Chum Salmon Bycatch Draft Alternatives: Area closures

Staff Discussion Paper

February 2010

The draft alternatives for the chum salmon bycatch measures include two different alternative time/area triggered closure configurations. The first was developed by staff in 2008 with iterative review and modification by the Council while the second results from work following the December 2009 Council meeting per request for staff to develop new candidate closures. This paper review the following information as it relates to alternative time/area closures: 1- the first alternative closure (already contained in the Council's draft suite of alternatives) and its methodological approach; 2- new candidate area closures; 3-timing and trigger cap formulations and application related to area closures. The full Council motion on the chum salmon bycatch alternatives from December 2009 is attached as Appendix 1.

Sections are labeled according to the structure of the Council's components and options in the draft suite of alternatives. Alternative 3 is the triggered closure alternative, and currently has 7 components with various options beneath each (see Appendix 1). Not all components of Alternative 3 are discussed in this paper. The components discussed include the following under Alternative 3-Triggered Closure:

Component 1: Trigger Cap Formulation

a)   Cap level

1. 25,000
2. 50,000
3. 75,000
4. 125,000
5. 200,000

b)   Application of Trigger Caps

1. Apply trigger to all chum bycatch

2. Apply trigger to all chum bycatch between specific dates

3. Apply trigger to all chum bycatch in a specific area.

Component 5: Area Option

a) Area identified in October, 2008 discussion paper (B-season chum bycatch rate-based closure described on pages 14-15 of December 2009 discussion paper)
b) New areas [to be identified by staff] which are small, discrete closure areas, each with its own separate cap whereby bycatch in that area only accrues towards the cap

Component 6: Timing Option – Dates of Area Closure

New closure dates [to be developed from staff analysis of seasonal proportions of pollock and chum salmon by period across additional ranges of years]

Discussion of components in this paper begins with proposed area options, their relative timing of highest bycatch and proposed methods for application of trigger caps by individual area or for all closures. Where possible staff suggestions are included for modification of language, alternative structure or interpretation of overlapping options. The action before the Council at this meeting is to review area closures and

provide direction to staff as necessary for refining alternatives for Council review in June 2010. The Council will refine final alternatives for analysis at the June 2010 meeting.

Component 5 a: Large area closure

This closure was identified by rate-based analysis delineating regions where average bycatch rate exceeded 0.9 chum salmon per ton of pollock (Fig. 1). Over the entire B season, this area accounts for 49% of the chum salmon on average (1994-2007) and only 12% of the pollock catch (Fig. 1)

Table 1   Area closure coordinates.

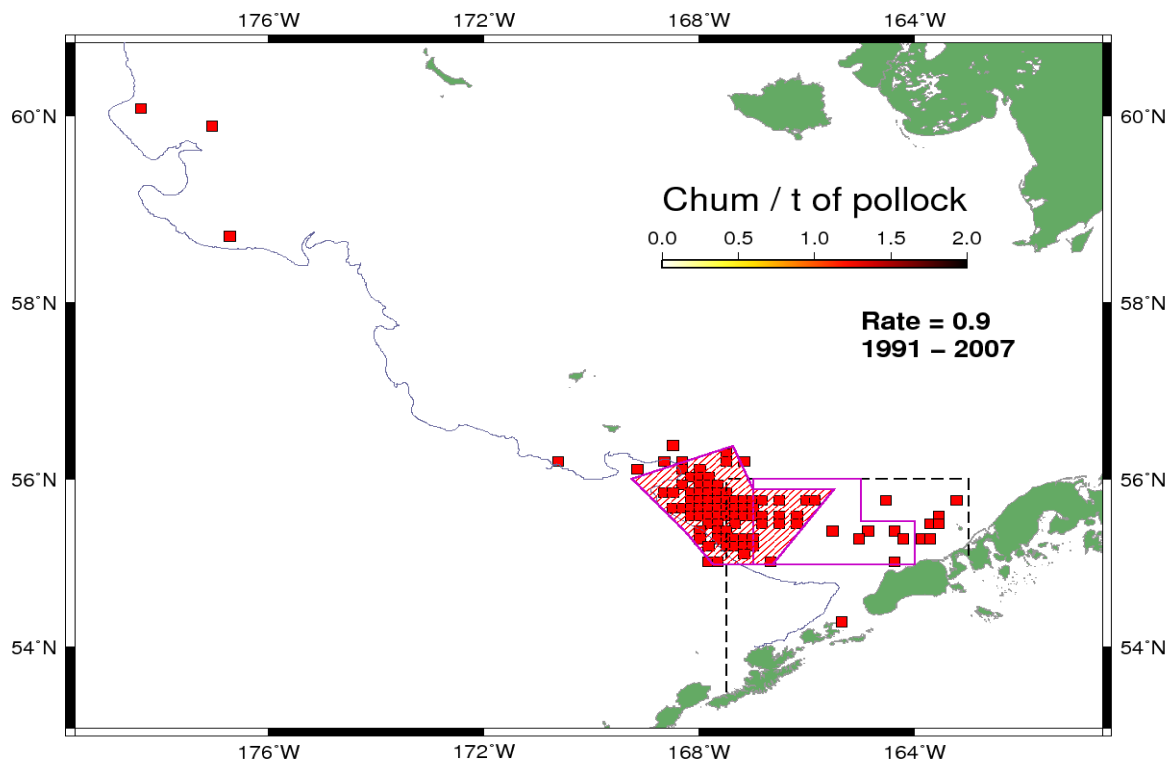| 55° 53'	165° 30'	56° 00'	169° 15'
55° 00'	166° 38'	56° 23'	167° 23'
55° 00'	167° 45'	55° 53'	167° 00'
55° 23'	168° 15'	55° 53'	165° 30'

Figure 1   B-season chum salmon proposed closure (red-hatched closure) over different rates based on 1991-2007 NMFS observer data. Filled in 10x10km cells represent locations where the average bycatch rate exceeded 0.9 chum salmon per t of pollock. Existing Chum Salmon Savings Area closure shown in pink line (no hatching).

Table 2   Average seasonal proportions by periods for 1993-2007 based on NMFS observer data (effort is relative hours towed, salmon are relative numbers, and pollock are relative tons).

Periods	Seasonal pollock proportion	Seasonal "other" salmon proportion	Seasonal effort proportion
Jun 1-7	0%	1%	1%
Jun 8-14	1%	1%	1%
Jun 15-21	2%	2%	2%
Jun 22-30	4%	3%	3%
Jul 1-7	4%	4%	3%
Jul 8-14	4%	2%	4%
Jul 15-21	4%	6%	3%
Jul 22-31	7%	6%	6%
Aug 1-7	5%	9%	5%
Aug 8-14	6%	5%	5%
Aug 15-21	7%	10%	7%
Aug 22-31	11%	7%	11%
Sep 1-7	9%	9%	9%
Sep 8-14	8%	9%	9%
Sep 15-21	8%	9%	9%
Sep 22-30	8%	5%	9%
Oct 1-7	5%	5%	6%
Oct 8-14	4%	4%	4%
Oct 15-21	2%	2%	3%
Oct 22-31	2%	1%	2%

Table 3   Average 1993-2007 seasonal pattern of other salmon bycatch per t of pollock in and outside of candidate closure area by different periods.

Periods	Rate In	Rate Outside	Pollock inside	Chum Inside	Effort Inside
All of B	1.216	0.144	5%	33%	5%
Jun 1-7	-	0.338	0%	0%	0%
Jun 8-14	0.221	0.186	0%	0%	0%
Jun 15-21	0.034	0.283	3%	0%	3%
Jun 22-30	0.372	0.161	3%	6%	3%
Jul 1-7	0.040	0.255	5%	1%	4%
Jul 8-14	0.289	0.104	12%	27%	11%
Jul 15-21	2.473	0.118	8%	66%	8%
Jul 22-31	0.965	0.131	5%	28%	5%
Aug 1-7	3.137	0.138	8%	66%	7%
Aug 8-14	0.607	0.166	6%	18%	6%
Aug 15-21	1.363	0.200	6%	32%	7%
Aug 22-31	0.833	0.109	3%	21%	4%
Sep 1-7	0.970	0.148	6%	30%	7%
Sep 8-14	2.199	0.137	3%	37%	4%
Sep 15-21	1.519	0.128	6%	44%	6%
Sep 22-30	0.963	0.108	4%	25%	4%
Oct 1-7	0.940	0.128	6%	33%	6%
Oct 8-14	1.538	0.153	3%	26%	3%
Oct 15-21	0.817	0.152	7%	29%	7%
Oct 22-31	0.383	0.111	14%	37%	12%

Component 5 b: New candidate closure areas

In December 2009, the Council moved the following as an additional area option to be considered in the chum salmon bycatch alternatives package:

"New areas [to be identified by staff] which are small, discrete closure areas, each with its own separate cap whereby bycatch in that area only accrues towards the cap"

A proposed methodology and candidate closures to address this alternative are provided in this section. The Council may wish to consider whether these statistical area closures meet their concept of small and discrete areas and provide direction to staff at this time for any revisions to area closure alternatives for review in June 2010. At that time draft alternatives for analysis (including candidate area closures) are scheduled to be approved for analysis. Discussion of trigger caps and their application to individual areas based on the range of approved cap numbers is provided following a description of the candidate closures.

