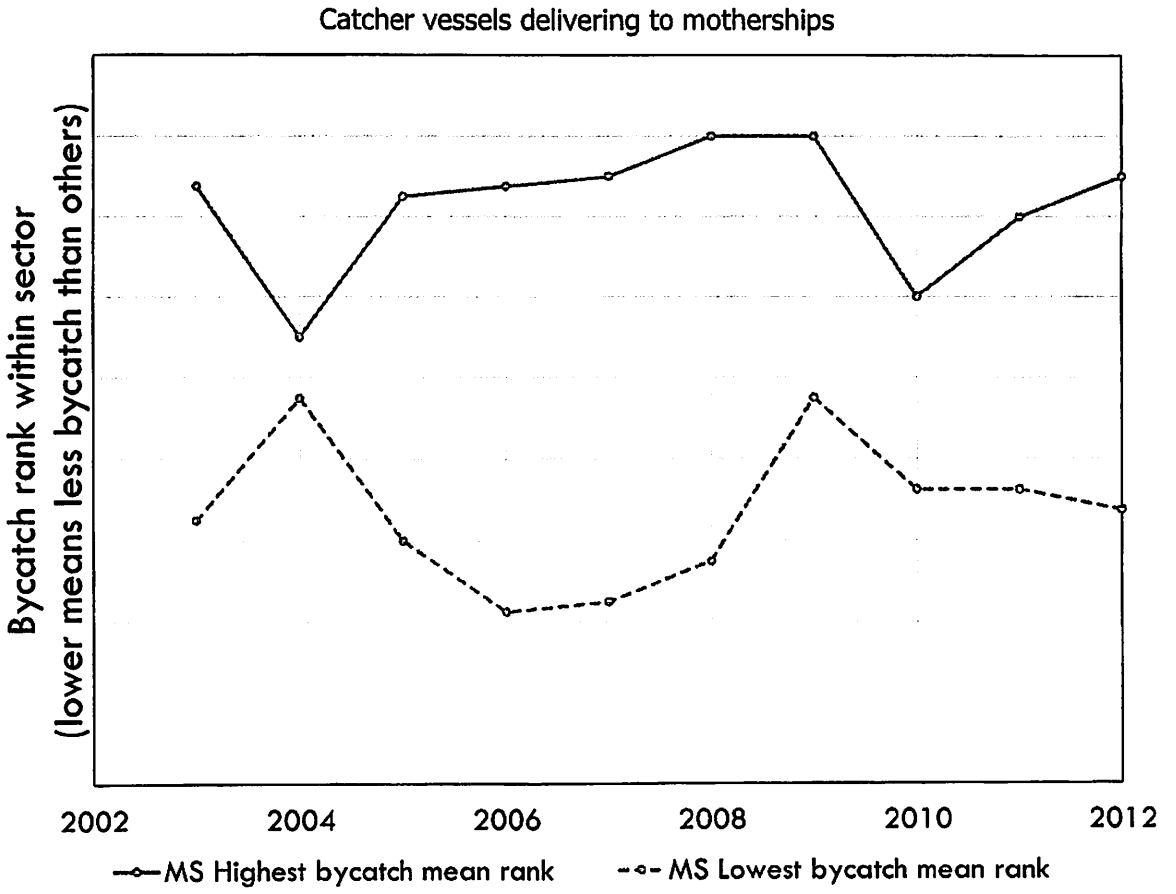


Figure 13. Trend in the performance for the catcher vessels delivering to motherships for 5 of the highest bycatch vessels (top line) compared to 5 vessels with the lowest bycatch rates, 2003-2012.

