

Analysis of Management Options for the Area 2C and 3A Charter Halibut Fisheries for 2016



**For the North Pacific Fishery Management Council
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Overview

- ▶ Harvest review through 2015
- ▶ Analysis of management measures for 2016
 - ▶ Area 2C
 - ▶ Area 3A

Harvest review through 2015

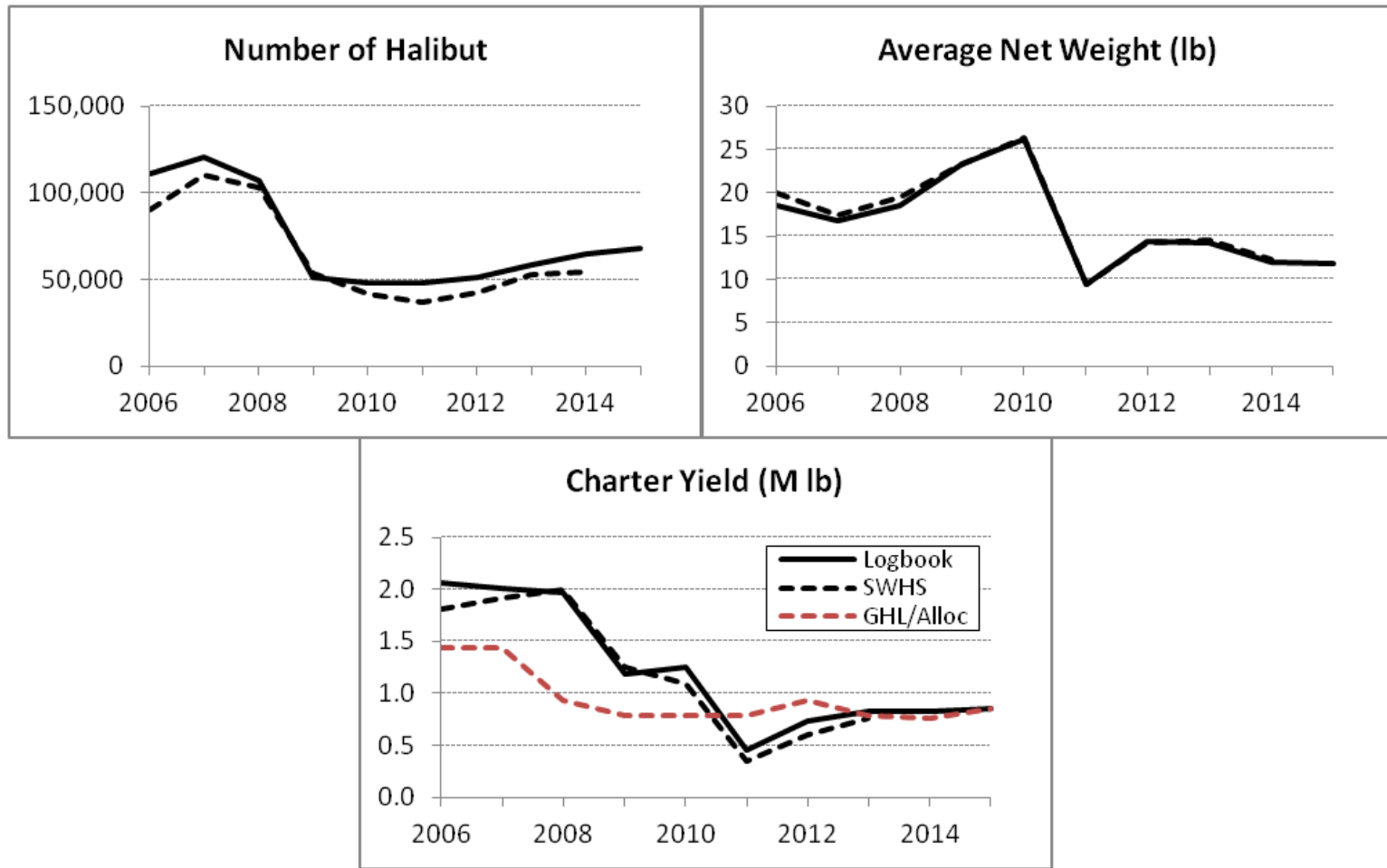


Preliminary charter estimates for 2015

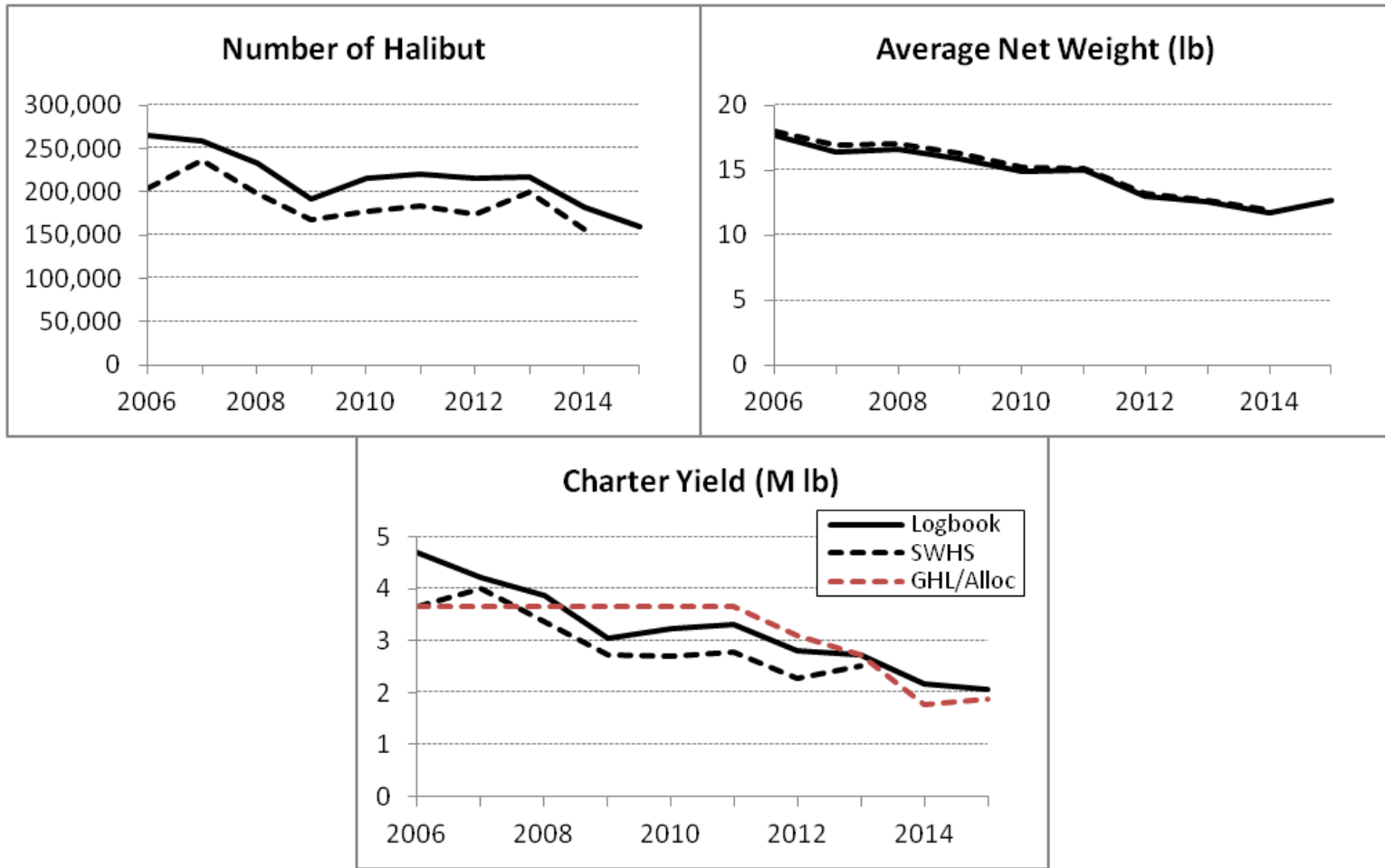
Area	Mean wt (lb)	Prelimin Logbook Harvest (no. fish)	Yield (Mlb)	O26 RelMort (Mlb)	Total Charter Removals (Mlb)	Allocation (Mlb)	Overage (Mlb)	Overage %
2C	11.75	68,092	0.800	0.047	0.848	0.851	-0.003	-0.4%
3A	12.69	160,353	2.035	0.027	2.063	1.890	0.173	9.1%

