Appendix 1 – Assessment of the Grenadier Stock Complex in the Gulf of Alaska, Eastern Bering Sea, and Aleutian Islands

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Executive Summary

Grenadiers are presently considered "nonspecified" by the NPFMC, which means they are technically not part of the NPFMC management process and are not assigned values for overfishing levels (OFL), acceptable biological catch (ABC), or total allowable catch (TAC). Therefore, there are no limitations on catch or retention, no reporting requirements, and no official tracking of grenadier catch by management. However, at the June, 2012 NPFMC meeting a motion was passed that included a purpose and need statement for moving grenadiers into the FMPs and four alternatives for doing so. An Environmental Assessment/ Regulatory Impact Review/ Initial Regulatory Flexibility Analysis (EA/RIR/IRFA) for the proposed FMP amendments will be presented at the December, 2013 meeting with final action scheduled for February, 2014.

A full assessment report was prepared for grenadiers in even years since 2006. Because grenadiers are "nonspecified", these reports are considered unofficial, and they have been included as appendices in the standard SAFE reports. For further information regarding the assessment, please refer to last year's full stock assessment, which is available online at http://www.afsc.noaa.gov/REFM/Docs/2012/GOAgrenadier.pdf (Rodgveller et al., 2012).

The tier 5 computations have been based on giant grenadier only and have excluded the other grenadier species because virtually none of the other species are caught in the commercial fishery and relatively few are taken in fish surveys. Therefore, in the tier 5 determinations, giant grenadier is serving as a proxy for the entire grenadier group.

Summary of changes in Assessment Inputs

Changes in the input data: New survey data are available from the 2013 NMFS Gulf of Alaska (GOA) trawl survey and the NMFS GOA and Bering Sea longline survey. Catch data for 2012-2013 are updated. Like in 2011, the trawl survey did not sample the deepest stratum, 701-1,000 m, where past surveys have found as much as >50% of the biomass; therefore, data from the 2013 survey (as well as the 2011 survey) are not used in Tier 5 calculations for 2014. For informational purposes only, the trawl survey biomass estimate down to 700 m was 18% higher than in 2011. Much of this increase was due to an unusually high estimate in the 301-500 m strata in the Kodiak region. This increase was attributed to two of five hauls with very large catches, which also contributed to a high variance estimate. There is no new trawl survey data for the Bering Sea (BS) slope/Aleutian Islands.

The GOA and BS were sampled during the 2013 longline survey. The relative population index in numbers (RPN) in the GOA decreased 10%, but the relative population index in weight (RPW) decreased by only <2%. Compared to 2011, when the Bering Sea was last sampled during the longline survey, RPNs decreased by 14% and RPW increased by 5%. A discrepancy in RPN and RPW trends can be attributed to an increase in fish size in at least some areas or strata.

In 2013, estimated catch increased by 33% in the GOA, decreased in the EBS by 49%, and decreased in the AI by 48%. This variation is typical in the AI. The catch estimate in the BS is 45% lower than average catch from 2003-2012. This is due to a decrease in grenadier catch in the Greenland turbot and Kamchatka flounder fisheries. Grenadier bycatch has only appeared in the Kamchatka fishery since 2011. In the GOA, catch of grenadier increased dramatically in the deep-water flatfish fishery (up 1,245 mt from 0). Catch has been sparse in this fishery since 2003. It is unknown to what extent the restructuring

of the observer program in 2013 may have affected catch estimation in these fisheries; future analyses will aim to investigate shifts in observer coverage and the effects on grenadier catch estimation.

Changes in assessment methodology: There were no changes in assessment methodology. As in all previous assessments, current exploitable biomass is based on averaging the biomass estimates in the last three trawl surveys that sampled down to at least 1,000. In the Gulf of Alaska this is currently 2005, 2007, and 2009. In the Bering Sea/Aleutian Islands, this is 2008, 2010, and 2012. Because biomass estimates are only available in the Aleutian Islands down to 500 m, a ratio of "shallow" biomass estimates from the trawl survey (1-500 m) to "shallow" relative population weights from the longline survey (1-500 m) is used to extrapolate total biomass from longline survey RPWs for 1-1000 m.

Summary of Results

Gulf of Alaska Grenadiers

	As specified last year for[a]:		**Recommended this year for:**	
Quantity/Status	2013	2014	**2014**	2015
M (natural mortality)	0.078	0.078	**0.078**	0.078
Specified/recommended Tier	5	5	**5**	5
Biomass	597,884	597,884	**597,884**	597,884
Upper 95% CI	790,559	790,559	**790,559**	790,559
Lower 95% CI	405,209	405,209	**405,209**	405,209
F_{OFL} (F=M)	0.078	0.078	**0.078**	0.078
$maxF_{ABC}$ (maximum allowable = 0.75x F_{OFL})	0.0585	0.0585	**0.0585**	0.0585
Specified/recommended F_{ABC}	0.0585	0.0585	**0.0585**	0.0585
Specified/recommended OFL (t)	46,635	46,635	**46,635**	46,635
Specified/recommended ABC (t)	34,976	34,976	**34,976**	34,976
Is the stock being subjected to overfishing?	n/a	n/a	n/a	n/a

[a]The values for biomass, OFL, and ABC in these two columns are based on Rodgveller et al. 2012. No new biomass estimates were available in 2013 so values of OFL and ABC remain constant.