Candidate areas were selected from observer data compiled from 1991-2007[1]. State statistical areas were selected as the smallest candidate closures. Initially all statistical areas were considered over all years, understanding that only a subset of areas would qualify for likely candidates. The first step to reducing the candidate areas was to rank them and examine the curvature of the cumulative proportion. This indicates that the top 20 areas had over 80% of the chum bycatch (Fig. 2).
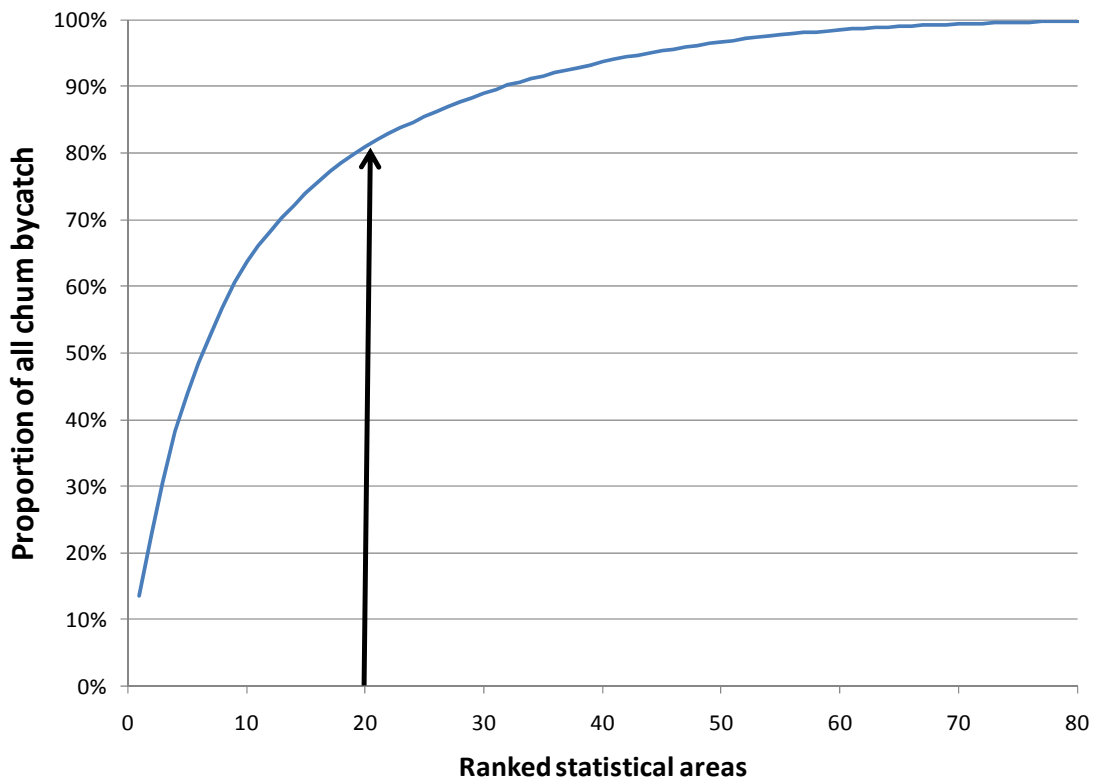
Figure 2.   Proportion of ADFG statistical areas ranked by total chum bycatch. The top 20 areas were selected for further consideration.

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[1]   Data from 2008 and 2009 could also be used for comparison against data compiled through 2007. These data were not easily available for use at this time but per request similar analyses could be evaluated for the June 2010 review of alternatives.

The next step was to evaluate these regions for consistency of bycatch, the bycatch rate (relative to pollock), and the total chum salmon bycatch. The consistency measure was computed as 1/CV where CV is the coefficient of variation of annual bycatch rate (standard deviation divided by mean rate). Weighting each of these three factors equally, combined and ranked provides a way to compare this aggregate measure with the individual criteria (Fig. 3). These areas are shown in Fig. 4. The corresponding statistical area names (6-digit) for these ranks are listed in Table 4.

In order to examine areas together with time (within a year), the data were parsed by area-week (since June 1st). Computing the bycatch magnitude, rate, and consistency along with the aggregate measure as above, shows which weeks and areas had the highest bycatch (Fig. 5). Broken out by week, the data show that total chum bycatch (observed) was highest in mid-July through the middle or end of August, depending on area (1991-2007; Fig. 6). This is similar to the recent years (2004-2006; Fig. 7). However, when 2004-2006 are omitted the timing of the bycatch appears to be primarily from August through mid-September and the "worst" area had relatively little bycatch compared to the areas ranked 2-5 (Fig. 8). The early period with high bycatch (1992-1994) showed similar areas and weeks (Fig. 9).

The weekly rates (chum / t of pollock) over these year groupings indicate a broader variability between locations and times which generally are different from the high bycatch areas (Figs. 10 and 11). This suggests that some of the highest bycatch may have come from areas with low bycatch rates. A summary of highest weeks (overall bycatch and by rate) by area for these various year-sets is indicated in Table 5.

Table 4.   Rank of the twenty highest bycatch areas for chum salmon, 1991-2007, based on observer data only. Ranked areas are depicted in Figure 4.

Ranking	Stat Area	Ranking	Stat Area
1	675530	11	665430
2	655430	12	665530
3	675500	13	655530
4	645501	14	665500
5	655500	15	775930
6	675600	16	755900
7	685600	17	765930
8	685530	18	695600
9	705600	19	755930
10	655409	20	665600
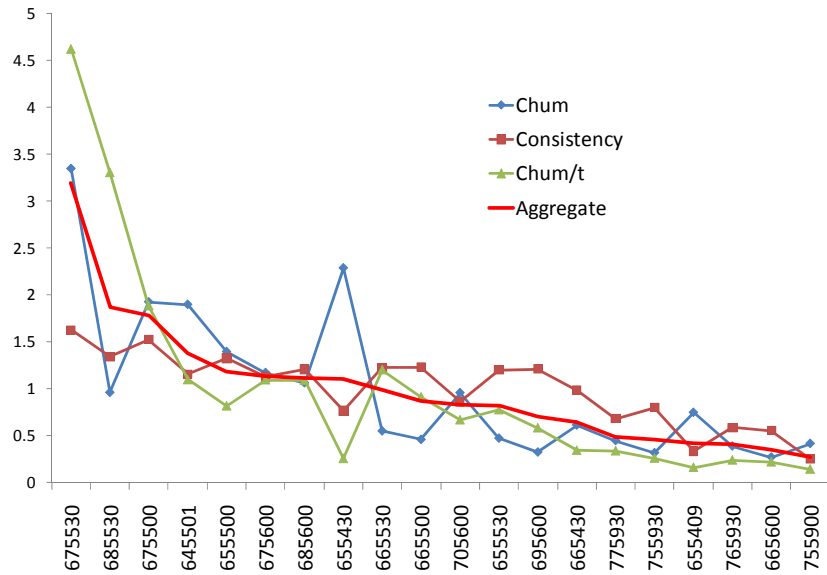
Figure 3.   Ranked selected ADFG statistical areas for all years (1991-2007) showing relative measures of chum bycatch, chum rates (number / t of pollock), inter-annual consistency in chum rates between years, and a weighted aggregate measure of these three factors (based solely on observer data).
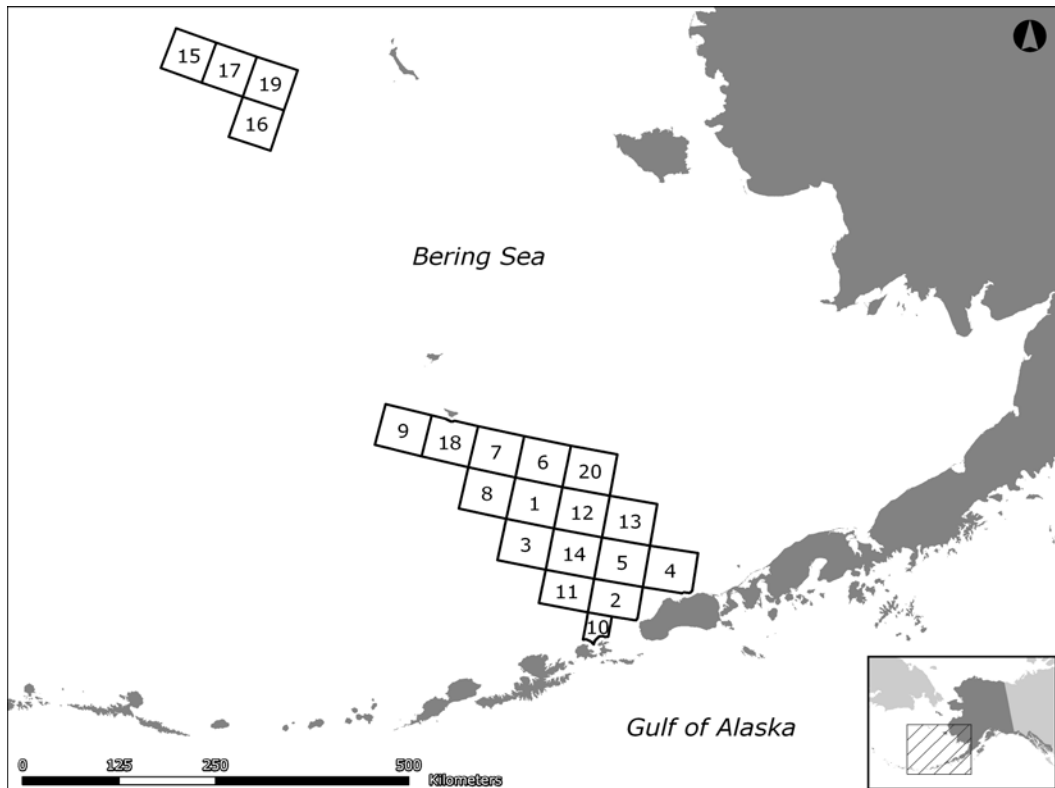
Figure 4.   Top 20 ranked selected ADFG statistical areas by week (since June 1st) for all years (1991-2007) as indicated in Figure 3.

Figure 5.   Ranked selected ADFG statistical areas by week (since June 1st) for all years (1991-2007) showing relative measures of chum bycatch, chum rates (number / t of pollock), inter-annual consistency in chum rates between years, and a weighted aggregate measure of these three factors (based solely on observer data).

