Appendix 1c Octopus Complex in the Gulf of Alaska

M. Elizabeth Conners and Elaina Jorgensen, Alaska Fisheries Science Center

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Executive Summary

Through 2007, octopuses have been managed as part of the "other species" complex in the Gulf of Alaska (GOA), with catch reported only in the aggregate with sharks, squids, and sculpins. Due to increasing market value of some groups, retention of other species complex members is increasing. This appendix to the other species SAFE chapter was prepared to review available information that would be needed if the other species complex were to be split into separate components for future management. All octopus species would continue to be grouped into a species assemblage. At least seven species of octopus are found in the GOA, and the species composition both of the natural community and the commercial harvest is unknown at this time. Octopuses are taken as incidental catch in trawl, longline, and pot fisheries throughout the GOA; the highest catch rates are from Pacific cod pot fisheries in the central and western GOA (statistical areas 610 and 630).

The current data are not sufficient for any model-based assessment. The GOA trawl surveys produce estimates of biomass for octopus, but these estimates are highly variable and may not reflect the same species and sizes of octopus caught by industry. As an example of how this species complex might be managed under catch quotas, we have estimated Tier 6 and Tier 5 catch limits from available data. There are concerns that a strict Tier 6 approach could result in an overly conservative OFL limit that would affect cod fisheries. An alternative Tier 6 approach was suggested in 2006; this method treats the existing data as a "probable safe catch rate", and uses the maximum incidental catch to set the ABC (Table 1). The various methods for setting annual catches for this assemblage are still under debate at the GOA plan team.

Because of the lack of information at this time, we recommend that directed fishing for octopus be discouraged in federal waters of the GOA and that incidental catch be limited by conservative catch limits. As better catch accounting and biological data for these species are collected, possible future assessment methods can be investigated.

Summary of Changes Since 2006

There have been only minor changes since completion of the fall 2006 assessment.

- As part of a NMFS cooperative research project, Elaina Jorgensen of AFSC visited the Alaska Pacific Seafoods processing plant in Kodiak in October 2006 and March 2007 to observe octopus delivered to the plant. All of the animals examined were Giant Pacific octopus (*E. dofleini*). Plant-delivered octopus ranged in weight from 4.1 to 21.8 kg (gutted weight), with an average gutted weight of 9.8 kg. These octopus were noticeably smaller and in poorer condition than octopus examined in Dutch Harbor during the same time frame.

- The observer program special project where sexes and individual weights of octopus are recorded continued through 2007, and will be extended through 2008. In 2007, the numbers of female octopus observed aboard vessels was higher than the number of males. Size differences by gear type continue to be apparent. As data accumulate for this project, changes in sex ratio by season are also beginning to be apparent.

- Catch data have been updated. Catch data for all of 2006 and for most of 2007 have been included (Table 2). Total catch for 2006 was 159 tons, up slightly from 2005. The catch through October 24, 2007 was 186 tons, slightly higher than in 2005-2006 but substantially lower than the high-catch years of 2002 and 2004. As in previous years, the majority of the reported catch came from statistical reporting areas 610 and 630. The long-term average catch rate for the ten years of complete data (1997-2006) is 185.9 tons.

- Survey data have been updated (Table 3). The 2007 GOA survey caught octopus in 8.7% of the trawl tows, with a total biomass estimate of 2,296 tons. This biomass estimate is the second-highest ever observed. The average of the most recent 10 years of survey biomass estimates is 1,835 tons.

Octopus remains difficult to place within the existing tier system for setting regulatory catch limits. In February 2006, the SSC concurred with the SAFE authors that the size difference between trawl and pot-caught octopus makes biomass data based on the trawl survey questionable for this species group. The best available estimates of octopus catch rates do not cover the time period specified for Tier 6 evaluation, and represent only incidental catch rates rather than targeted fishing. Ecosystem models of the GOA indicate that fishery catch is a tiny fraction of the estimated total predation mortality on octopus. If the average incidental catch rate from 1997-2006 had been used to set limits on octopus catch for 2007, fisheries would have come close to the OFL by mid-October, and cod pot fisheries may have been shut down to avoid further bycatch of octopus. Since there is no requirement to set ABC and OFL for octopus as a separate management category in 2008, this report remains a discussion of possible future management approaches, without specific recommendations for setting catch levels. Table 1 includes a summary of ABC and OFL levels that would result from applying various methods to the existing data for octopus.

Table 1. Estimates of octopus catch limits under different methods for 2006 and 2007. Note that Tier 6 estimates are based on average of only complete year data, so 2007 estimates do not include the partial catch estimate for 2007.

	2006			**2007**	
Method	**ABC**	**OFL**		**ABC**	**OFL**
Tier 5	701	935		730	973
Tier 6 (avg)	141	189		139	186
Tier 6 (max)	298	398		298	398

Table 2. GOA catch estimates for octopus (all species), in metric tons. Catch estimates for 1997-2002 are estimated from blend data, 2003-2007 data are from AK region catch accounting. * 2007 Data are partial catch as of Oct 24, 2007.

Target Fishery	Gear	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007*
Pacific cod	hook n line	0.84	25.10	16.82	16.39	6.43	6.98	2.97	13.38	1.21	1.76	1.48
	trawl	25.09	0.72	4.40	0.06	2.71	6.95	0.48	5.56	0.29	0.56	1.32
	pot	167.91	73.84	141.99	137.09	62.97	251.51	185.29	247.38	139.16	143.89	175.08
Pacific cod	Total	193.85	99.66	163.21	153.54	72.10	265.44	188.90	266.54	140.68	146.22	177.87
Pollock		0.74	3.51	0.03	-	0.18	0.04	-	0.00	0.06	3.412	1.44
Flatfish		1.35	4.34	2.43	0.69	0.84	17.16	6.80	1.52	7.52	8.60	4.11
Rockfish		2.26	0.76	0.47	0.18	0.04	0.66	0.65	0.43	0.19	0.47	0.04
Sablefish		22.41	0.27	0.18	0.52	2.01	0.99	2.82	0.09	0.22	0.32	1.79
Other/Unknown								10.48	17.44	2.56	0.42	0.66
Total		232.19	112.00	166.33	156.12	87.59	298.14	209.65	286.01	151.22	159.43	185.91

Table 3. GOA survey biomass estimates for octopus (all species), in metric tons, and Tier 5 calculations based on the average over the most recent 10 years. Note that the M value of 0.53 used in calculations is estimated based on Hoening's equation, which was developed for finfish.

Survey Year	Survey Hauls	Hauls with Octopus		Estimated Biomass (t)
1984	929	89	9.6%	1,498
1987	783	35	4.5%	2,221
1990	708	34	4.8%	1,029
1993	775	43	5.5%	1,335
1996	807	34	4.2%	1,960
1999	764	47	6.2%	994
2001	489	29	5.9%	994
2003	809	70	8.7%	3,767
2005	839	56	6.7%	1,125
2007	820	71	8.7%	2,296
		Average all		1,722
		Average 10 yrs		1,835
	Tier 5	OFL = **0.53***10yr		972.68
	Tier 5	ABC = 0.75*OFL		729.51