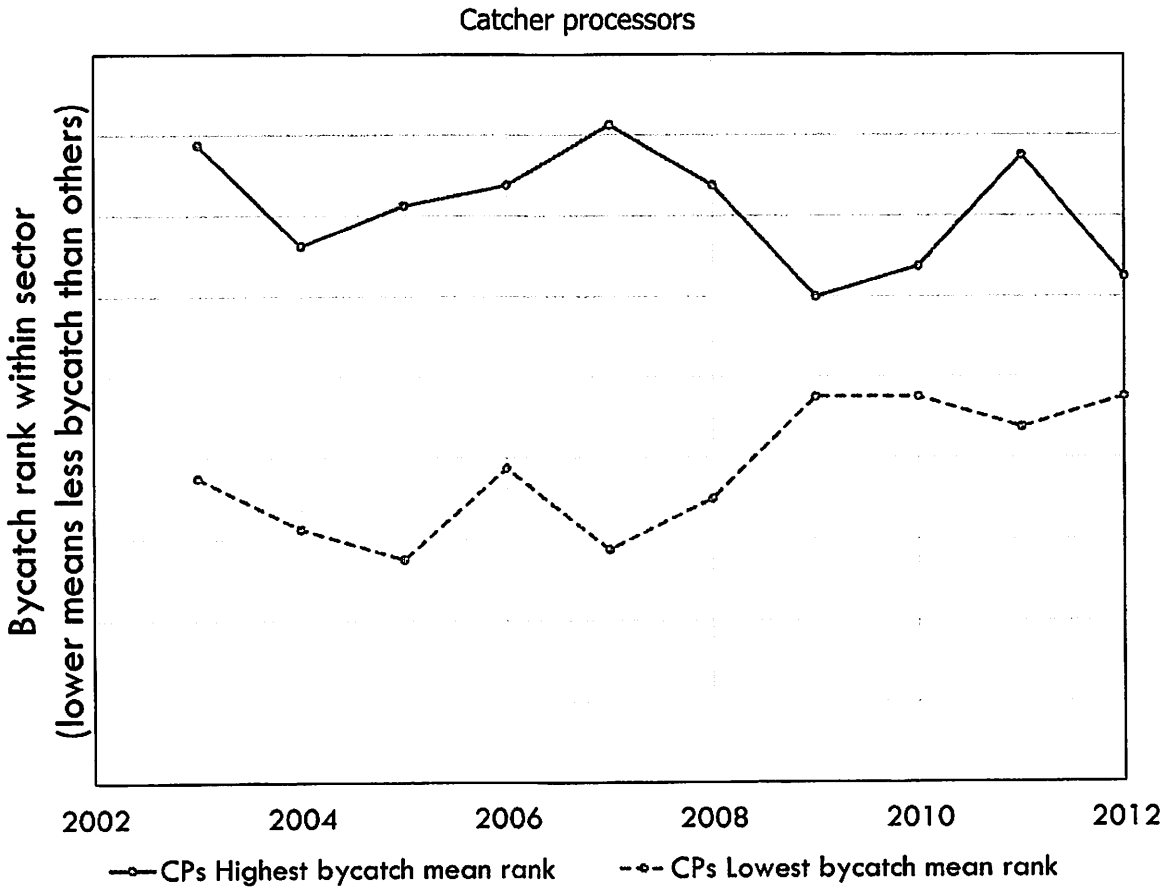
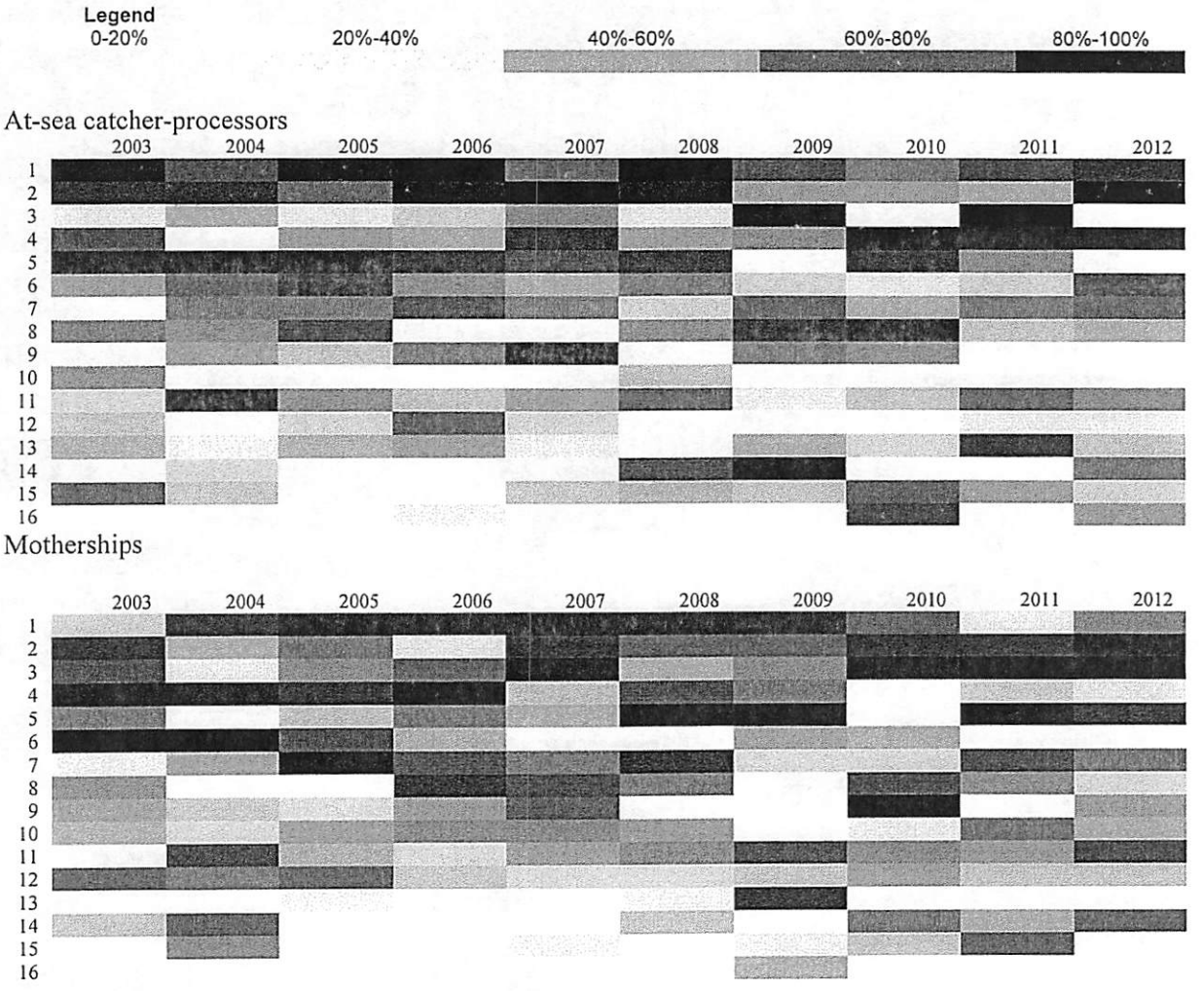