Year(s) (All) — Begin week date — Top panel: weekly totals

ADFG Stat Area	1-Jun	8-Jun	15-Jun	22-Jun	29-Jun	6-Jul	13-Jul	20-Jul	27-Jul	3-Aug	10-Aug	17-Aug	24-Aug	31-Aug	7-Sep	14-Sep	21-Sep	28-Sep	5-Oct	12-Oct	19-Oct	26-Oct
675530	0	0	0	0	1	0	1	49	24	53	33	3	26	1	7	17	10	5	3	1	3	0
655430	0	1	6	6	5	3	5	3	4	17	26	14	11	13	12	10	6	7	5	4	1	0
675500	0	0	0	0	0	1	3	2	1	16	4	10	3	4	27	21	17	7	10	4	3	4
645501	0	2	15	9	29	3	1	22	5	2	0	1	1	7	7	13	9	3	3	2	1	0
655500	0	1	3	6	7	4	4	7	7	2	1	2	2	19	6	13	4	4	6	1	0	0
675600	0	0	0	4	0	0	1	3	7	4	6	9	2	15	1	11	4	6	1	10	0	0
685600	0	0	0	1	0	1	0	2	7	9	11	2	3	2	1	3	5	8	3	12	2	3
685530	0	0	0	0	0	0	0	0	21	8	8	5	3	3	0	10	2	4	2	0	0	0
705600	0	3	1	1	1	0	8	1	8	3	4	12	3	4	2	4	1	2	4	3	3	0
655409	0	0	0	1	2	2	1	1	1	4	1	2	2	3	4	9	5	8	3	4	0	0
665430	0	0	0	0	0	0	2	1	3	1	7	13	3	0	4	2	1	0	2	2	0	0
665530	0	0	0	0	0	5	0	4	2	1	0	0	0	2	17	1	1	1	0	3	1	0
655530	0	0	0	1	2	0	1	0	2	1	0	0	0	5	3	3	9	1	0	4	0	0
665500	0	0	0	0	0	2	1	0	2	2	7	6	0	1	4	5	1	0	0	0	0	0
775930	0	0	0	0	0	0	0	0	0	0	0	1	4	13	10	1	1	2	0	0	0	0
755900	0	0	0	0	0	0	0	0	0	1	7	10	2	1	3	1	2	2	0	0	0	0
765930	0	0	0	0	0	0	0	0	0	0	2	11	4	6	1	1	1	0	0	0	0	0
695600	0	0	0	0	0	1	0	0	1	2	5	1	4	0	0	3	0	3	2	1	0	0
755930	0	0	0	0	0	0	0	0	0	1	1	11	1	1	2	5	1	0	0	0	0	0
665600	0	0	1	1	1	1	0	0	0	0	0	1	2	1	2	1	3	1	2	2	0	0

Year(s) (All) — Begin week date — Bottom panel: cumulative totals from June 1st

ADFG Stat Area	1-Jun	8-Jun	15-Jun	22-Jun	29-Jun	6-Jul	13-Jul	20-Jul	27-Jul	3-Aug	10-Aug	17-Aug	24-Aug	31-Aug	7-Sep	14-Sep	21-Sep	28-Sep	5-Oct	12-Oct	19-Oct	26-Oct
675530	0	0	0	1	1	1	50	74	127	160	163	189	190	197	215	225	231	234	235	238	238	238
655430	0	1	8	14	19	23	28	31	35	52	78	92	104	117	129	139	146	153	158	162	163	163
675500	0	0	0	0	0	1	3	5	6	22	26	37	39	43	70	91	108	115	126	130	133	137
645501	0	2	17	26	55	58	59	81	87	89	89	90	91	97	104	117	126	129	132	134	135	135
655500	0	1	4	10	17	21	25	32	39	41	42	44	45	65	71	84	88	92	98	99	99	99
675600	0	0	0	4	4	4	5	8	15	19	24	33	35	51	51	62	66	72	72	83	83	83
685600	0	0	0	1	1	2	3	5	12	21	32	34	37	39	40	42	47	55	58	70	72	76
685530	0	0	0	0	0	1	1	1	22	29	38	43	46	49	50	59	61	65	67	68	68	68
705600	0	3	4	5	6	6	14	15	23	26	30	42	45	49	51	55	56	57	62	65	68	68
655409	0	0	0	1	3	5	6	7	8	12	13	15	17	20	24	33	37	45	49	53	53	53
665430	0	0	0	0	0	0	3	3	6	8	15	29	32	33	36	38	39	39	41	43	43	44
665530	0	0	0	0	0	5	6	9	11	12	13	13	13	15	31	33	34	35	35	38	39	39
655530	0	0	0	1	3	3	4	5	7	8	8	8	8	13	17	19	28	29	29	33	33	34
665500	0	0	0	0	0	2	3	3	5	7	15	20	20	22	26	30	32	32	32	32	33	33
775930	0	0	0	0	0	0	0	0	0	0	0	1	5	18	28	28	29	31	32	32	32	32
755900	0	0	0	0	0	0	0	0	0	2	8	18	20	21	24	26	28	29	30	30	30	30
765930	0	0	0	0	0	0	0	0	0	0	2	13	16	22	24	25	26	27	27	28	28	28
695600	0	0	0	0	0	1	1	1	2	4	9	10	14	14	14	18	18	20	22	23	23	23
755930	0	0	0	0	0	0	0	0	0	1	1	13	14	15	16	21	22	22	22	23	23	23
665600	0	0	1	2	3	4	4	5	5	6	6	7	9	10	11	12	15	16	17	19	19	19

Figure 6. Chum bycatch totals (1,000s) by selected areas and weeks, 1991-2007 (observer data only). The top panel shows weekly totals, the bottom panel shows cumulative totals from June 1st. Shading (and circles) indicate relative intensity of bycatch. Open circles represent lower 5th, solid circles upper 5th, half-filled are middle 5th etc.

Year(s)

ADFG Stat Area — Weekly totals

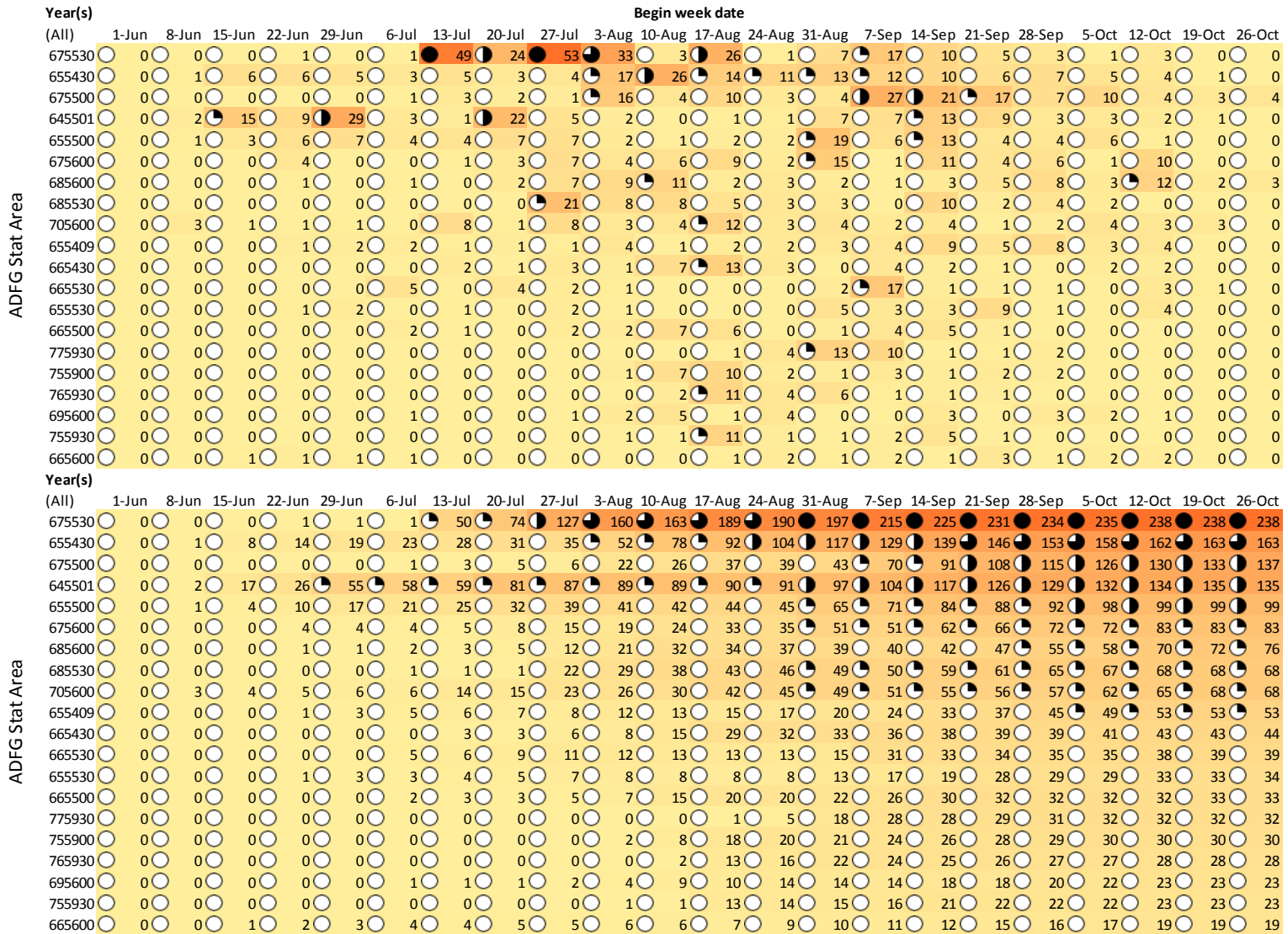| 04-06	1-Jun	8-Jun	15-Jun	22-Jun	29-Jun	6-Jul	13-Jul	20-Jul	27-Jul	3-Aug	10-Aug	17-Aug	24-Aug	31-Aug	7-Sep	14-Sep	21-Sep	28-Sep	5-Oct	12-Oct	19-Oct	26-Oct
675530	0	0	0	1	0	1	49	24	53	32	2	25	0	5	17	8	1	3	0	2	0	0
655430	0	1	6	6	5	2	5	2	1	7	3	3	4	0	1	0	1	1	2	0	0	0
675500	0	0	0	0	0	1	2	1	1	14	1	1	0	0	24	11	4	7	7	1	3	3
645501	0	2	15	9	29	2	1	21	2	0	0	0	0	0	0	1	0	0	0	0	0	0
655500	0	1	3	5	6	1	4	4	1	0	0	0	0	2	0	0	0	0	0	0	0	0
675600	0	0	0	4	0	0	1	3	7	4	6	8	1	1	0	10	3	1	1	9	0	0
685600	0	0	0	1	0	1	0	2	6	8	11	1	1	0	0	2	4	2	2	9	2	3
685530	0	0	0	0	0	0	0	0	20	8	8	5	2	0	0	10	1	4	2	0	0	0
705600	0	3	1	0	0	0	7	1	8	2	4	11	2	4	2	4	0	1	3	3	0	0
655409	0	0	0	0	1	2	1	1	1	3	0	1	1	1	2	1	1	4	2	4	0	0
665430	0	0	0	0	0	0	2	0	0	0	3	1	3	0	0	0	0	0	0	0	0	0
665530	0	0	0	0	0	5	0	4	0	0	0	0	0	1	17	0	0	0	0	2	1	0
655530	0	0	0	1	2	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0
665500	0	0	0	0	0	2	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0
775930	0	0	0	0	0	0	0	0	0	0	1	3	8	0	1	0	0	0	0	0	0	0
755900	0	0	0	0	0	0	0	0	0	1	6	9	1	1	0	0	1	1	0	0	0	0
765930	0	0	0	0	0	0	0	0	0	0	2	11	2	4	1	1	1	0	0	0	0	0
695600	0	0	0	0	0	1	0	0	0	1	2	5	1	3	0	0	3	0	0	0	0	0
755930	0	0	0	0	0	0	0	0	0	1	1	11	1	1	1	5	1	0	0	0	0	0
665600	0	0	1	1	1	1	0	0	0	0	0	1	2	0	1	0	0	0	1	2	0	0