Area		Predicted	Observed	Error %
2C	Harvest	69,637	68,092	2.3%
	Average wt (lb)	11.28	11.75	-4.0%
	Removals (Mlb)	0.828	0.848	-2.4%
3A	Harvest	160,788	160,353	0.3%
	Average wt (lb)	11.65	12.69	-8.2%
	Removals (Mlb)	1.911	2.063	-7.4%

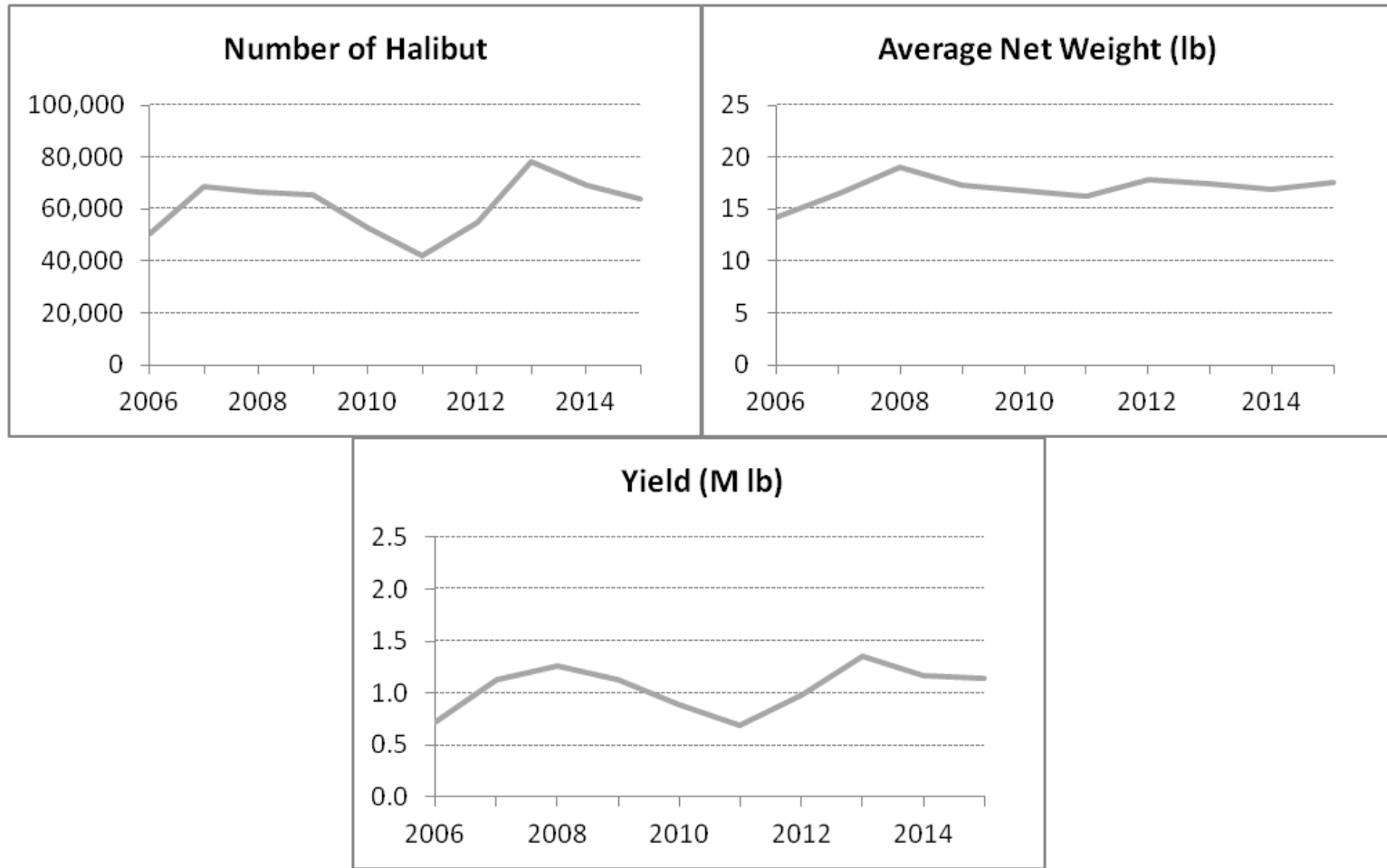
Area 2C charter fishery



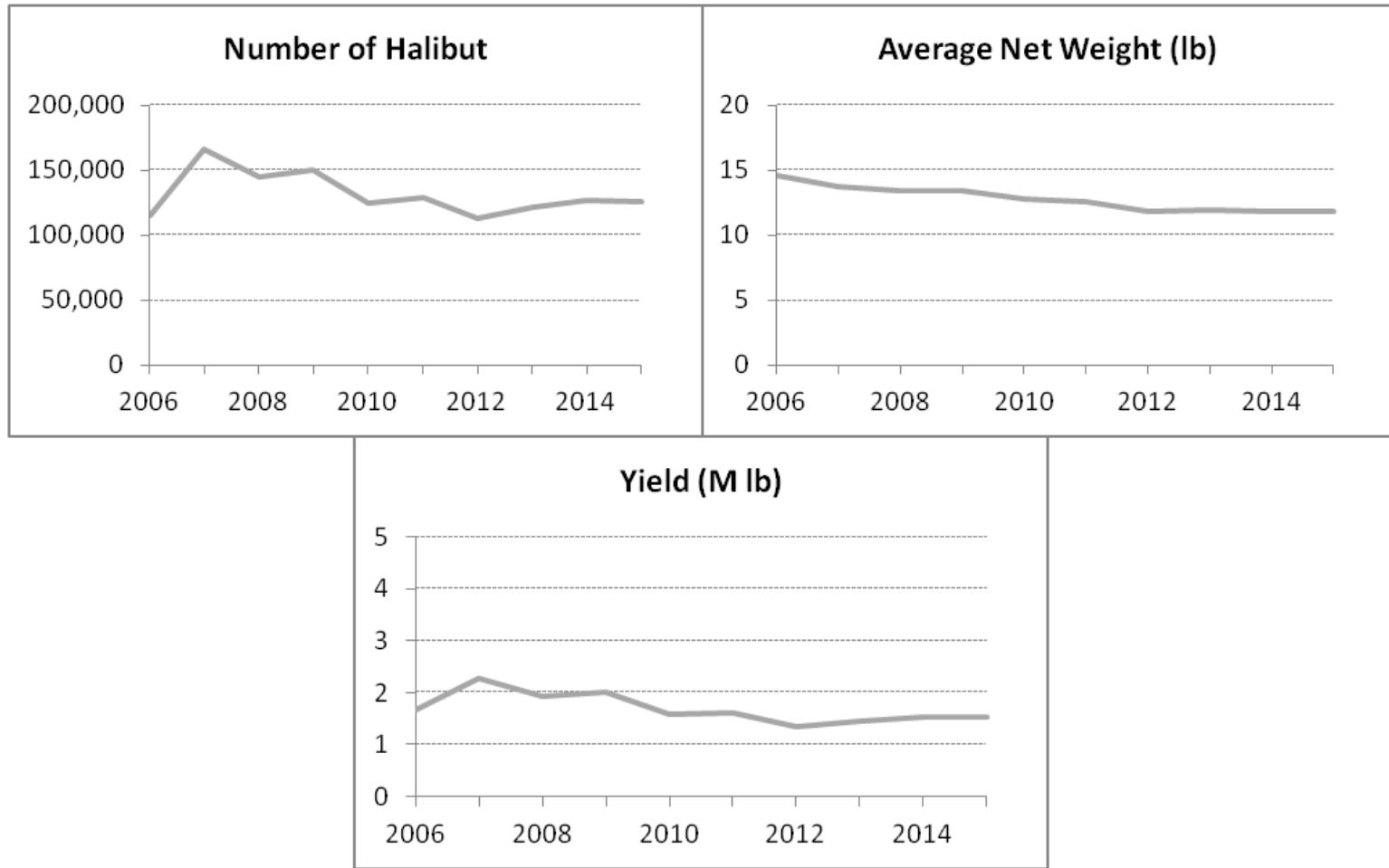
Area 3A charter fishery



Area 2C – unguided fishery



Area 3A – unguided fishery



Performance of Council-recommended management measures

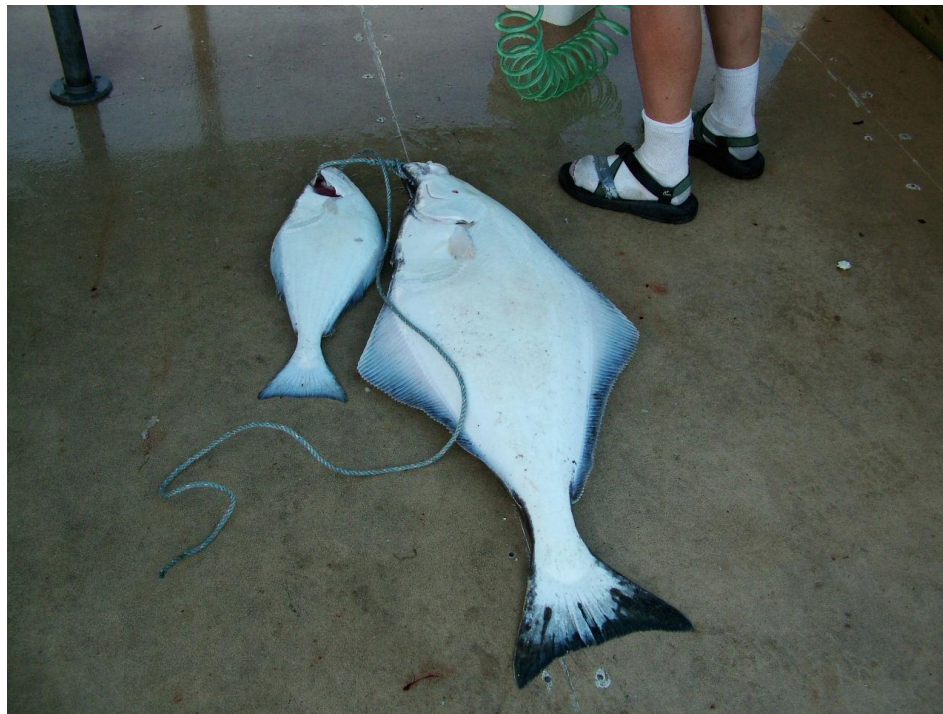
Area	Year	Management measure	MgmtType	Allocation ^a (Mlb)	Removals ^a (Mlb)	Overage (Mlb)	Percent Over/Under
2C	2012	One fish, U45-O68 rev. slot	GHL	0.931	0.605	-0.326	-35%
	2013	One fish, U45-O68 rev. slot	GHL	0.788	0.762	-0.026	-3%
	2014	One fish, U44-O76 rev. slot	CSP	0.761	0.827	0.066	9%
	2015	One fish, U42-O80 rev slot	CSP	0.851	0.848	-0.004	0%
3A	2012	Two fish any size	GHL	3.103	2.284	-0.819	-26%
	2013	Two fish any size	GHL	2.734	2.514	-0.220	-8%
	2014	Two fish, one ≤ 29", trip limit	CSP	1.782	2.068	0.284	16%
	2015	Two fish, one ≤ 29", Thursday closed Jun 15-Aug 31, trip limit, annual limit 5 halibut.	CSP	1.89	2.063	0.150	9%