Figure 14. Trend in the performance for the catcher vessels delivering to shore-based plants for 5 of the highest bycatch vessels (top line) compared to 5 vessels with the lowest bycatch rates, 2003-2012.

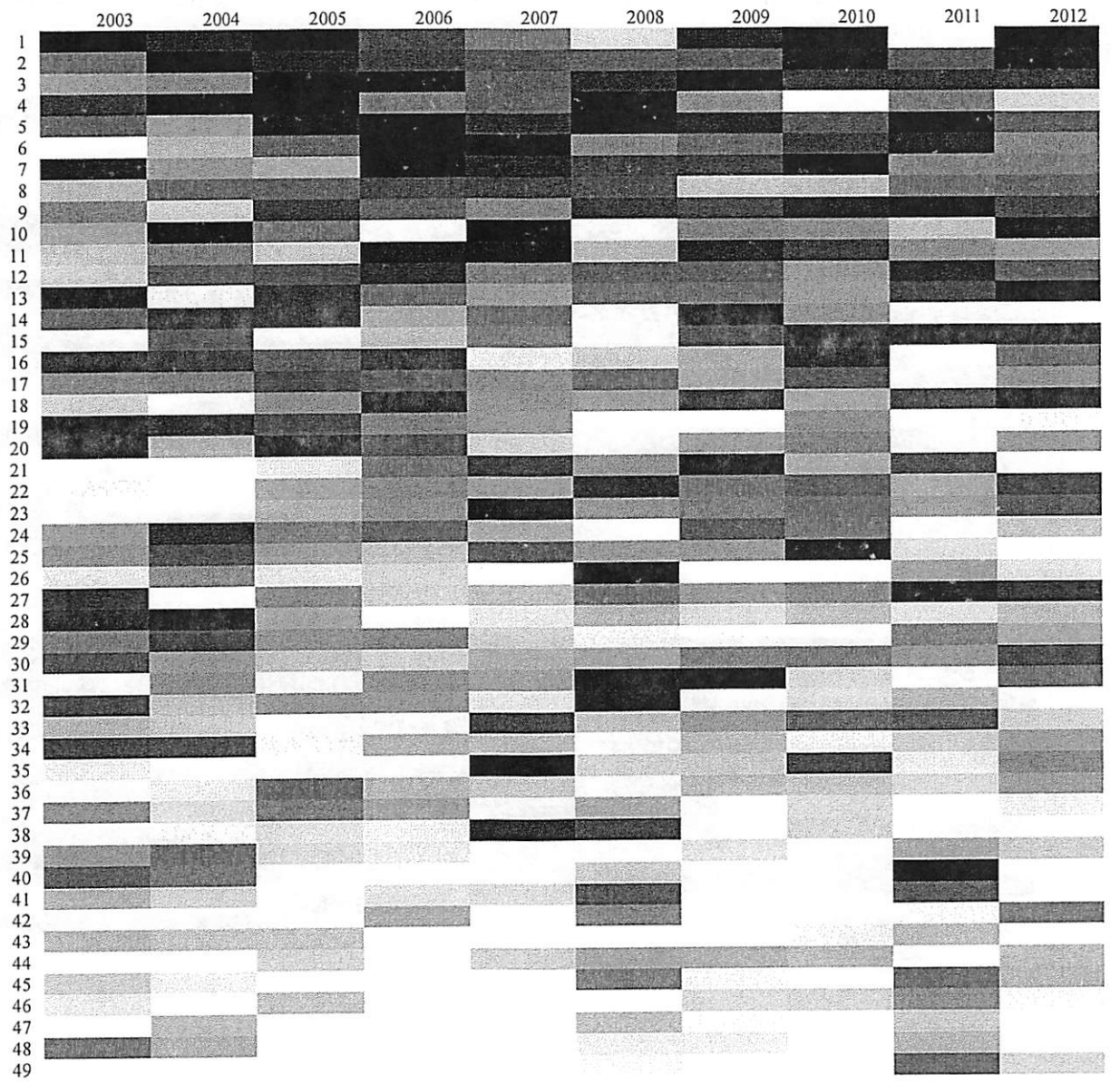
Table 18 shows how specific vessels perform from one year to the next. Ideally this would show a vessels numerical rank within each year such that it's ranking could be clearly displayed from one year to the next and provide some sort of measure of behavioral changes since the program's inception in 2011. Confidentiality concerns prohibit displays of individual vessels ranking and are instead grouped by shaded categories. Furthermore in order to avoid biasing the results by vessels that did not fish in some years, these data have been screened to remove vessels that caught less than 40,000 tons of pollock cumulatively over the time period (2003-2012).