Year(s)

ADFG Stat Area — Cumulative totals

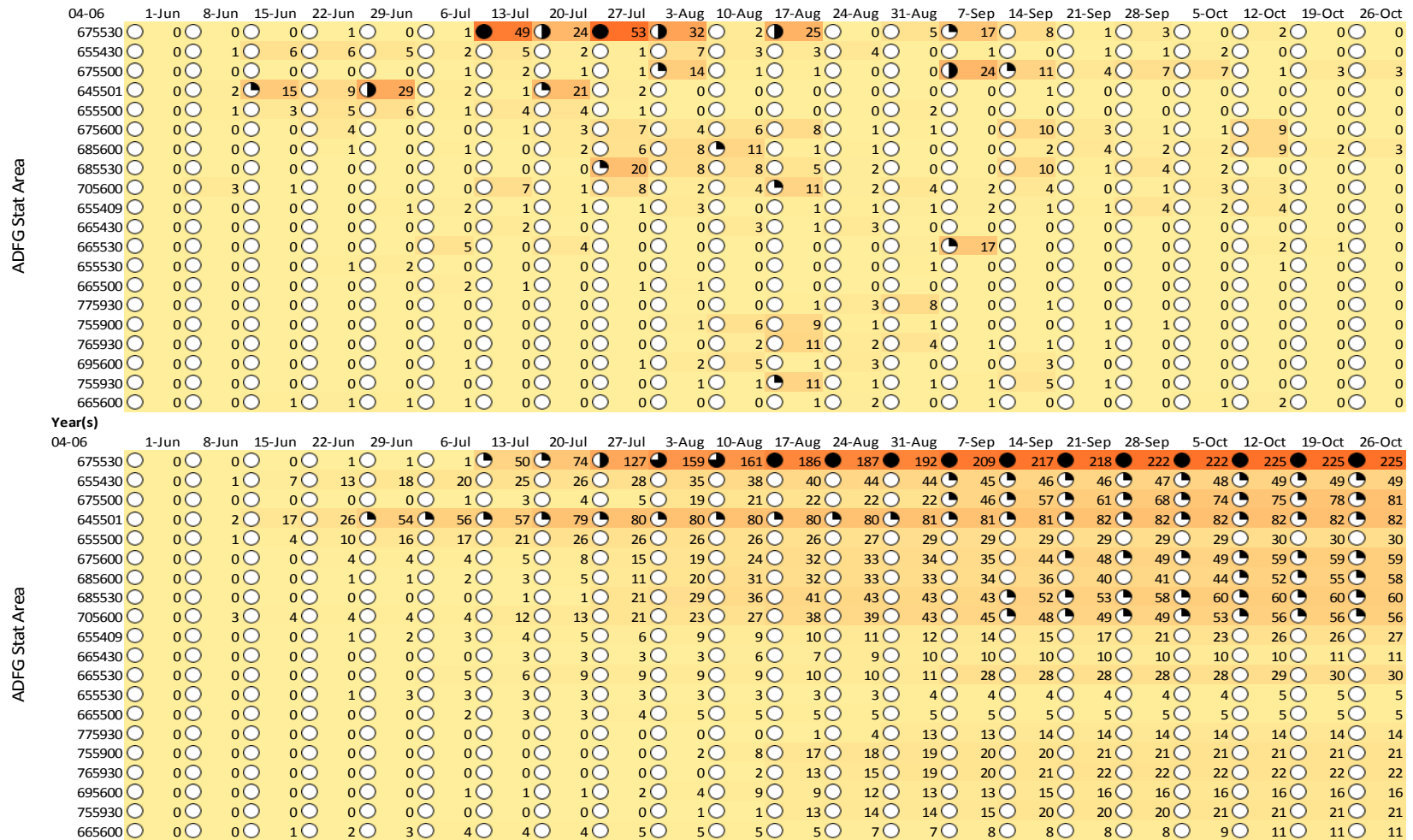| 04-06	1-Jun	8-Jun	15-Jun	22-Jun	29-Jun	6-Jul	13-Jul	20-Jul	27-Jul	3-Aug	10-Aug	17-Aug	24-Aug	31-Aug	7-Sep	14-Sep	21-Sep	28-Sep	5-Oct	12-Oct	19-Oct	26-Oct
675530	0	0	0	1	1	1	50	74	127	159	161	186	187	192	209	217	218	222	222	225	225	225
655430	0	1	7	13	18	20	25	26	28	35	38	40	44	44	45	46	46	47	48	49	49	49
675500	0	0	0	0	0	1	3	4	5	19	21	22	22	22	46	57	61	68	74	75	78	81
645501	0	2	17	26	54	56	57	79	80	80	80	80	80	81	81	81	82	82	82	82	82	82
655500	0	1	4	10	16	17	21	26	26	26	26	27	29	29	29	29	29	29	30	30	30	30
675600	0	0	0	4	4	4	5	8	15	19	24	32	33	34	35	44	48	49	49	59	59	59
685600	0	0	0	1	1	2	3	5	11	20	31	32	33	33	34	36	40	41	44	52	55	58
685530	0	0	0	0	0	0	1	1	21	29	36	41	43	43	43	52	53	58	60	60	60	60
705600	0	3	4	4	4	4	12	13	21	23	27	38	39	43	45	48	49	49	53	56	56	56
655409	0	0	0	1	2	3	4	5	6	9	9	10	11	12	14	15	17	21	23	26	26	27
665430	0	0	0	0	0	0	3	3	3	3	6	7	9	10	10	10	10	10	10	10	11	11
665530	0	0	0	0	0	5	6	9	9	9	9	10	10	11	28	28	28	28	29	30	30	30
655530	0	0	0	1	3	3	3	3	3	3	3	3	4	4	4	4	4	4	4	5	5	5
665500	0	0	0	0	0	2	3	3	4	5	5	5	5	5	5	5	5	5	5	5	5	5
775930	0	0	0	0	0	0	0	0	0	0	1	4	13	13	14	14	14	14	14	14	14	14
755900	0	0	0	0	0	0	0	0	0	2	8	17	18	19	20	20	21	21	21	21	21	21
765930	0	0	0	0	0	0	0	0	0	0	2	13	15	19	20	21	22	22	22	22	22	22
695600	0	0	0	0	0	1	1	1	2	4	9	9	12	13	13	15	16	16	16	16	16	16
755930	0	0	0	0	0	0	0	0	0	1	1	13	14	14	15	20	20	20	21	21	21	21
665600	0	0	1	2	3	4	4	4	5	5	5	5	7	7	8	8	8	8	9	11	11	11