-9%

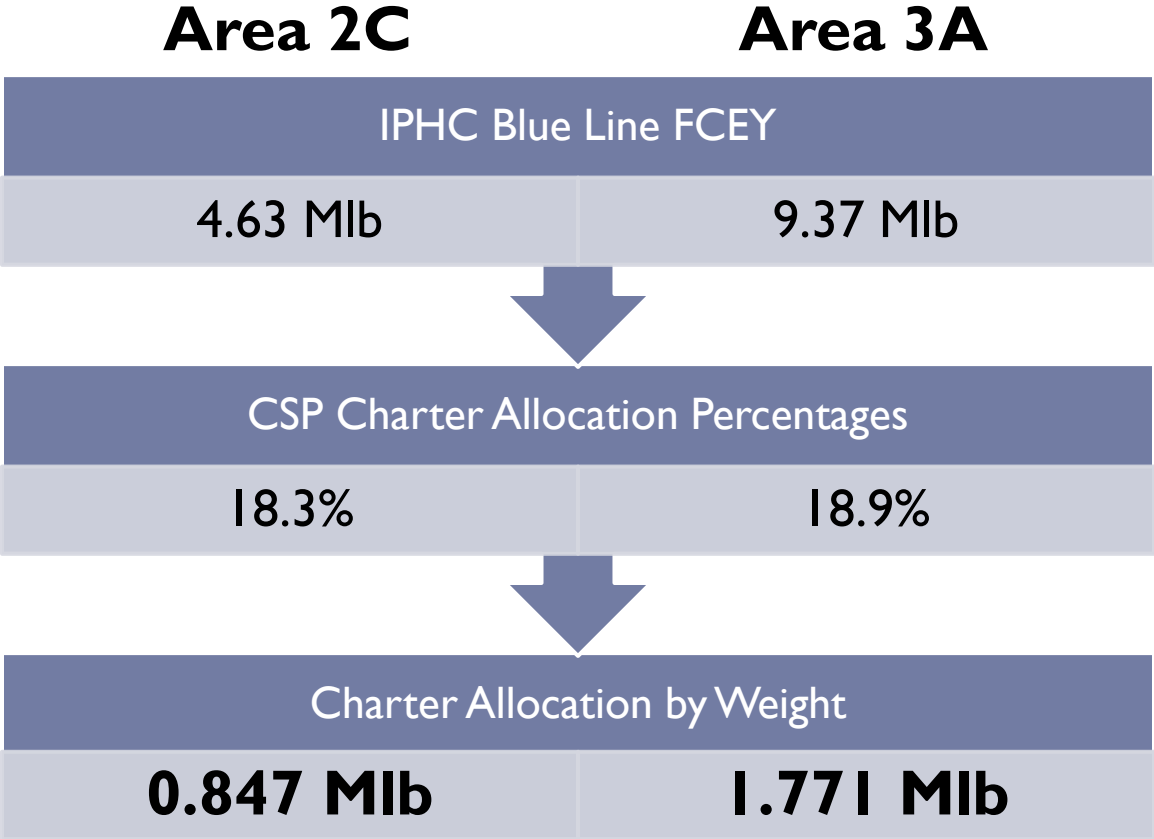
-6%

^a - Allocations and removals include O26 release mortality beginning with the CSP in 2014.

Analysis of management measures for 2016



IPHC “Blue Line” allocations for 2016

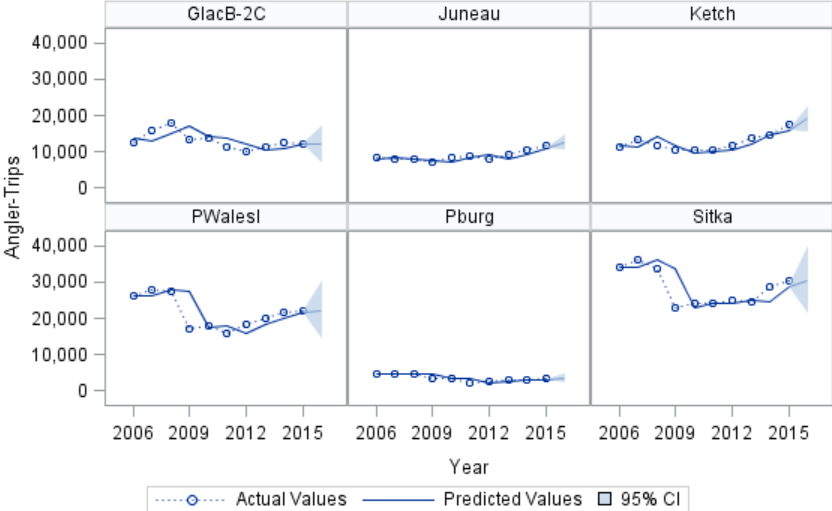


Status quo forecasts of charter removals

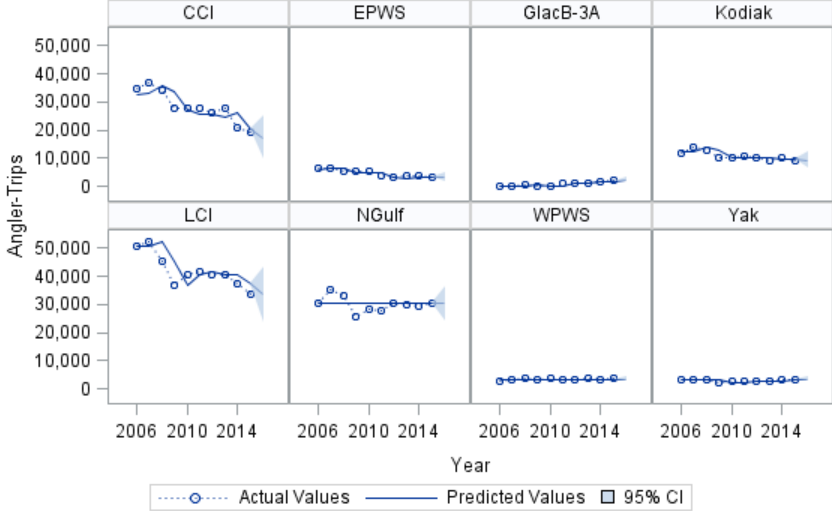
- ▶ Forecast effort, HPUE → Harvest
- ▶ Harvest × predicted average weight → Yield
- ▶ Inflate to account for O26 release mortality → Removals