Nonetheless this measure of vessel ranking still demonstrates some consistency in the worst bycatch vessels across all years. There is clearly inter-annual variability such that the worst vessels in general are not the worst vessels in every year. However, it appears that the worst vessels are tending to be together and consistently for the short two-year period of the program (since 2011).

Table 18. Relative ranking of individual vessels bycatch within each year and sector from 2003-2012. The column with the numbers represent a distinct vessel (row) and the shadings show the quintile ranks



Shoreside catcher vessels



4.3 Use of salmon excluders by sector

Salmon excluder devices have been in development for many years and rely on an opening in the in the pelagic trawl net through which Chinook may escape the net before it is hauled back. Excluders are being used more frequently by the fleet now in an effort to avoid bycatch. The Council specifically requested that information be compiled on the voluntary use of salmon excluders by sectors of the pollock fleet. Information related to the usage of excluder devices is not included in data reporting requirements for Amendment 91 however, thus compilation of information related to general usage is provided voluntarily by the fleet in good faith in an attempt to meet the Council's request. Each sector provided different details for their fleets either from previous reports to the Council or specific inquiries since April 2013 of the fleet.. It should be understood that absent reporting requirements (voluntary or mandatory) to note

when a tow is made using an excluder these data are reported qualitatively by participants after the fact (and looking backward several years) in an attempt to best meet the intent of qualitatively describing trends in usage of excluder devices since 2010. Should the Council wish to have this information reported regularly a more explicit request to the fleet to record when excluder are used (and on a tow-by-tow) basis would be preferable to making this request of captains and operators after the fact.

4.3.1 Mothership fleet excluder usage

In order to comply with the Council's request, the Mothership Fleet Cooperative (MFC) representatives sent a letter to the Council describing their voluntary use of salmon excluders since 2010[2]. According to these reports catcher vessels use excluders at all times when fishing in the Mothership pollock fishery. The MFC reports 'fleet-wide' use of salmon excluders beginning in 2010 (one year prior to implementation of Amendment 91). Following Amendment 91 the MFC states that it became 'imperative to MFC members to use salmon excluders to manage the disproportionately low Chinook salmon allocation to the Mothership sector". However catcher vessels in the Mothership sector do not keep logbook records of salmon excluder use, nor does the MFC require the members retain or create such records, thus there are no 'official' estimates recorded of percentage usage of excluders .

Nonetheless, MFC representatives contacted all owners or operators of catcher vessels in the fleet to provide a voluntary estimate of how long they have been using excluders, and whether they are in use at all times during the A and B seasons. Based on this inquiry, 100% of owners and operators confirmed that they have been using excluders for many years, some as far back as 2008. They confirmed their continuous usage in both A and B season in 2012 and 2013. However given the lack of specific records respondents were uncomfortable estimating a relative percentage of usage on a tow-by-tow basis. They did note that the only instances were excluders were not in use were isolated incidences to verify the effectiveness of their pollock catch and verification of proper installation. Rare cases were noted when a spare net was used absent an excluder while the primary net was being repaired. It was noted by MFC that many owners and operators now have excluders on their spare nets as well.

4.3.2 Catcher Processor fleet excluder usage

In April 2013 the Catcher Processor sector provided and overview of excluder use within their sector in conjunction with the CP IPA report to the Council. The frequency with which excluders were used during the 2012 fishery was reported. Figure 15 shows the frequency report included in that document (need ref for CP IPA report) broken out by A and B season, with B-season broken out by early) June through August) and late (September and October) time frames. It appears that use of excluders is slightly more prevalent in the A-season for this sector than the B-season and within the B-season higher usage in the early compared to the latter part of the season.

The CP IPA report notes that while improved escapements of Chinook on the order of 20-40% have been measured in experimental trials, it is nevertheless possible for pollock to escape the trawl, especially during periods when the trawl is short-wired. This was cited in that report as a reason why some vessel captains remain reluctant to exclusively deploy excluder devices particularly when there is 'evidence that that Chinook abundance on the grounds is very low". They further note that in 2013 CP IPA vessels will begin a program to confirm low pollock escapement during haul-back using video observations which may help to promote increased use of excluder devices in the CP fleet. Information is not provided on a tow-by-tow basis.