Figure 7. Chum bycatch totals (1,000s) by selected areas and weeks, 2004-2006 (observer data only). The top panel shows weekly totals, the bottom panel shows cumulative totals from June 1st. Shading (and circles) indicate relative intensity of bycatch. Open circles represent lower 5th, solid circles upper 5th, half-filled are middle 5th etc.
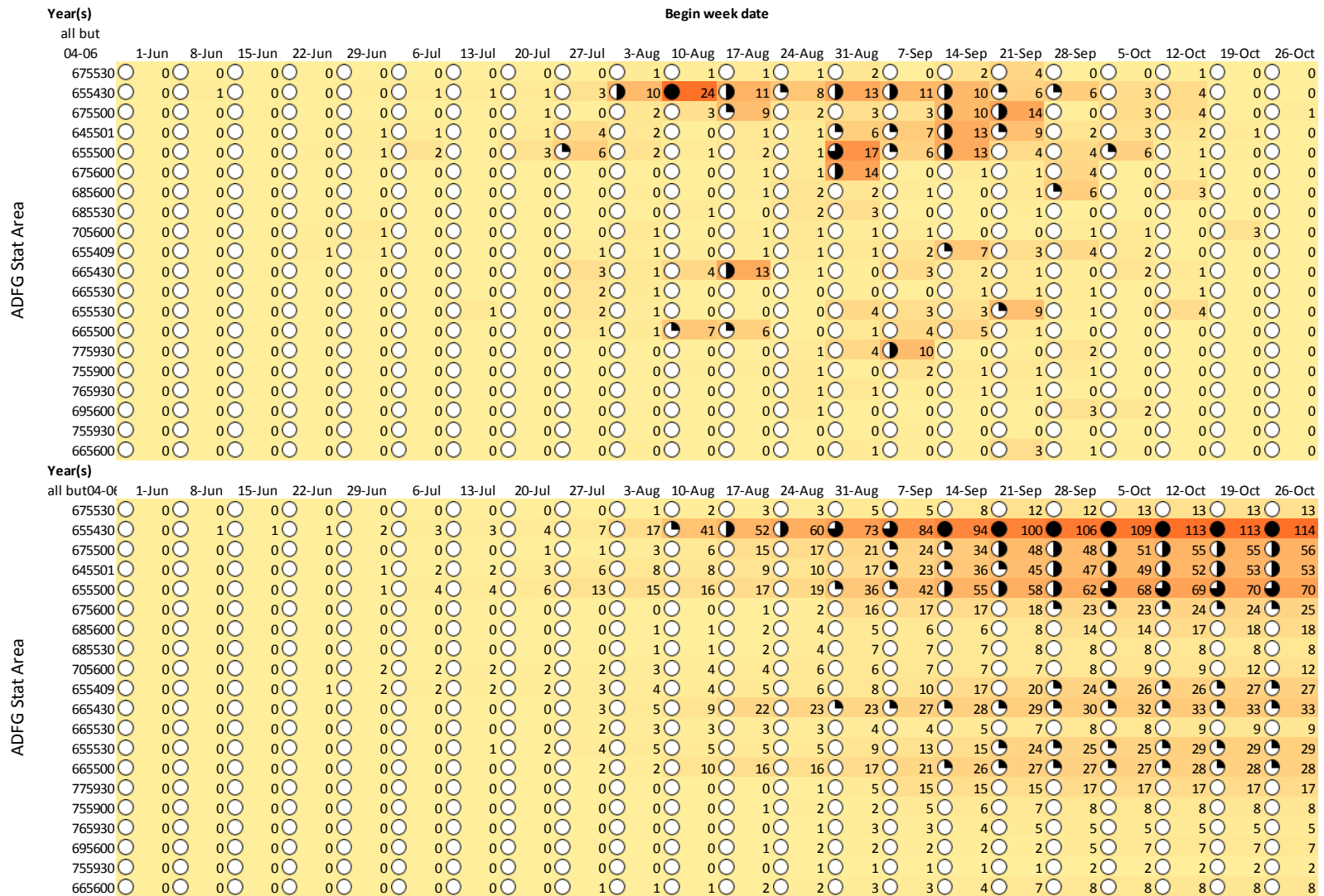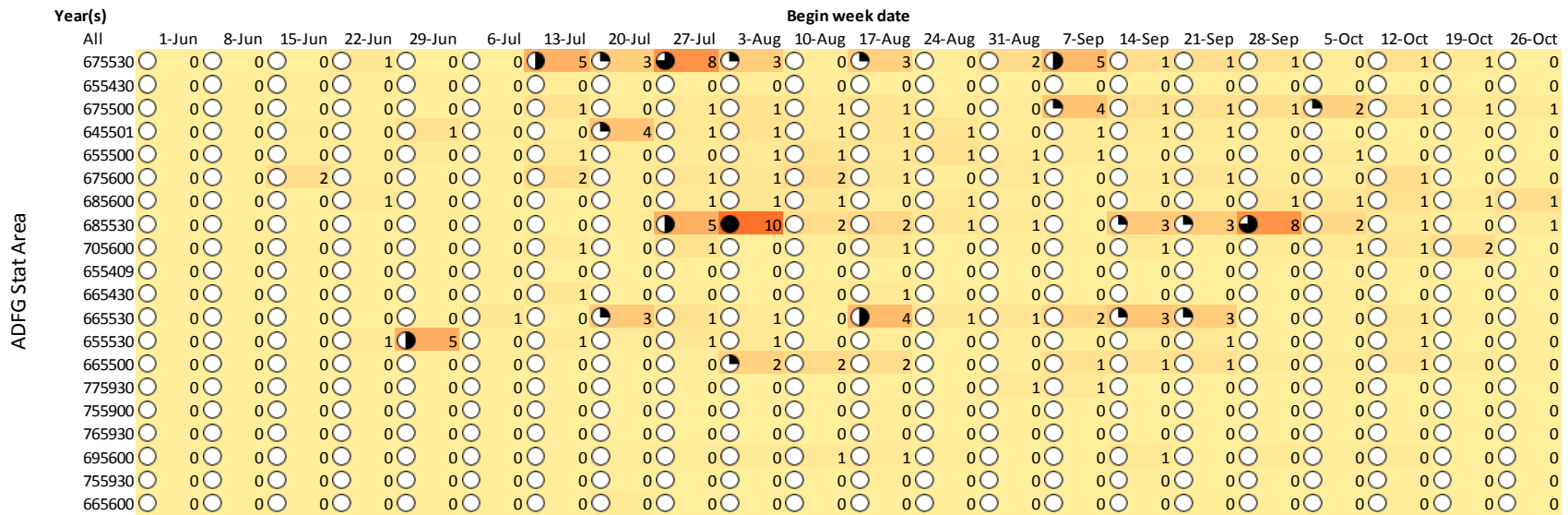
Begin week date

Top panel — weekly totals

Year(s) all but 04-06	1-Jun	8-Jun	15-Jun	22-Jun	29-Jun	6-Jul	13-Jul	20-Jul	27-Jul	3-Aug	10-Aug	17-Aug	24-Aug	31-Aug	7-Sep	14-Sep	21-Sep	28-Sep	5-Oct	12-Oct	19-Oct	26-Oct
675530	0	0	0	0	0	0	0	0	0	1	1	1	1	2	0	2	4	0	0	1	0	0
655430	0	1	0	0	0	1	1	1	3	10	24	11	8	13	11	10	6	6	3	4	0	0
675500	0	0	0	0	0	0	0	1	0	2	3	9	2	3	3	10	14	0	3	4	0	1
645501	0	0	0	0	1	1	0	1	4	2	0	1	1	6	7	13	9	2	3	2	1	0
655500	0	0	0	0	1	2	0	3	6	2	1	2	1	17	6	13	4	4	6	1	0	0
675600	0	0	0	0	0	0	0	0	0	0	0	1	1	14	0	1	1	4	0	1	0	0
685600	0	0	0	0	0	0	0	0	0	0	0	1	2	2	1	0	1	6	0	3	0	0
685530	0	0	0	0	0	0	0	0	0	0	1	0	2	3	0	0	1	0	0	0	0	0
705600	0	0	0	0	1	0	0	0	0	1	0	1	1	1	1	0	0	1	1	0	3	0
655409	0	0	0	1	1	0	0	0	1	1	0	1	1	1	2	7	3	4	2	0	0	0
665430	0	0	0	0	0	0	0	0	3	1	4	13	1	0	3	2	1	0	2	1	0	0
665530	0	0	0	0	0	0	0	0	2	1	0	0	0	0	0	1	1	1	0	1	0	0
655530	0	0	0	0	0	0	1	0	2	1	0	0	0	4	3	3	9	1	0	4	0	0
665500	0	0	0	0	0	0	0	0	1	1	7	6	0	1	4	5	1	0	0	0	0	0
775930	0	0	0	0	0	0	0	0	0	0	0	0	1	4	10	0	0	2	0	0	0	0
755900	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2	1	1	1	0	0	0	0
765930	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	1	0	0	0	0	0
695600	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	3	2	0	0	0
755930	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
665600	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	3	1	0	0	0	0

ADFG Stat Area (left axis label for both panels)

Bottom panel — cumulative totals from June 1st

Year(s) all but 04-06	1-Jun	8-Jun	15-Jun	22-Jun	29-Jun	6-Jul	13-Jul	20-Jul	27-Jul	3-Aug	10-Aug	17-Aug	24-Aug	31-Aug	7-Sep	14-Sep	21-Sep	28-Sep	5-Oct	12-Oct	19-Oct	26-Oct
675530	0	0	0	0	0	0	0	0	0	1	2	3	3	5	5	8	12	12	13	13	13	13
655430	0	1	1	1	2	3	3	4	7	17	41	52	60	73	84	94	100	106	109	113	113	114
675500	0	0	0	0	0	0	0	1	1	3	6	15	17	21	24	34	48	48	51	55	55	56
645501	0	0	0	0	1	2	2	3	6	8	8	9	10	17	23	36	45	47	49	52	53	53
655500	0	0	0	0	1	4	4	6	13	15	16	17	19	36	42	55	58	62	68	69	70	70
675600	0	0	0	0	0	0	0	0	0	0	0	1	2	16	17	17	18	23	23	24	24	25
685600	0	0	0	0	0	0	0	0	0	1	1	2	4	5	6	6	8	14	14	17	18	18
685530	0	0	0	0	0	0	0	0	0	1	1	2	4	7	7	7	8	8	8	8	8	8
705600	0	0	0	0	2	2	2	2	2	3	4	4	6	6	7	7	7	8	9	9	12	12
655409	0	0	0	1	2	2	2	2	3	4	4	5	6	8	10	17	20	24	26	26	27	27
665430	0	0	0	0	0	0	0	0	3	5	9	22	23	23	27	28	29	30	32	33	33	33
665530	0	0	0	0	0	0	0	0	2	3	3	3	3	4	4	5	7	8	8	9	9	9
655530	0	0	0	0	0	0	1	2	4	5	5	5	5	9	13	15	24	25	25	29	29	29
665500	0	0	0	0	0	0	0	0	2	2	10	16	16	17	21	26	27	27	27	28	28	28
775930	0	0	0	0	0	0	0	0	0	0	0	0	1	5	15	15	15	17	17	17	17	17
755900	0	0	0	0	0	0	0	0	0	0	1	2	2	5	6	7	8	8	8	8	8	8
765930	0	0	0	0	0	0	0	0	0	0	0	1	3	3	4	5	5	5	5	5	5	5
695600	0	0	0	0	0	0	0	0	0	0	1	2	2	2	2	2	5	7	7	7	7	7
755930	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	2	2	2	2	2	2
665600	0	0	0	0	0	0	0	0	1	1	1	2	2	3	3	4	7	8	8	8	8	8