Effort trends

Area 2C Effort

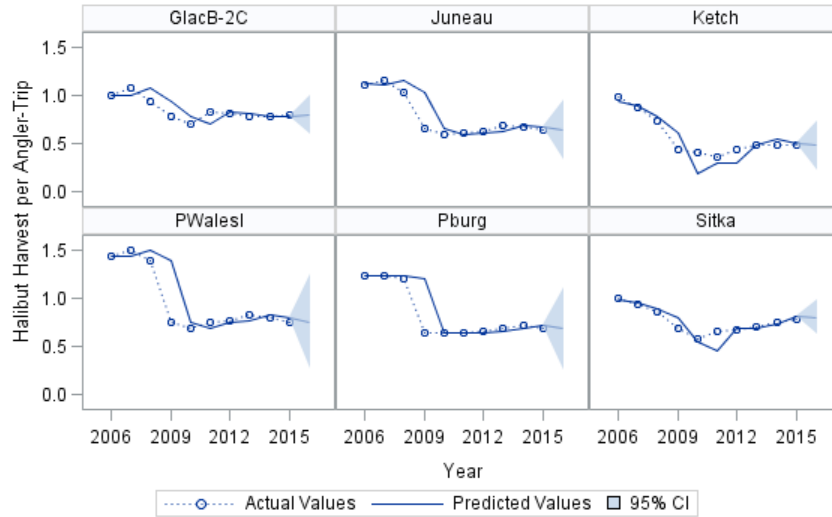


Area 3A Effort

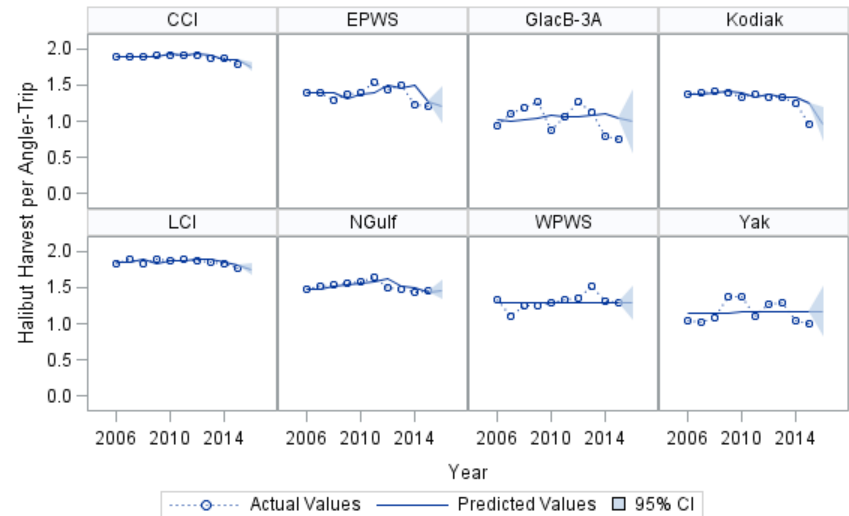


HPUE trends

Area 2C HPUE

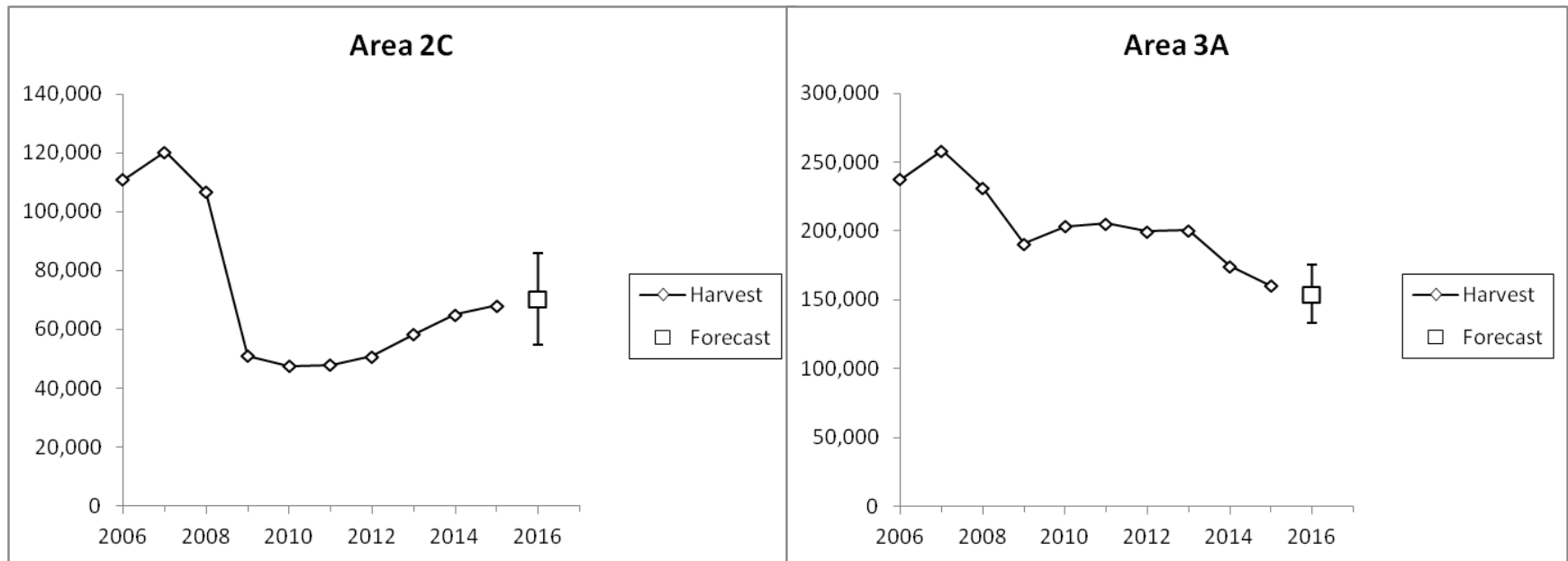


Area 3A HPUE



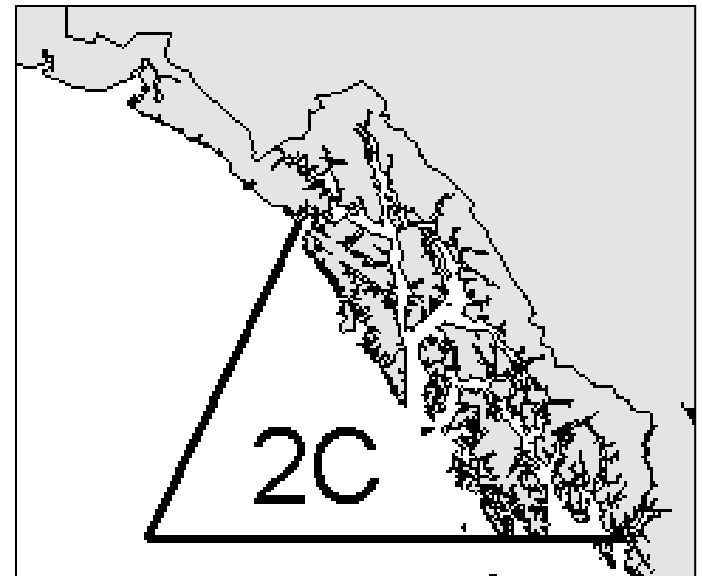
Status quo forecasts of charter removals

Area	Harvest	HPUE	Harvest	Average		Rel Mort (Mlb)	Removals (Mlb)	Allocation	
				Wt (lb)	Yield (Mlb)			(Mlb)	Difference
2C	99,298	0.707	70,165	11.48	0.805	0.049	0.854	0.847	0.8%
3A	102,821	1.498	154,001	12.44	1.916	0.029	1.945	1.771	8.9%