[2] Letter to C. Oliver from J. Bersch, Mothership Fleet Cooperative. This letter will be included in briefing books for the October Council meeting.

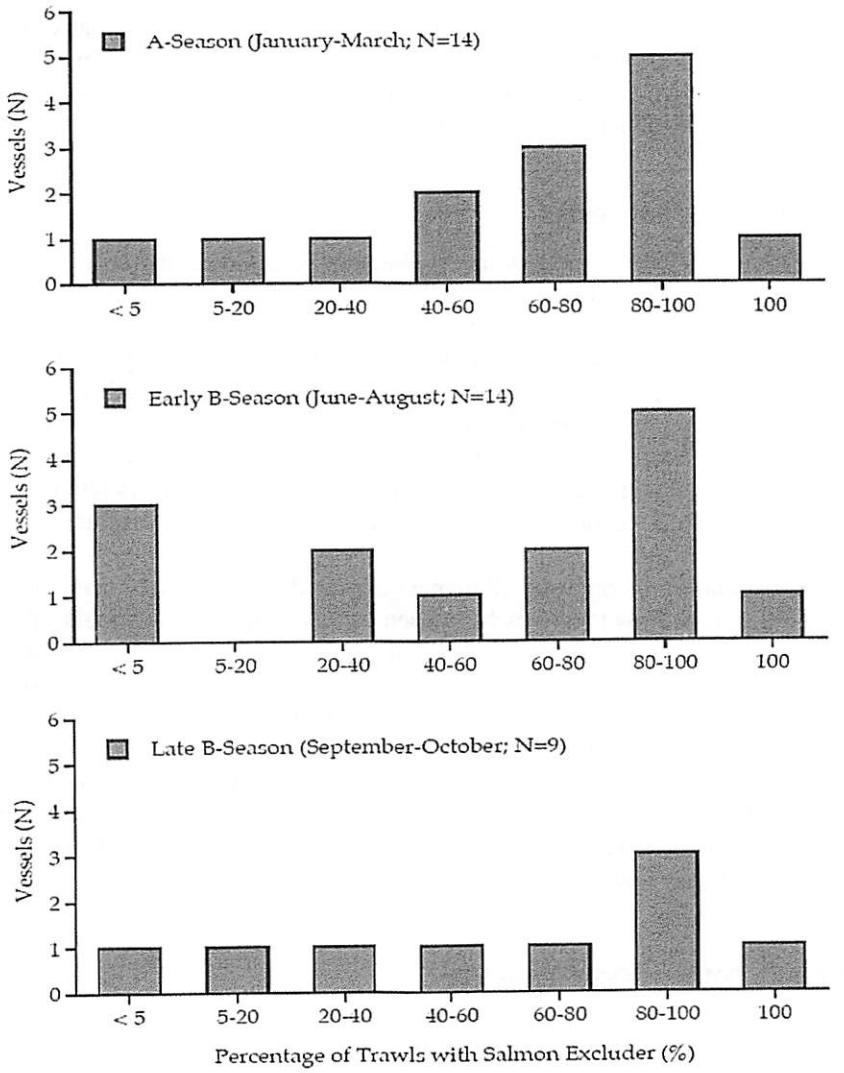


Figure 15. Frequency of IPA Chinook excluder use 2012.

4.3.3 Inshore catcher vessel excluder usage

In order to best respond to the request of the Council, the Inshore catcher vessel sector initiated a survey of all captains to request information on their relative excluder usage from 2010 through 2013 (A-season only). Results from the survey are shown in Table 19. The survey was designed to provide an estimate of the number of actual tows made with an excluder by season. Due to the difficulty in estimation after the fact and the discomfort with providing a hard number absent any records to back that up, operators were asked to provide details on a relative scale of 4 response categories. These categories were the following: "all tows", "almost all tows", "more than half", "about half of tows" and "occasionally". This survey is by necessity qualitative and as with the results from other sectors should be understood to be carefully caveated in the context of a voluntary estimation without records upon which to verify. However it does, nonetheless, provide a general trend of both increased number of vessels using excluders for some of their tows in both seasons as well as increasing excluder usage by tow, particularly in the A-season.

Table 19. AFA Inshore Sector Catcher Vessel Salmon Excluder Use Summary - 2010 A Season through 2013 A Season

Number of Vessels That Fished	Number of Vessels That Used an Excluder	Vessels' Estimated Number of Tows Made with Excluder	Number of Vessels That Fished	Number of Vessels That Used an Excluder	Vessels' Estimated Number of Tows Made with Excluder
2010 A Season			**2010 B Season**		
74	44	28 All 15 Almost All 1 About Half	69	41	26 All 13 Almost All 2 Occasionally
2011 A Season			**2011 B Season**		
69	55	37 All 16 Almost All 2 Occasionally	71	56	28 All 23 Almost All 1 More than half 1 About Half 3 Occasionally
2012 A Season			**2012 B Season**		
72	61	40 All 16 Almost All 2 About Half 3 Occasionally	72	60	28 All 27 Almost All 1 More than half 3 About Half 1 Occasionally
2013 A Season			**2013 B Season**		
72	59	40 All 16 Almost All 2 More Than Half 1 About Half	NA	NA	NA

4.4 Additional measures of bycatch performance

Additional information is summarized here to better list of what other sources of information are either currently available or could be requested as well as analyses that will be available in the future. Some combination of these reports may assist the Council in the future in understanding the efficacy of the Chinook PSC management system.