Figure 8. Chum bycatch totals (1,000s) by selected areas and weeks, 1991-2003, and 2007 (observer data only). The top panel shows weekly totals, the bottom panel shows cumulative totals from June 1st. Shading (and circles) indicate relative intensity of bycatch. Open circles represent lower 5th, solid circles upper 5th, half-filled are middle 5th etc.
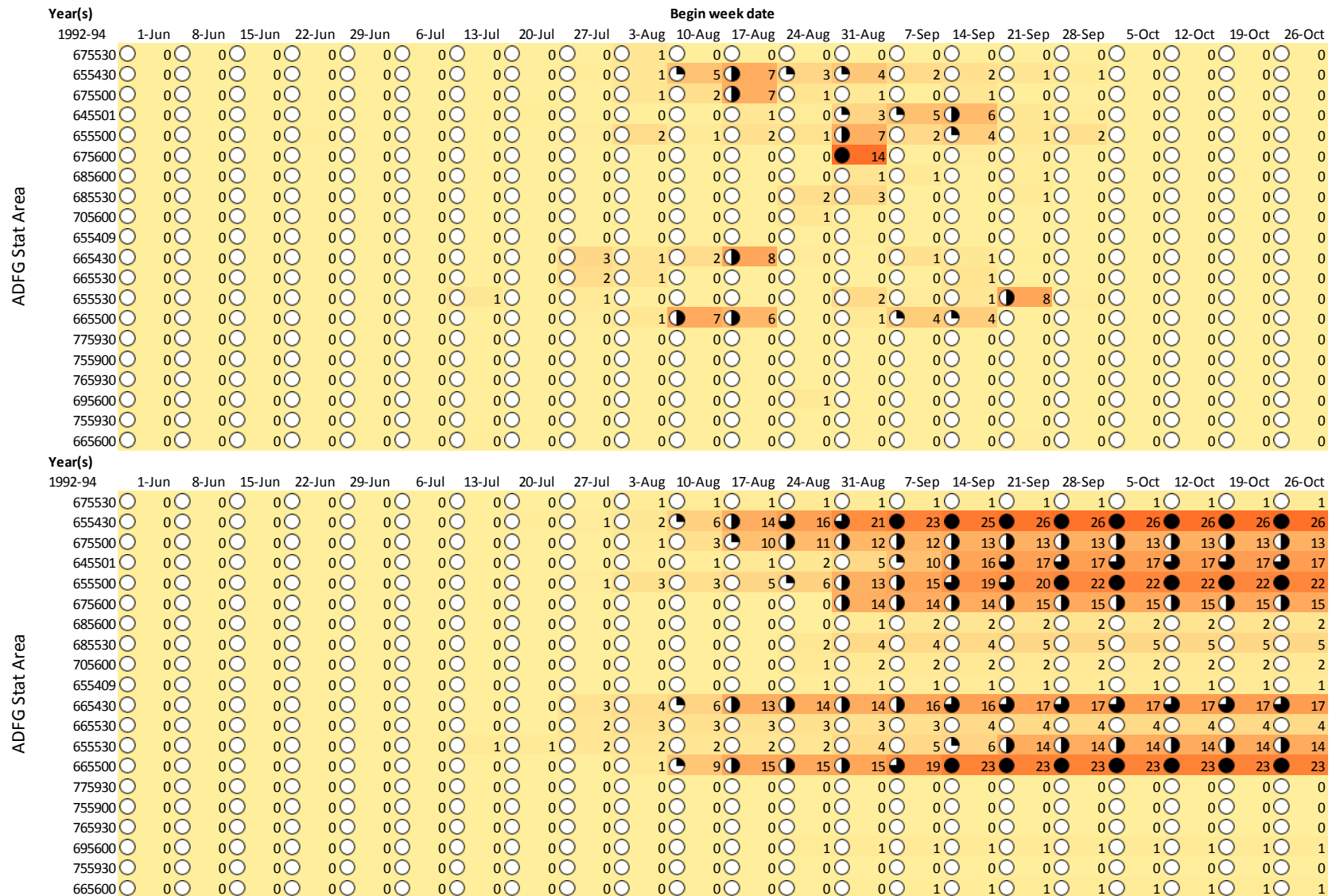
Figure 9. Chum bycatch totals (1,000s) by selected areas and weeks, 1992-1994 (observer data only). The top panel shows weekly totals, the bottom panel shows cumulative totals from June 1st. Shading (and circles) indicate relative intensity of bycatch. Open circles represent lower 5th, solid circles upper 5th, half-filled are middle 5th etc.

Year(s)   **Begin week date**

ADFG Stat Area	All	1-Jun	8-Jun	15-Jun	22-Jun	29-Jun	6-Jul	13-Jul	20-Jul	27-Jul	3-Aug	10-Aug	17-Aug	24-Aug	31-Aug	7-Sep	14-Sep	21-Sep	28-Sep	5-Oct	12-Oct	19-Oct	26-Oct
675530		0	0	0	1	0	0	5	3	8	3	0	3	0	2	5	1	1	1	0	1	1	0
655430		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
675500		0	0	0	0	0	0	0	1	0	1	1	1	1	0	4	1	1	1	2	1	1	1
645501		0	0	0	0	1	0	0	4	1	1	1	1	1	0	1	1	1	0	0	0	0	0
655500		0	0	0	0	0	0	1	0	0	1	1	1	1	1	1	0	0	0	1	0	0	0
675600		0	0	2	0	0	0	2	0	1	1	2	1	0	1	0	1	1	0	0	1	0	0
685600		0	0	0	1	0	0	0	0	1	1	1	0	1	0	0	0	1	1	1	1	1	1
685530		0	0	0	0	0	0	0	0	5	10	2	2	1	1	0	3	3	8	2	1	0	1
705600		0	0	0	0	0	0	1	0	1	0	0	1	0	0	0	1	0	0	1	1	2	0
655409		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
665430		0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
665530		0	0	0	0	0	1	0	3	1	1	0	4	1	1	2	3	3	0	0	1	0	0
655530		0	0	0	1	5	0	1	0	1	1	0	0	0	0	1	0	1	0	0	1	0	0
665500		0	0	0	0	0	0	0	0	0	2	2	2	0	0	1	1	1	0	0	1	0	0
775930		0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0
755900		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
765930		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
695600		0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	1	0	0	0	0	0	0
755930		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
665600		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Figure 10.   Chum bycatch **rates** per ton of pollock by selected areas and weeks, 1991- 2007 from June 1st (observer data only). Shading (and circles) indicate relative intensity of bycatch. Open circles represent lower 5th, solid circles upper 5th, half-filled are middle 5th etc.
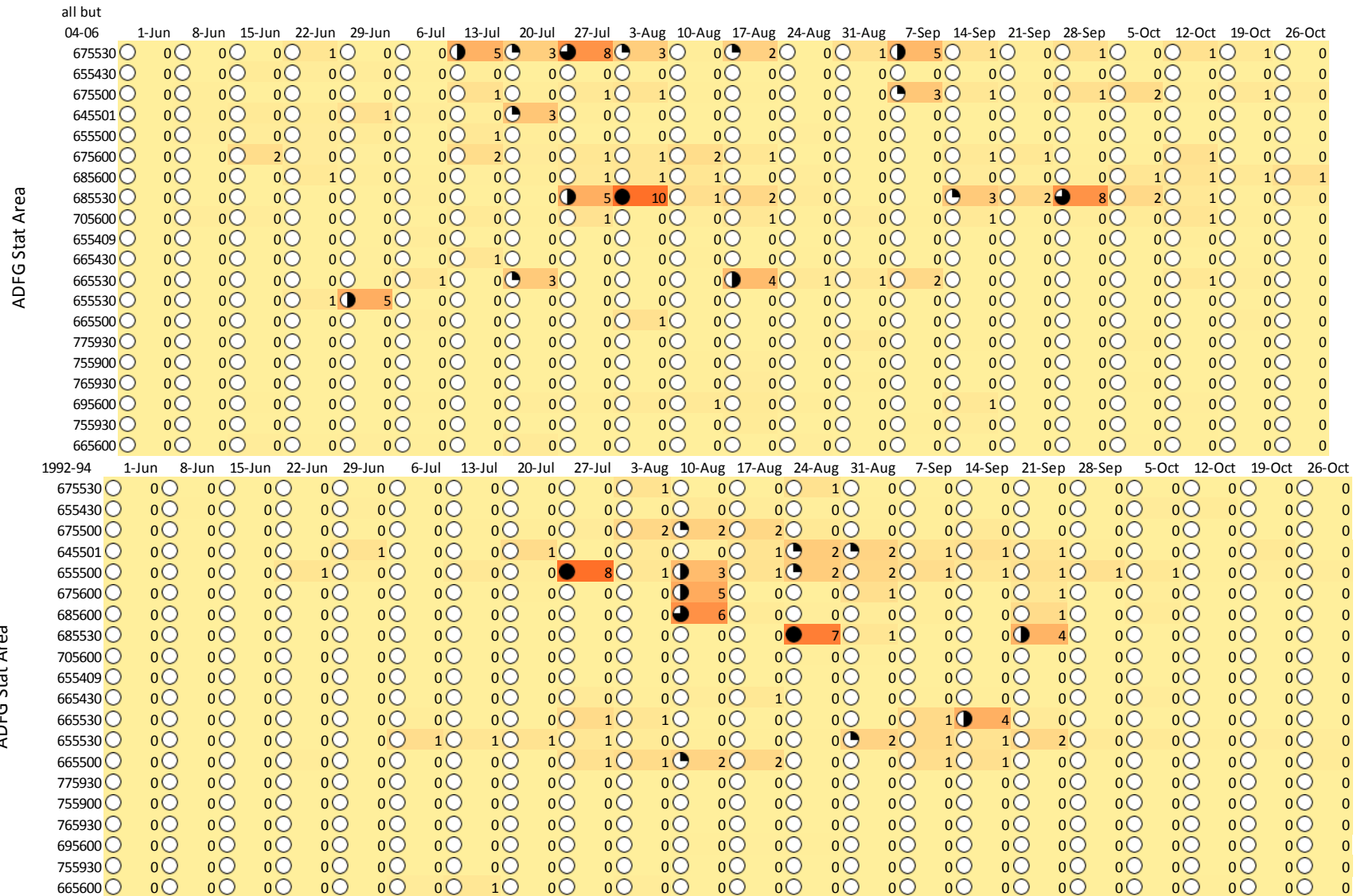
Figure 11.   Chum bycatch rates per ton of pollock by selected areas and weeks, 1991- 2003, and 2007 (top panel) and from 1992-1994 (bottom panel). Shading (and circles) indicate relative intensity of bycatch. Open circles represent lower 5th, solid circles upper 5th, half-filled are middle 5th etc.