Area 2C measures for 2016

- ▶ Status quo: 1 fish bag limit, U42O80 reverse slot size limit
- ▶ Reverse (protected) slot limit + annual limit
- ▶ Maximum size limit + annual limit
- ▶ Limit vessels to one trip per day



Area 2C – effect of annual limits

Annual Limit	Subarea							Area 2C
	Ketch	PWI	Pburg	Sitka	Jun	GlacB		
Estimated percent of anglers affected by the annual limit:								
1	24.2%	73.3%	59.4%	68.6%	43.0%	59.9%	57.9%	
2	9.3%	48.5%	33.2%	37.5%	26.4%	41.9%	34.4%	
3	2.0%	14.8%	13.0%	8.2%	13.8%	26.2%	11.6%	
4	0.5%	3.3%	4.1%	1.2%	5.4%	15.9%	3.9%	
5	0.1%	0.9%	0.3%	0.2%	1.1%	9.4%	1.5%	
Estimated percent change in harvest:								
1	-26.6%	-58.6%	-52.7%	-53.7%	-47.4%	-62.5%	-51.8%	
2	-8.8%	-28.2%	-24.6%	-21.9%	-24.8%	-40.1%	-24.6%	
3	-2.0%	-8.1%	-8.9%	-4.5%	-11.0%	-24.4%	-8.6%	
4	-0.5%	-2.0%	-2.8%	-0.8%	-3.7%	-14.6%	-3.3%	
5	-0.1%	-0.6%	-0.8%	-0.2%	-0.9%	-8.7%	-1.5%	
Projected harvest (number of halibut):								
1	6,691	6,972	1,060	11,347	4,206	3,552	33,828	
2	8,310	12,082	1,690	19,126	6,016	5,680	52,903	
3	8,935	15,466	2,042	23,380	7,126	7,167	64,116	
4	9,070	16,498	2,180	24,309	7,706	8,097	67,860	
5	9,102	16,727	2,224	24,448	7,933	8,660	69,094	
None	9,113	16,830	2,242	24,494	8,004	9,483	70,166	



Area 2C – reverse slot limit + annual limit

- ▶ Blue Line allocation is 0.847 Mlb.

No annual limit, harvest = 70,165 halibut

Lower Limit (in)	Upper Length Limit (in)															
	50	52	54	56	58	60	62	64	66	68	70	72	74	76	78	80
35	1.268	1.183	1.119	1.049	0.996	0.948	0.882	0.818	0.783	0.753	0.722	0.703	0.677	0.661	0.659	0.646
36	1.303	1.219	1.156	1.087	1.035	0.987	0.921	0.858	0.823	0.793	0.762	0.744	0.718	0.702	0.700	0.687
37	1.324	1.241	1.179	1.110	1.058	1.011	0.946	0.882	0.848	0.818	0.787	0.769	0.743	0.727	0.725	0.712
38	1.355	1.274	1.213	1.145	1.094	1.047	0.983	0.920	0.885	0.856	0.825	0.807	0.781	0.766	0.763	0.750
39	1.379	1.298	1.238	1.171	1.120	1.073	1.009	0.947	0.913	0.883	0.853	0.834	0.809	0.793	0.791	0.778
40	1.398	1.319	1.260	1.193	1.143	1.096	1.033	0.971	0.937	0.907	0.877	0.859	0.834	0.818	0.816	0.803
41	1.423	1.345	1.286	1.220	1.171	1.125	1.062	1.000	0.966	0.937	0.907	0.889	0.864	0.848	0.846	0.833
42	1.439	1.362	1.304	1.239	1.190	1.144	1.081	1.020	0.986	0.957	0.928	0.910	0.884	0.869	0.866	0.854
43	1.457	1.381	1.324	1.259	1.211	1.165	1.103	1.042	1.009	0.980	0.950	0.932	0.907	0.891	0.889	0.877
44	1.481	1.407	1.351	1.287	1.239	1.194	1.132	1.072	1.038	1.010	0.980	0.962	0.937	0.922	0.919	0.907
45	1.508	1.435	1.380	1.317	1.269	1.225	1.163	1.103	1.070	1.042	1.013	0.995	0.970	0.954	0.952	0.939
46	1.526	1.454	1.399	1.337	1.290	1.246	1.185	1.125	1.092	1.064	1.035	1.017	0.992	0.977	0.974	0.962
47	1.550	1.480	1.426	1.365	1.318	1.275	1.214	1.155	1.123	1.094	1.065	1.048	1.023	1.007	1.005	0.993
48	1.568	1.498	1.445	1.384	1.338	1.294	1.234	1.176	1.143	1.115	1.086	1.068	1.044	1.028	1.026	1.014
49	1.597	1.529	1.476	1.416	1.371	1.328	1.269	1.211	1.178	1.150	1.122	1.104	1.079	1.064	1.062	1.050
50	1.618	1.551	1.500	1.440	1.395	1.353	1.294	1.237	1.205	1.177	1.149	1.131	1.107	1.091	1.089	1.077



Area 2C – maximum size limit

- ▶ Blue Line allocation is 0.847 Mlb.