4.4.1 Update on the Chinook Economic data report (EDR)

Several pieces of information are being collected annually to help analyze Amendment 91:[3]

- Chinook PSC Compensated Transfer Report (CTR)
- Vessel Fuel usage survey
- Vessel master survey
- By-haul salmon-avoidance/vessel movement checkbox in vessel logbooks

The CTR, fuel, and vessel master surveys are collected as annual reports of data pertaining to the calendar year, to be submitted to NMFS by June 1 of the following year.[4] Vessel movement for each haul is captured for in the daily fishing logbook (DFL) for catcher vessels and in the electronic logbook for CP's and motherships.

[3] The Amendment 91 EDR forms and additional information are available at http://alaskafisheries.noaa.gov/sustainablefisheries/bycatch/salmon/chinook/edr/default.htm.
[4] The data are to be submitted electronically through an online reporting portal at http://www.psmfc.org/chinookedr/.

4.4.1.1 Planned timeline for EDR analysis

All data collection for the 2012 fishing year has been completed and data is being prepared for validation and analysis. An administrative report on the data collection, describing the timeline of the data collection process, compliance, data validation results, and a summary of the reported data is in preparation and is expected to be complete by end of this year.

The fuel usage and vessel master survey will provide a considerable amount of data and are being organized and integrated with other fishing data to support analysis of fishing behavior and costs of Amendment 91 on the pollock fishery. AFSC intends to complete this analysis by early 2014. In future years, the EDR will be summarized and the results will be utilized in future salmon bycatch analyses. An important result of the EDR data collection was that compensated transfers were reported for 2012, and a minimal number of vessel moves have been reported via the logbook checkbox. AFSC staff have held several informal meetings and discussions with AFA members regarding the EDR and indicate that the survey design of the CTR and logbook checkbox may require substantial revisions to effectively capture the information the Council intended. Data quality and survey design issues will be addressed in the administrative report being prepared.

4.4.2 Chum salmon PSC management measures environmental analysis (EA)

In December 2012 the Council reviewed the Chum salmon PSC management measures EA and elected to postpone any further action on that analysis at that time. The Council moved at that time to request that industry provide proposals for including chum salmon in the existing sector-specific IPAs for discussion at the October 2013 Council meeting. In conjunction with the Chum EA however, staff made some suggestions regarding reporting requirements that could be included in a revised RHS program for chum and/or add to the ability to evaluate the efficacy of the Chinook measures. These suggestions are excerpted below as they may be relevant to discussions of evaluating the Chinook salmon PSC management program efficacy as well as assist in the discussion of appropriate measures for chum salmon PSC at this time.

4.4.2.1 Reporting requirements and analytical suggestions (excerpt of Section 2.6.5.3 of Chum Salmon PSC management measures EA, December 2012 draft)

The main rationale for these specific reporting requirements is to provide transparency to the activities that actively affect fishing patterns and industry management of the RHS program. Following this, a list of additional information and analyses which could be requested of staff (Agency or Council or otherwise) is provided to indicate what additional information could be provided annually or periodically in order to best evaluate the efficacy of the program. The industry-requested reporting requirements can be derived from data SeaState currently uses for their in-season program. Reporting this information annually (or in-season as noted in the table) is meant to provide the Council and the public with information on the management and efficacy of the program and will complement additional analyses by staff. No additional data collection is envisioned.

Table 20. Suggested reporting requirements in conjunction with selection of a RHS-based management program. Requirements are for annual reporting unless indicated otherwise.

	Requirement	Rationale for requirement	Details and frequency
1	Dates and areas of Chinook closures under IPAs	Better understand relative constraints already imposed	As done by SeaState. Annual or in-season (see further explanation below)
2	Date and area Chinook threshold invoked and relative Chinook rates in other stat areas over time frame	To see whether threshold seems appropriate in when and why invoked based on relative rates in other stat areas	Detailed information on when the chum closures are suspended and based on what Chinook data
3	Sea State summary of closure decision-making	Provide transparency to why a particular area was closed	When closures are modified or extended during the B Season
4	Continue publication of any chum RHS reports sent to the pollock fleet	Continued transparency of reports and closed areas	Following A84, as issued.
5	Listing of advisory closure areas	Additional incentive provided by advisory areas	Need some measure of who fished in test fishing areas
6	Consolidate reporting requirements for both salmon species		To be developed further in conjunction with further action by the Council on this analysis. See below.