Timing of closures and trigger caps for alternatives

The Council included the following language referring to delineating specific dates for closures under Component 6: Timing Option – Dates of Area Closure.

> New closure dates [to be developed from staff analysis of seasonal proportions of pollock and chum salmon by period across additional ranges of years]

Information on time frames for highest overall bycatch and by rate (figures 6-11) is included to evaluate appropriate closure periods for each area closure in Figure 4. Based on these initial evaluations, weeks with highest bycatch by area are not always equivalent to the weeks with highest bycatch *rates* (Table 5). Data for the large area closure were not summarized by equivalent years or exact dates for direct comparison with the new closures but some inference can be made by comparison with similar weeks.

Table 5   Summary of information in Figures 6-11 relative to areas (indicated by Area # to go with Figure 4) with highest bycatch overall and by rate for 1991-2007 years. Bolded numbers show where the same area has both a high overall number and by rate while '—' indicate where no area had a high enough bycatch (overall or rate) to rank for that week.

	Week	Highest relative areas by **number** of chum	Highest relative areas by **rate** of chum
June	1-7	--	--
	8-14	--	--
	15-21	4	--
	22-28	--	--
July	Jun 29-Jul 5	4	13
	6-12	--	--
	13-19	**1**	**1**
	20-26	**1, 4**	**1, 4**, 12
August	Jul 27-Aug 2	**1, 8**	**1, 8**
	3-9	**1**, 2, 3	**1**, 8, 14
	10-16	2, 7	--
	17-23	**1**, 2, 9, 11, 19, 17	**1**, 12
	24-30	2	--
September	Aug 31-Sep 6	2, 5, 6, 15	--
	7-13	**1**, 2, **3**, 12	**1, 3**
	14-20	3, 4, 5	8, 12
	21-27	3	8, 12
October	Sep 28-Oct 4	--	8
	5-11	--	3
	12-18	7	--
	19-25	--	--
	26-31	--	--

Further consideration of the timing aspect of closure is discussed after the application of trigger caps as it relates to more than one aspect of the components under Alternative 3.

Application of trigger caps

The draft alternatives specify a range of trigger caps as well as their application under Component 1.

Component 1: Trigger Cap Formulation

      a)   Cap level

           1. 25,000
           2. 50,000
           3. 75,000
           4. 125,000
           5. 200,000

      b)   Application of Trigger Caps

           1. Apply trigger to all chum bycatch

           2. Apply trigger to all chum bycatch between specific dates

           3. Apply trigger to all chum bycatch in a specific area.

In order to equate trigger caps and application with actual areas, some relationship is needed to relate relative rates by area to overall chum bycatch. Table 6-Table 8 show the overall regional estimates of salmon bycatch by year (Table 6), the aggregate overall number by year (and year-set considerations as noted) and area (Table 7) as well as the relative proportion of bycatch by area for the closures in Component 5b (Table 8). Note that for Table 7 and Table 8, observer data only was used thus numbers are lower than those in Table 6 where the overall bycatch by year includes the extrapolation to the unobserved fleet. For purposes of this initial evaluation, observed proportions by area are considered to be representative of the relative catch by area overall. Further information on seasonal proportions of pollock catch over these time frames are summarized in Table 9 and Table 10.

Table 6.   Non-Chinook salmon catch (numbers of fish) in the BSAI pollock trawl fishery (all sectors) 1991-2009, CDQ is indicated separately and by season where available. 'na' indicates that data were not available in that year. 2009 data through 10/10/09

Year	Annual with CDQ	Annual without CDQ	Annual CDQ only	A season With CDQ	B season	A season Without CDQ	B season	A season CDQ only	B season
1991	Na	28,951	na	na	na	2,850	26,101	na	na
1992	na	40,274	na	na	na	1,951	38,324	na	na
1993	na	242,191	na	na	na	1,594	240,597	na	na
1994	92,672	81,508	11,165	3,991	88,681	3,682	77,825	309	10,856
1995	19,264	18,678	585	1,708	17,556	1,578	17,100	130	456
1996	77,236	74,977	2,259	222	77,014	177	74,800	45	2,214
1997	65,988	61,759	4,229	2,083	63,904	1,991	59,767	92	4,137
1998	64,042	63,127	915	4,002	60,040	3,914	59,213	88	827
1999	45,172	44,610	562	362	44,810	349	44,261	13	549
2000	58,571	56,867	1,704	213	58,358	148	56,719	65	1,639
2001	57,007	53,904	3,103	2,386	54,621	2,213	51,691	173	2,930
2002	80,782	77,178	3,604	1,377	79,404	1,356	75,821	21	3,453
2003	189,184	180,782	8,402	3,834	185,350	3,597	177,185	237	8,165
2004	440,472	430,284	10,188	422	440.050	395	429,889	27	10,161
2005	704,590	696,880	7,710	595	703,995	563	696,317	32	7,678
2006	309,643	308,429	1,214	1,332	308,311	1,266	307,163	66	1,148
2007	93,660	87,191	6,469	8,523	85,137	7,368	79,823	1,155	5,314
2008	15,423	14,992	431	320	15,103	247	14,745	73	358
2009	45,905	44,911	994						

Table 7.   Total chum by area and year-subsets (observer data only; 1991-2007).

Ranked Area	All years	1992-1994	2004-06	All but 04 - 06	All but 92-94
Outside	349,444	28,140	166,956	182,488	321,304
1	238,087	1,096	224,840	13,247	236,991
2	163,083	26,406	49,171	113,912	136,676
3	136,960	13,121	81,243	55,717	123,840
4	136,674	17,337	82,336	54,338	119,337
5	99,483	21,921	29,543	69,940	77,562
6	83,629	14,509	58,835	24,794	69,120
7	75,908	2,472	57,903	18,005	73,436
8	69,038	4,996	60,782	8,256	64,042
9	68,165	1,587	56,334	11,831	66,577
10	56,428	1,209	26,994	29,434	55,218
11	43,736	17,104	10,552	33,184	26,632
12	39,116	4,475	30,336	8,780	34,641
13	33,661	14,524	4,820	28,841	19,137
14	32,674	23,000	4,895	27,779	9,673
15	31,764	8	14,335	17,429	31,756
16	29,594	0	21,463	8,131	29,594
17	27,597	1	22,448	5,149	27,596
18	23,223	1,132	16,185	7,038	22,091
19	22,553	12	20,750	1,803	22,541
20	19,520	1,037	11,123	8,397	18,483
Totals	1,780,335	194,087	1,051,844	728,491	1,586,248

Table 8.   Proportions of chum by area and year-subsets.

Ranked Area	All years	1992-1994	2004-06	All but 04 - 06	All but 92-94
Outside	20%	14%	16%	25%	20%
1	13%	1%	21%	2%	15%
2	9%	14%	5%	16%	9%
3	8%	7%	8%	8%	8%
4	8%	9%	8%	7%	8%
5	6%	11%	3%	10%	5%
6	5%	7%	6%	3%	4%
7	4%	1%	6%	2%	5%
8	4%	3%	6%	1%	4%
9	4%	1%	5%	2%	4%
10	3%	1%	3%	4%	3%
11	2%	9%	1%	5%	2%
12	2%	2%	3%	1%	2%
13	2%	7%	0%	4%	1%
14	2%	12%	0%	4%	1%
15	2%	0%	1%	2%	2%
16	2%	0%	2%	1%	2%
17	2%	0%	2%	1%	2%
18	1%	1%	2%	1%	1%
19	1%	0%	2%	0%	1%
20	1%	1%	1%	1%	1%

Table 9.   Total pollock by area and year-subsets (observer data only; 1991-2007). Millions of t.

Ranked Area	All years	1992-1994	2004-06	All but 04 - 06	All but 92-94
Outside	7,776	954	1,804	5,972	6,822
1	104	2	54	50	102
2	1,735	350	187	1,548	1,385
3	147	22	41	105	125
4	1,554	207	394	1,161	1,348
5	553	111	106	447	441
6	263	26	72	191	237
7	434	59	142	292	375
8	175	18	82	94	157
9	275	62	68	208	213
10	787	129	89	698	658
11	285	136	35	250	149
12	83	9	21	62	74
13	222	55	27	195	167
14	96	39	29	67	57
15	189	16	64	125	173
16	414	3	175	239	411
17	231	4	107	124	227
18	321	68	94	227	253
19	174	11	82	93	163
20	373	28	58	316	345
Totals	16,192	2,308	3,730	12,462	13,884

Table 10. Proportions of pollock by area and year-subsets.

Ranked Area	All years	1992-1994	2004-06	All but 04 - 06	All but 92-94
Outside	48%	41%	48%	48%	49%
1	1%	0%	1%	0%	1%
2	11%	15%	5%	12%	10%
3	1%	1%	1%	1%	1%
4	10%	9%	11%	9%	10%
5	3%	5%	3%	4%	3%
6	2%	1%	2%	2%	2%
7	3%	3%	4%	2%	3%
8	1%	1%	2%	1%	1%
9	2%	3%	2%	2%	2%
10	5%	6%	2%	6%	5%
11	2%	6%	1%	2%	1%
12	1%	0%	1%	0%	1%
13	1%	2%	1%	2%	1%
14	1%	2%	1%	1%	0%
15	1%	1%	2%	1%	1%
16	3%	0%	5%	2%	3%
17	1%	0%	3%	1%	2%
18	2%	3%	3%	2%	2%
19	1%	0%	2%	1%	1%
20	2%	1%	2%	3%	2%

Proposed application of trigger caps

Under Component 1b as described above, there are three options for application of the trigger cap. Here we discuss option 1: apply trigger to all chum bycatch and 3: apply trigger to all chum bycatch in a specific area. Option 2: apply trigger to all chum bycatch between specific dates was not yet evaluated at this time. Suggestions for clarifying the overlap between some aspects of Component 1 and those under Components 5 and 6 will be provided at the meeting.