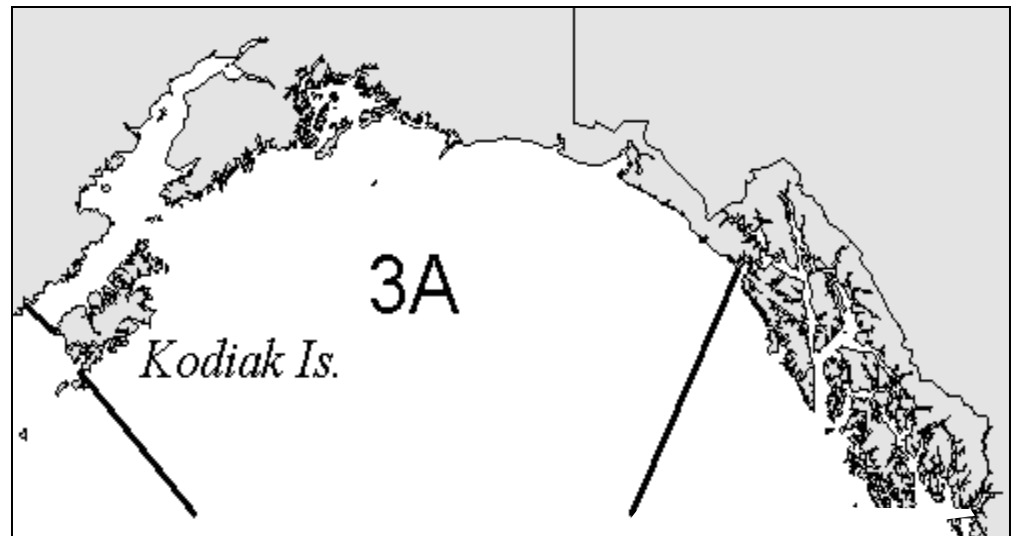
Size limit (inches)	A. Projected total removals including release mortality (M lb).					
	Annual Limit (number of fish per year)					
	1	2	3	4	5	No Limit
30	0.223	0.350	0.424	0.449	0.457	0.464
31	0.240	0.376	0.456	0.482	0.491	0.498
32	0.261	0.408	0.495	0.524	0.533	0.542
33	0.276	0.430	0.521	0.552	0.562	0.571
34	0.293	0.456	0.552	0.585	0.595	0.605
35	0.305	0.476	0.576	0.610	0.622	0.632
36	0.327	0.509	0.615	0.652	0.664	0.674
37	0.340	0.529	0.640	0.678	0.690	0.701
38	0.360	0.559	0.676	0.717	0.730	0.742
39	0.374	0.581	0.703	0.745	0.759	0.772
40	0.387	0.601	0.727	0.770	0.785	0.799
41	0.403	0.625	0.756	0.801	0.817	0.831
42	0.413	0.642	0.776	0.822	0.839	0.854
43	0.424	0.659	0.798	0.846	0.863	0.879
44	0.440	0.684	0.827	0.876	0.894	0.911
45	0.456	0.710	0.858	0.910	0.928	0.946
46	0.468	0.728	0.880	0.933	0.952	0.970
47	0.484	0.752	0.910	0.965	0.984	1.003
48	0.495	0.769	0.930	0.986	1.006	1.026
49	0.513	0.797	0.964	1.023	1.044	1.065
50	0.526	0.819	0.990	1.051	1.073	1.095
51	0.540	0.841	1.017	1.079	1.101	1.124
52	0.560	0.871	1.053	1.118	1.141	1.165
53	0.572	0.890	1.077	1.143	1.167	1.191
54	0.589	0.916	1.108	1.176	1.201	1.226
55	0.602	0.938	1.135	1.204	1.230	1.256

Area 2C – vessel trip limit (one per day)

- ▶ ~30% of vessels make multiple trips per day for bottomfish in recent years (Table 9).
- ▶ 2.1-2.4 percent of halibut harvest from trips after the first trip of the day.
- ▶ Percentage varies by subarea 0.4 – 4.7% in 2014.
- ▶ Multiple reasons and business models.
- ▶ Can't precisely estimate effect of vessel limit.
- ▶ Maximum reduction ~2.0-2.4%.

Area 3A Measures for 2016

- ▶ Status quo: 2-fish bag limit with 29-inch max. size limit on one fish, annual limit 5 halibut, one trip per vessel per day, fishery closed Thursdays Jun 15-Aug 31.
- ▶ Maximum size limit on one fish + annual limit
- ▶ Extend Thursday closure, close additional day of the week.



Area 3A – effect of annual limits

Area 3A

Annual Limit	Subarea								Area 3A
	CCI	EPWS	GlacBay	Yak	LCI	NGulf	Kod	WPWS	
Estimated percent of anglers affected by an annual limit:									
1	94.4%	57.3%	47.5%	51.8%	94.0%	83.8%	77.6%	62.7%	86.7%
2	18.0%	9.7%	16.3%	21.3%	19.1%	12.3%	40.8%	9.0%	17.6%
3	16.3%	6.3%	5.1%	10.1%	17.2%	9.5%	30.5%	4.6%	14.6%
4	5.0%	1.3%	0.5%	4.0%	4.2%	2.8%	18.9%	0.5%	4.5%
5	4.3%	0.6%	0.0%	1.3%	3.6%	1.9%	12.9%	0.0%	3.5%
6	1.5%	0.2%	0.0%	0.8%	1.1%	0.7%	8.4%	0.0%	1.4%
7	1.3%	0.1%	0.0%	0.6%	0.9%	0.4%	6.1%	0.0%	1.1%
8	0.6%	0.0%	0.0%	0.1%	0.3%	0.2%	2.9%	0.0%	0.4%
9	0.5%	0.0%	0.0%	0.0%	0.2%	0.1%	1.8%	0.0%	0.3%
10	0.3%	0.0%	0.0%	0.0%	0.1%	0.1%	0.5%	0.0%	0.2%
Estimated percent change in harvest:									
1	-58.8%	-43.0%	-40.9%	-47.4%	-58.5%	-52.8%	-66.8%	-43.4%	-56.0%
2	-19.9%	-10.4%	-12.9%	-20.1%	-19.6%	-13.3%	-41.0%	-8.0%	-18.5%
3	-12.6%	-4.9%	-3.3%	-8.9%	-11.7%	-7.5%	-27.5%	-2.9%	-10.9%
4	-5.9%	-1.3%	-0.3%	-3.6%	-4.5%	-3.1%	-17.4%	-0.3%	-4.8%
5	-3.8%	-0.5%	0.0%	-1.4%	-2.8%	-1.7%	-11.1%	0.0%	-2.9%
6	-2.0%	-0.2%	0.0%	-0.7%	-1.3%	-0.9%	-6.8%	0.0%	-1.5%
7	-1.4%	-0.1%	0.0%	-0.3%	-0.8%	-0.5%	-4.0%	0.0%	-1.0%
8	-0.9%	0.0%	0.0%	0.0%	-0.5%	-0.3%	-2.0%	0.0%	-0.6%
9	-0.7%	0.0%	0.0%	0.0%	-0.4%	-0.2%	-1.0%	0.0%	-0.4%
10	-0.5%	0.0%	0.0%	0.0%	-0.2%	-0.2%	-0.5%	0.0%	-0.3%
Projected harvest (number of halibut):									
1	12,196	2,290	1,346	2,154	24,592	21,165	3,341	2,532	69,616
2	23,710	3,601	1,985	3,270	47,698	38,895	5,933	4,119	129,212
3	25,900	3,823	2,205	3,728	52,403	41,498	7,295	4,346	141,200
4	27,886	3,957	2,274	3,946	56,645	43,505	8,314	4,463	151,001
5	28,491	3,998	2,280	4,033	57,680	44,096	8,947	4,476	154,001
6	29,014	4,012	2,280	4,062	58,571	44,493	9,379	4,477	156,287
7	29,193	4,016	2,280	4,079	58,831	44,635	9,661	4,477	157,173
8	29,348	4,018	2,280	4,091	59,042	44,729	9,863	4,477	157,848
9	29,415	4,019	2,280	4,092	59,117	44,766	9,959	4,477	158,125
10	29,473	4,019	2,280	4,092	59,178	44,794	10,018	4,477	158,331
None	29,619	4,019	2,280	4,092	59,325	44,877	10,064	4,477	158,754