Bering Sea and Aleutian Islands Grenadiers

Quantity/Status	As specified last year for[a]: 2013	2014	Recommended this year for: **2014**	2015
M (natural mortality)	0.078	0.078	**0.078**	0.078
Specified/recommended Tier	5	5	**5**	5
Biomass	1,152,284	1,152,284	**1,152,284**	1,152,284
Upper 95% CI	1,326,713	1,326,713	**1,326,713**	1,326,713
Lower 95% CI	977,854	977,854	**977,854**	977,854
F_{OFL} (F=M)	0.078	0.078	**0.078**	0.078
$maxF_{ABC}$ (maximum allowable = 0.75*x* F_{OFL})	0.0585	0.0585	**0.0585**	0.0585
Specified/recommended F_{ABC}	0.0585	0.0585	**0.0585**	0.0585
Specified/recommended OFL (t)	89,878	89,878	**89,878**	89,878
Specified/recommended ABC (t)	67,409	67,409	**67,409**	67,409
Is the stock being subjected to overfishing?	n/a	n/a	n/a	n/a

[a]The values for biomass, OFL, and ABC in these two columns are based on Rodgveller et al. 2012.

Updated catch data (mt) for grenadiers, nearly all of which are thought to be giant grenadier as of October 13, 2013 (NMFS Alaska Regional Office Catch Accounting System via the Alaska Fisheries Information Network (AKFIN) database, http://www.akfin.org).

Year	Eastern Bering Sea	Aleutian Islands	Gulf of Alaska	Total
2012	2,913	4,570	7,931	15,415
2013	1,482	2,367	10,525	14,374

Summaries for Plan Team

Species	Year	BSAI Biomass[1]	BSAI ABC	BSAI Catch[2]	GOA Biomass[1]	GOA ABC	GOA Catch[2]	Total Catch[2]
grenadiers	2012	1,733,797	101,427	7,483	597,884	34,976	7,931	15,415
	2013	1,152,284	67,409	3,849	597,884	34,976	10,525	14,374
	2014	1,152,284	67,409		597,884	34,976		
	2015	1,152,284	67,409		597,884	34,976		

[1]Total biomass from trawl survey estimates.

[2]Current as of October 13, 2013. Source: NMFS Alaska Regional Office Catch Accounting System via the Alaska Fisheries Information Network (AKFIN) database (http://www.akfin.org).

SSC and Plan Team Comments Specific to this Assessment

Due to the government shutdown, and hence an abbreviated working period, responses to the previously listed SSC, Plan Team, and CIE Comments will be provided in next year's full stock assessment report. To address several of these comments, we plan to follow the recommendations listed in the various working group reports (e.g. the methods for averaging surveys report) submitted to the Plan Team in September 2012.

"In response to SSC comments, the authors included a Kalman filter model for estimating biomass. The Kalman filter estimates miss the most recent trawl biomass estimate in the GOA resulting in a substantially lower biomass estimate. For future assessments, the SSC encourages continued exploration of the Kalman filter method and we ask the authors to consider the recommendations in the Plan Team survey averaging work group." (SSC, 2012)

"The authors introduced a new method for determining AI biomass and variance estimates. The SSC cautions that this is an uncertain extrapolation method. The catchability and size selection of longline surveys is known to differ from the trawl survey. This method assumes that the ratio between longline and trawl surveys in shallow water will be the same for the ratio of longline and trawl surveys in deep water. The SSC encourages the authors to verify whether this assumption is valid." (SSC, 2012)

Center of Independent Expect Review Comments

In May, 2013 there was a Center of Independent Expert (CIE) review of non-target assessments at the AFSC. Three reviewers participated and each produced a report without collaboration from NMFS or other reviewers. The AFSC will prepare a formal response to the review, but this is not yet available. Due to the government shutdown, and hence an abbreviated working period, full responses relating to comments on the grenadier assessment will be provided in next year's stock assessment report.

Literature Cited

Rodgveller, C, J, D. M. Clausen, P. Hulson. 2012. Assessment of the grenadier stock complex in the Gulf of Alaska, Eastern Bering Sea, and the Aleutian Islands. *In* Stock assessment and fishery evaluation report for the groundfish resources of the Gulf of Alaska for 2013. North Pacific Fishery Management Council, 605 W 4th Ave, Suite 306, Anchorage, AK 99501. http://www.afsc.noaa.gov/REFM/Docs/2012/GOAgrenadier.pdf