Single EBS-wide cap

Several methods are proposed for applying the draft suite of trigger caps to the candidate areas. The first would be to trigger closures when a cap levels specified under Component 1a was attained. Given temporal bycatch variability for different areas, closures could be established for specified date ranges (i.e. each area or set of areas would have a specified closure time frame should the overall cap be triggered). Areas would close at different times, but the mechanism that triggers such closures in a season would be a single cap. Triggering the cap then results in a patchwork of time/area closures over the remainder of the season.

For example, proposed closure periods (for highest bycatch by individual areas) would be fixed time periods and enacted only if the overall cap were triggered (Table 11). Some closure dates may not be enacted under higher overall cap levels (e.g. Area 4 in June), but if triggered the remaining closure dates would go into affect by area for the remainder of the season. The selected dates will depend upon the time frame over which the bycatch is evaluated by area thus Table 11 provides an example at this time using the years 1991-2007.

Table 11   Example of fixed closure dates by area under a EBS-wide cap using 1991-2007 year-sets for identifying highest bycatch by region.

Ranked Area	Dates of closure if overall cap triggered				
	June	**July**	**August**	**September**	**October**
1		13-31	1-9; 17-23	7-13	
2			3-31	1-13	
3			3-9	7-27	
4	15-21; 29-30	1-5; 20-26	14-20		
5			14-20		
6			31	1-6	
7		10-16			12-18
8		27-31			
9			17-23		
10					
11			17-23		
12				7-13	
13					
14					
15			31	1-6	
16					
17			17-21		
18					
19					
20					

Discrete area caps
Alternatively, each closure could have its own discrete cap, with bycatch towards that cap accruing for each area. In this case, some proportion of the cap levels would be distributed to individual areas. Alternative methods for doing this might be:

a) assume that the overall trigger cap is proportioned out to the 20 areas without compensating for the bycatch outside of those areas,

b) discount the caps for the proportion of bycatch which accrues outside of the areas and proportion the remaining amongst the twenty areas. For example, using the calculations over 1991-2007 (inclusive of all years), the relative proportion of bycatch outside of the 20 closures was 20%.

c) account for baseline rates (chum per ton of pollock) to project the likelihood of individual area bycatch totals and select those areas for closure (until a specified high-bycatch period ended).

Thus under proposed mechanism b) above, the cap options are discounted first for the proportion outside of the areas, and then proportionally amongst the 20 areas (Table 12). Under proposed mechanism a), each cap would be higher as there would be no initial discounting for bycatch outside of the candidate areas and the relative proportion of the cap by area would be increased. Proportions by area (and resulting trigger caps) could also be considered for high and low bycatch year-sets.

Table 12.   Example of proportioning trigger caps amongst 20 ranked areas by discounting for bycatch which accrues outside of all closures. Proportions are related to the relative proportion in each area based on 1991-2007 data.

Ranked Area	Proportion of cap	Cap level				
		25,000	50,000	75,000	125,000	200,000
Outside	20%	*5,000*	*10,000*	*15,000*	*25,000*	*40,000*
1	13%	3,250	6,500	9,750	16,250	26,000
2	9%	2,250	4,500	6,750	11,250	18,000
3	8%	2,000	4,000	6,000	10,000	16,000
4	8%	2,000	4,000	6,000	10,000	16,000
5	6%	1,500	3,000	4,500	7,500	12,000
6	5%	1,250	2,500	3,750	6,250	10,000
7	4%	1,000	2,000	3,000	5,000	8,000
8	4%	1,000	2,000	3,000	5,000	8,000
9	4%	1,000	2,000	3,000	5,000	8,000
10	3%	750	1,500	2,250	3,750	6,000
11	2%	500	1,000	1,500	2,500	4,000
12	2%	500	1,000	1,500	2,500	4,000
13	2%	500	1,000	1,500	2,500	4,000
14	2%	500	1,000	1,500	2,500	4,000
15	2%	500	1,000	1,500	2,500	4,000
16	2%	500	1,000	1,500	2,500	4,000
17	2%	500	1,000	1,500	2,500	4,000
18	1%	250	500	750	1,250	2,000
19	1%	250	500	750	1,250	2,000
20	1%	250	500	750	1,250	2,000

Council considerations at this meeting

At this meeting the Council will review the candidate closures and trigger applications as described in this paper. The Council should refine alternatives as necessary and provide direction to staff for revisions to area options, trigger levels and applications as necessary to allow for final review and revisions to Alternative 3 in June 2010. At the June meeting the Council will refine its final set of alternatives for the chum salmon bycatch management measures analysis. Preliminary review of that analysis is scheduled for February 2011 with Initial review in June 2011.

Appendix 1. December 2009 Council motion on Bering Sea Chum salmon management measures

C-4(b) Bering Sea Salmon Bycatch

Council motion: strike-outs and underlines to indicate additions and deletions from original alternative set

Alternative 1 – Status Quo

Alternative 1 retains the current program of the Chum Salmon Savings Area (SSA) closures triggered by separate non-CDQ and CDQ caps with the fleet's exemption to these closures per regulations for Amendment 84 and as modified by the Amendment 91 Chinook bycatch action.

Alternative 2 – Hard Cap

Component 1: Hard Cap Formulation (with CDQ allocation of 10.7%)

    a) ~~58,000~~   50,000
    b) ~~206,000~~   75,000
    c) ~~353,000~~   125,000
    d) ~~488,000~~   200,000
    e)   300,000
    f)   353,000

Component 2: Sector Allocation

    Use blend of CDQ/CDQ partner bycatch numbers for historical average calculations.

    a)   No sector allocation
    b)   Allocations to Inshore, Catcher Processor, Mothership, and CDQ
          1) Pro-rata to pollock AFA pollock sector allocation
          2) Historical average
              i.   ~~2004–2006~~ 2007-2009
              ii. ~~2002–2006~~ 2005-2009
              iii. ~~1997–2006~~ 2000-2009
              iv. 1997–2009
          3) Allocation based on 75% pro-rata and 25% historical
          4) Allocation based on 50% pro-rata and 50% historical
          5) Allocation based on 25% pro-rata and 75% historical
    c)   Allocate 10.7% to CDQ, remainder divided among other sectors

Component 3: Sector Transfer

    a)   No transfers or rollovers
    b)   Allow NMFS-approved transfers between sectors
          Suboption: Limit transfers to the following percentage of salmon that is available to the transferring entity at the time of transfer:
              1) 50%
              2) 70%
              3) 90%
    c)   Allow NMFS to roll-over unused bycatch allocation to sectors that are still fishing

Component 4: Cooperative Provision

    a) Allow allocation at the co-op level for the inshore sector, and apply transfer rules (Component 3) at the co-op level for the inshore sector.
        Suboption: Limit transfers to the following percentage of salmon that is available to the transferring entity at the time of transfer:
            1) 50%
            2) 70%
            3) 90%
    b) Allow NMFS to rollover unused bycatch allocation to inshore cooperatives that are still fishing.

Alternative 3 – Trigger Closure

Component 1: Trigger Cap Formulation

    Cap level

    a) ~~45,000~~   25,000
    b) ~~58,000~~   50,000
    c) ~~206,000~~   75,000
    d) ~~353,000~~   125,000
    e) ~~488,000~~   200,000

    Application of Trigger Caps

    a) Apply trigger to all chum bycatch

    ~~b) Apply trigger to all chum bycatch in the CVOA~~
    ~~c)~~ b) Apply trigger to all chum bycatch between specific dates
    ~~d)~~ c) Apply trigger to all chum bycatch in a specific area.

Component 2: Sector allocation

    Use blend of CDQ/CDQ partner bycatch numbers for historical average calculations.

    a) No sector allocation
    b) Allocations to Inshore, Catcher Processor, Mothership, and CDQ
        1) Pro-rata to pollock AFA pollock sector allocation
        2) Historical average
            i. ~~2004-2006~~ 2007-2009
            ii. ~~2002-2006~~ 2005-2009
            iii. ~~1997-2006~~ 2000-2009
            iv. 1997-2009
        3) Allocation based on 75% pro-rata and 25% historical
        4) Allocation based on 50% pro-rata and 50% historical
        5) Allocation based on 25% pro-rata and 75% historical
    c) Allocate 10.7% to CDQ, remainder divided among other sectors

Component 3: Sector Transfer

    a) No transfers or rollovers
    b) Allow NMFS-approved transfers between sectors
        Suboption: Limit transfers to the following percentage of salmon that is available to the transferring entity at the time of transfer:
            1) 50%
            2) 70%
            3) 90%
    c) Allow NMFS to roll-over unused bycatch allocation to sectors that are still fishing
        Suboption: Limit transfers to the following percentage of salmon that is available to the transferring entity at the time of transfer:

       1)   50%
       2)   70%
       3)   90%

Components 4: Cooperative Provisions

    a)   Allow allocation at the co-op level for the inshore sector, and apply transfer rules (Component 3) at the co-op level for the inshore sector.
        Suboption: Limit transfers to the following percentage of salmon that is available to the transferring entity at the time of transfer:
          1)   50%
          2)   70%
          3)   90%
    b) <u>Allow NMFS to roll-over unused bycatch allocation to cooperatives that are still fishing</u>

Component 5: Area Option

    b)   Area identified in October, 2008 discussion paper <u>(B-season chum bycatch rate-based closure described on pages 14-15 of December 2009 discussion paper)</u>
    ~~c)   Existing Chum Salmon Savings Area (differs from status quo with application of other components)~~
    b)   <u>New areas [to be identified by staff] which are small, discrete closure areas, each with its own separate cap whereby bycatch in that area only accrues towards the cap</u>

Component 6: Timing Option – Dates of Area Closure
    ~~a)   Existing closure dates (August 1 – August 31 and September 1 through October 14 if trigger is reached.)~~
    b)   <u>New closure dates [to be developed from staff analysis of seasonal proportions of pollock and chum salmon by period across additional ranges of years]</u>

Component 7: Rolling Hot Spot (RHS) Exemption – Similar to status quo, participants in a vessel-level (platform level for Mothership fleet) RHS would be exempt from regulatory triggered closure(s).
    a)   Sub-option: RHS regulations would contain an ICA provision that the regulatory trigger closure (as adopted in Component 5) apply to participants that do not maintain a certain level of rate-based chum salmon bycatch performance.