Details on these numbered items are as follows:

1. Chinook closures under IPAs: This information is not required under the reporting requirements for Amendment 91. However, understanding the areas and frequency of closures for Chinook would allow for a better understanding of the constraints already imposed on the fleet outside of the measures proposed for chum salmon PSC management. This information is available through the IPA representatives but would require an agreement from each IPA to make this publicly available in conjunction with these reporting requirements. This information could be reported on an annual basis in the annual report to provide broader transparency of management, or in-season (as well) in order to better inform the fleet itself in-season as to high bycatch areas of which they may not yet be aware. Not all closures under IPAs are shared between sectors currently.
2. Date and area Chinook threshold invoked: Detailed information on when the chum closures are suspended and based on what Chinook data (area, time period of calculation, etc.). This would be provided in the annual report. For greater transparency to the public it could be provided in-season.
3. Sea State summary of closure decision-making: collect data from SeaState that would provide additional information on why an area was closed and allow greater transparency about what information is being used which would also allow improved future analysis of when closures are most effective.
4. Continue publication of any chum RHS reports sent to the pollock fleet: when Amendment 91 was implemented, RHS agreements became private and NMFS, the Council, and the public no longer view when RHS were put in place. This requirement will ensure that chum RHS reports continued to be available at the time that closures are implemented.
5. Advisory closure listings: Often the RHS provides additional information to participants on areas which do not qualify as a closure based on criteria but are still potential hot spots that some participants may wish to avoid voluntarily. Currently there are no provisions for test fishing in RHS closures however the revised program under Alternatives 3 and 4 does provide a test-fishing provision associated with modified tier structure in June and July. Some measure of fishing in

those closure areas as well as any information available from vessels fishing in advisory areas would be beneficial in examining the efficacy of these voluntary methods of bycatch avoidance.

6. This item was suggested by NMFS RO staff as a means to better consolidate reporting requirements for salmon PSC by the fleet. Developing the details for this option is incomplete but could happen at the Council request for inclusion in a public review draft.

Table 21. Additional information that could be compiled and analyzed by Agency or Council staff analysts in conjunction with Table 20information provided by industry for evaluating the efficacy of the selected RHS-based management program

	Requirement	Rationale for requirement	Details and frequency
1	Cumulative catch statistics by ADFG area for pollock, chum and Chinook	Allows for comparison with historical data, greater transparency for effectiveness of closures	Data used weekly by SeaState to manage closures in-season
2	Relative ranking of bycatch rates for chum and Chinook by vessel	Measure of performance of incentives to reduce bycatch	Show distribution of rankings over vessels (no vessel identification)
3	CPUE, fuel cost, travel time	Measure of search time for fishing opportunities	Fuel costs from EDR in 2012, distance traveled from VMS
4	Index of salmon impact by species	Relative change in bycatch rates of affected vessels	*See below
5	Summary of % of pollock, chum, and Chinook in closure areas prior to Closure	The larger % of chum is in an area, the more likely the closure will be effective. This reveals whether the RHS closures are capturing much of the effort and salmon PSC	Ideally as part of each report, but if this is infeasible this information could be summarized post-season

Descriptions of these numbered items are as follows:

1. Cumulative catch statistics by ADFG area for pollock, chum and Chinook: The rationale for this requirement is to provide the data that is currently used weekly by SeaState to manage in-season closures in order to allow for transparent evaluation of the actions taken to delineate a closure and for comparison with similar data available historically. These data are easily available from the Observer Program thus requiring this of industry as opposed to tasking staff to compile annually is one negative to this requirement.
2. Relative ranking of bycatch rates for chum and Chinook by vessel: The rationale for this requirement is to give some vessel-level performance comparison under the new management regime to evaluate to what extent the incentives of fishing under the program are effective. The distribution of ranking of vessels within and across years would provide the Council with information in order to assess the performance of the program. Some of the difficulties that would need to be addressed in including this requirement would be issues related to not identifying vessels by name, for including a caveat that there are complications with evaluating vessel trends due to multiple changes in operator and ownership.
3. Data on CPUE, fuel cost, travel time: Providing data on these items will allow for an assessment of the fishing search time undergone in operation under the new management program. Fuel cost data will become available from the Chinook EDR starting in 2012 while estimates of distance traveled could be made available using VMS data and the Catch-in-Areas-database.
4. Index of salmon by species: Some method of accounting for salmon PSC reduction by virtue of the imposed RHS closures should be annually reported. There are multiple methods by which this calculation could be done, understanding that the variability between years may affect the reliability of this calculation. Examples of calculating this index are shown below:
    a. Index of total salmon impact

i. Examines the degree to which there is a measurable average (and/or median) impact on bycatch rates in the period following closures compared to the period before the actual closures.
ii. This follows the work done in the status quo analysis to estimate the observed savings from the closures.
iii. Because there are periods of rising and declining bycatch during given years, this will be most informative over longer time-frames (annual or multi-year) rather than determining whether or not a particular closure is effective.
iv. Other measures of annual impact will be researched and utilized as available.