86.7%

17.6%

14.6%

4.5%

3.5%

1.4%

1.1%

0.4%

-56.0%

0.3%

-18.5%

0.2%

-10.9%

-4.8%

-2.9%

-1.5%

69,616

-1.0%

129,212

-0.6%

141,200

-0.4%

151,001

-0.3%

154,001

156,287

157,173

157,848

158,125

158,331

158,754



Area 3A – maximum size limit on one fish + annual limit

▶ Blue Line allocation is 1.771 Mlb

Projected Removals (M lb)

	Harvest Forecast Associated with Each Annual Limit (no. fish):										
	69,616	129,212	141,200	151,001	154,001	156,287	157,173	157,848	158,125	158,331	158,754
	Annual Limit										
Size Limit (in)	1	2	3	4	5	6	7	8	9	10	None
26	0.855	1.539	1.684	1.793	1.827	1.852	1.862	1.870	1.873	1.875	1.879
27	0.870	1.566	1.714	1.826	1.861	1.886	1.896	1.904	1.907	1.909	1.914
28	0.893	1.609	1.761	1.876	1.912	1.938	1.948	1.956	1.959	1.962	1.966
29	0.908	1.637	1.791	1.908	1.945	1.971	1.982	1.990	1.993	1.996	2.001
30	0.930	1.680	1.838	1.958	1.996	2.023	2.034	2.042	2.045	2.048	2.053
31	0.946	1.708	1.869	1.991	2.030	2.057	2.068	2.077	2.080	2.083	2.088
32	0.965	1.745	1.909	2.034	2.073	2.101	2.113	2.121	2.125	2.127	2.133
33	0.977	1.767	1.933	2.060	2.099	2.128	2.140	2.149	2.152	2.155	2.160
34	0.991	1.792	1.960	2.089	2.129	2.158	2.170	2.179	2.182	2.185	2.190
35	0.999	1.808	1.978	2.108	2.148	2.178	2.190	2.199	2.202	2.205	2.210

Area 3A – extension of Thursday closure

- ▶ **Status quo: Closed Jun 15 – Aug 31**
 - ▶ Cannot precisely analyze harvest reduction achieved
- ▶ **Proposed: Closed Jun 1 - Sep 15**

▶ Jun 15 - Aug 31, 2014	11.2%
▶ Jun 1 - Sep 15, 2014	12.8%
▶ Difference	1.6%

Area 3A – additional daily closure

Day of the Week	Percent of Harvest by Month					Percent of Harvest by Period		
	May	Jun	Jul	Aug	Sep	May-Sep	Jun-Aug	Entire Year
Sun	0.8	4.0	5.0	3.9	0.4	14.1	12.9	14.2
Mon	0.5	3.5	5.7	3.3	0.6	13.7	12.5	13.7
Tue	0.6	2.6	7.0	3.3	0.4	13.9	12.9	14.0
Wed	0.8	3.0	7.1	3.7	0.5	15.2	13.8	15.3
Thu	0.8	3.3	6.0	3.2	0.4	13.7	12.4	13.8
Fri	1.0	3.1	5.2	4.4	0.3	14.0	12.8	14.1
Sat	1.4	3.8	5.1	4.2	0.5	15.0	13.1	15.1
Total	6.0	23.5	41.2	25.9	3.2	99.7	90.5	100.0

Area 3A – additional daily closure

Day of the Week	2014 Entire Yr	2015 Thru July
Sun	14.2	16.7
Mon	13.7	15.8
Tue	14.0	15.7
Wed	15.3	16.7
Thu	13.8	2.3
Fri	14.1	16.7
Sun	15.1	16.1

Area 3A – additional combinations

- ▶ Few options under max size on one fish + annual limit.
- ▶ Need about 9% reduction from status quo forecast

Projected Removals (M lb)

	Harvest Forecast Associated with Each Annual Limit (no. fish):										
	62,654	116,291	127,080	135,901	138,601	140,659	141,455	142,064	142,313	142,498	142,879
	Annual Limit										
Size Limit (in)	1	2	3	4	5	6	7	8	9	10	None
26	0.769	1.385	1.515	1.614	1.645	1.667	1.676	1.683	1.685	1.687	1.691
27	0.783	1.410	1.543	1.643	1.675	1.697	1.706	1.713	1.716	1.718	1.722
28	0.803	1.448	1.585	1.688	1.721	1.744	1.753	1.761	1.763	1.766	1.770
29	0.817	1.474	1.612	1.718	1.750	1.774	1.784	1.791	1.794	1.796	1.801
30	0.837	1.512	1.654	1.762	1.796	1.821	1.830	1.838	1.841	1.843	1.848
31	0.851	1.538	1.682	1.792	1.827	1.852	1.862	1.869	1.872	1.874	1.879
32	0.869	1.570	1.718	1.830	1.866	1.891	1.901	1.909	1.912	1.915	1.919
33	0.879	1.590	1.740	1.854	1.889	1.915	1.926	1.934	1.937	1.939	1.944
34	0.891	1.613	1.764	1.880	1.916	1.942	1.953	1.961	1.964	1.967	1.971
35	0.899	1.627	1.780	1.897	1.933	1.960	1.971	1.979	1.982	1.984	1.989

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Extra slides

Projected removals under proposed alternative

- ▶ Assume 4.1% reduction in harvest from Wednesdays closed all years, vessel trip limit.

Projected Removals (M lb)

Size Limit (in)	Harvest Forecast Associated with Each Annual Limit (no. fish):										
	66,762	123,915	135,411	144,810	147,687	149,879	150,729	151,377	151,642	151,839	152,245
	Annual Limit										
	1	2	3	4	5	6	7	8	9	10	None
26	0.820	1.476	1.615	1.720	1.752	1.776	1.786	1.793	1.796	1.798	1.802
27	0.834	1.502	1.644	1.751	1.784	1.808	1.818	1.826	1.829	1.831	1.835
28	0.856	1.543	1.689	1.799	1.833	1.858	1.868	1.876	1.879	1.881	1.886
29	0.870	1.570	1.718	1.830	1.865	1.891	1.901	1.909	1.912	1.914	1.919
30	0.892	1.611	1.762	1.878	1.914	1.940	1.950	1.958	1.962	1.964	1.969
31	0.907	1.638	1.792	1.910	1.946	1.973	1.984	1.992	1.995	1.997	2.002
32	0.926	1.673	1.830	1.950	1.988	2.015	2.026	2.034	2.038	2.040	2.045
33	0.937	1.695	1.854	1.975	2.013	2.041	2.052	2.060	2.064	2.066	2.071
34	0.950	1.718	1.880	2.003	2.042	2.070	2.081	2.089	2.093	2.095	2.101
35	0.958	1.734	1.897	2.021	2.060	2.088	2.100	2.108	2.112	2.115	2.120