b. Index of salmon reduction by species for affected vessels:

Use a simple formula which would provide a relative index of salmon savings. E.g., use the rate at the time of closure, the proportion of pollock that occurred in the closed area in that week (or specified time period), and use the "diverted pollock" to come up with an index that can be computed going forward and historically. E.g., let C

$$\hat{C}_{in} = p_{prior} C_{out}$$
$$\hat{S}_{in} = r_{in} \hat{C}_{in}$$
$$\hat{S}_{out} = r_{out} \hat{C}_{in}$$
$$S_{saved} = \hat{S}_{in} - \hat{S}_{out}$$

where $\hat{C}_{in}$ is estimated pollock catch that would have occurred inside closed area given the proportion (p_{prior}) of the pollock that occurred inside the closure prior to the closure and $\hat{S}_{in}$ is the estimated salmon that would have been caught inside the closure given the observed rate r_{in} and estimated pollock) etc.

It's important to note that there are limitations to the method because it is not necessarily a causal relationship. If where and when bycatch occurs is random and areas of high bycatch are identified every period, vessels in the high-bycatch area before the closure will be average in the second (because bycatch is random), and this method would estimate a large salmon savings that would not actually be due the closures. However, bycatch is not completely random, and thus this may potentially provide a useful index from year to year, although the specific numbers should be viewed with caution.

5. Summary of % of pollock, chum, and Chinook in closure areas prior to Closure: similar to the information presented in the status quo analysis, a summary of pollock and PSC occurring in the area prior to the closure would be presented. If feasible, this information could be presented with all reports or alternatively at the end of the season. The following information could be included, reported by sector:
    a. % of pollock hauls and catch inside each closure
    b. % and number of chum and Chinook PSC occurring inside each closure.
    c. Number and % of vessels that fished in each closure.

5 Summary and Considerations for Council in October

The Council requested this report in April 2013 after receiving their second annual report from the IPAs on performance of the Chinook salmon PSC management program enacted in 2011. The Council's primary motivation in requesting this report (as well as the separate reports from the IPAs on their incentive mechanisms) was to consider bycatch management performance measures in the context of the ongoing interest and actions in front of the Council to minimize salmon bycatch and to have the opportunity to evaluate this issue with updated information on directed salmon fisheries and with the most recent genetic information, AEQ analysis and examination of individual vessel performance. Information included in this report provides both an update of what was previously available to the Council at final action in 2009 for Amendment 91 as well as information and analyses that were not available in the 2009 analysis. The latter includes calculated AEQ impact rates by stock grouping at current levels and cap levels, vessel-specific bycatch comparison, and voluntary excluder usage.

Results indicate that overall AEQ has declined considerably from the peak value in 2007. Furthermore, the estimated impact rates to western Alaska have declined in recent years from peaks in 2008 (for CWAK) and 2010 (for Upper Yukon). The regulatory caps that are in place, assuming they could have been reached by the fishery in 2011 and 2012, would have resulted in lower impacts to both CWAK and Upper Yukon than what was estimated for those peak values. The extent that the impact rate has decreased due to measures such as these or due to fishing conditions (e.g., changes in the TAC, overlap of Chinook salmon distribution relative to the pollock fishery, and the concentrations (CPUE) of pollock) is unclear.

The updated genetics sampling has succeeded in improving the precision of the stock composition estimates but remains limited for resolving fine-scale stock separation issues. Should finer scale stock identification become available, estimates of the number of Chinook salmon returning at the same resolution would be employed to better evaluate fishery impacts. Currently aggregate impacts only can be estimated for western Alaska at the resolution of coastal western Alaska and Upper Yukon. Using these recent genetic data results in estimated AEQ to coastal western Alaska that is similar to previous estimates (considered by the Council in 2009). However, the estimated AEQ attributed to the Upper Yukon is higher than previously estimated.

Overall, the pollock fleet bycatch rate (in Chinook salmon per t of pollock) has declined annually while some sectors continue to have disproportionately higher rates in some months. Examinations of individual vessel performance, to the extent this was possible given confidentiality issues, suggests that some vessels are improving their within-fleet rank by lowering their bycatch rates. However, there are still indications that there is some consistency in the worst bycatch vessels across all years. These results were variable. The use of salmon excluders has also increased in recent years both in the number of boats that are outfitted with them and in the regularity with which they are used. More explicit reporting requirements would facilitate estimation of excluder usage.

Considerations for Council: This report is intended as a way for the Council to monitor progress towards their objectives and to begin evaluating the effectiveness of the new measures. Whereas it is premature to make broad conclusions after only two years of data on the program, the results clearly indicate that things are moving in a positive direction. The Council will receive this report at the October meeting in conjunction with the Advisory Panel report and public testimony. They will consider at that time what the appropriate next steps may be and have the discretion to request additional information (e.g., via a discussion paper) or to initiate an action (via an amendment analysis) at any time.

6 References

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