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MEMORANDUM FOR: Doug DeMaster and Steve Ignell

FROM: Anne Hollowed (AFSC/REFM/SSMA) and Phil Rigby (AFSC/ABL)

SUBJECT: Draft catch reporting standards in the GOA hook-and-line fishery

Complete catch accounting for all managed species is of critical importance for successful stock assessment and fisheries management, and is mandated under NOAA Fisheries National Standard Guidelines (http://www.nmfs.noaa.gov/sfa/laws_policies/national_standards/index.html). In the Gulf of Alaska (GOA), catch accounting for fisheries operating in federal waters has been in place for several decades and since 2003 has been standardized in the Catch Accounting System (CAS) (http://alaskafisheries.noaa.gov/sustainablefisheries/inseason/catchaccounting.htm) maintained by the NMFS Alaska Regional Office. The CAS relies on fishery observers to provide data on species composition of catches, particularly in the case of at-sea discards that are not recorded in landings data. As observers have historically not been required on boats less than 60 feet in length, there exists the potential for large amounts of discarded catches to go unreported. This is especially true for non-target species that are generally not retained or for which retention may be highly selective, based on size or other factors. If an electronic monitoring (EM) system can be designed in a manner that provides accurate catch records for target and non-target species, this system would represent a substantial improvement by expanding coverage to vessels where observers are not deployed. The EM system should be designed to accurately account for the catch of target species as well as incidental catch of non-target and ecosystem species.

As explained above, we are interested in total catch estimates for all managed species. Current TACs of some species such as sablefish in the GOA groundfish fishery are already close to their acceptable biological catch (ABC) amounts. Unaccounted for catch of these species means that overfishing may be occurring. Also of concern for monitoring for stock assessment purposes in the GOA hook-and-line are rockfish, sharks, and skates. In addition, grenadiers have recently been recommended to be brought into the GOA Groundfish FMP as an ecosystem component species that requires monitoring. Monitoring the catch of all these groups in hook and line fisheries will be particularly challenging because most are discarded or are drop-offs before reaching the rail. As shown in Table 1, all of these species groups are in the high end of the vulnerability spectrum compared to other groundfish species and are highly susceptible to overfishing.

In addition to long-lived rockfish species, several lines of evidence suggest that sharks and skates are vulnerable to overfishing. Ormseth and Spencer (2011) showed the vulnerability of skates and sharks to overfishing was relatively high compared to other species in the fishery (Table 1 at end of document). Of 39 total stocks, the three skate species were ranked 10th, 14th, and 15th in vulnerability. The three shark species were ranked 5th, 9th, and 12th. The available evidence suggests that there is the potential for substantial incidental catches of sharks and skates in unobserved fisheries (Ormseth 2011 & Tribuzio et al. 2011). Skates and spiny dogfish are regularly captured in hook-and-line fisheries. When directed fisheries for skates have occurred in the GOA (in federal waters in 2003 and state waters in 2009-2010), they have largely been conducted by relatively smaller hook and line boats. There is also substantial overlap between the geographical areas inhabited by sharks and skates and the areas fished by the hook and line fisheries. In 2013, when the observer program restructuring produced the first catch accounting for vessels between 40 and 60', reported catches of skates increased substantially (Ormseth 2013).

Giant grenadiers were ranked 18th in the vulnerability analysis, approximately in the middle of all GOA groundfish stocks. The great majority of the catch and biomass in waters <1,000 m are females which are long-lived and late to mature. These factors make grenadier important for monitoring and also increase the need for information on sex ratios as well as length distributions within the fishery.

In order for NMFS to properly assess fish stocks (target and non-target) and prevent overfishing and impacts to ecosystem component species, we need reliable estimates of catch from all sectors of the GOA fishing fleet regardless of vessel size. Catch amounts, length data, etc. can be based on a representative sample rather than a complete accounting of each and every captured fish. Many factors affect the design and scope of such sampling, and such design is beyond the objectives of this document. However we would expect that at a minimum the sampling design would match current standards used in fisheries with in-person observers.

The critical outcome of an observer or an EM system is to get reliable total catch estimates for both target and non-target stocks to ensure overfishing is not occurring. The design of a system for monitoring not only for total catch amounts but also for obtaining representative biological information needed for stock assessment should be considered. Representative individual lengths and weights in addition to otoliths and sex composition data are important to ensure that stock assessment models can track which segment of the population is being impacted by fisheries. The data collection system is continually being refined across all fisheries to ensure representatives samples and adequate sample sizes for stock assessment. AFSC strives to advance groundfish stock assessments to higher tier (greater information) when possible and as technology and fishery information allows such advancement. Risk of unknowingly overfishing a stock is reduced as more information is obtained.

An iterative process in the refinement of the sampling protocols for total catch accounting and for stock assessment needs for the GOA hook and line is envisioned. The first step of this process will be to conduct the 2014 cooperative EM research project and evaluate the information gained from EM to support catch estimation of discards. This would be combined with biological information that is available from other representative observed vessels obtained directly from an onboard observer system. Discrepancies between these estimates would be reviewed and priority improvements to the information would be identified by inseason managers and stock assessment scientists. Monitoring alternatives and tradeoffs for cost and stock risk would be evaluated and brought forward to the NPFMC for consideration. Technology advances and annual review of information obtained from this fleet would lead to further improvements in coming years.

Data collection needs for groundfish on hook-and-line vessels

1) **An estimate of the total number of individuals captured**. This estimate should include all fishes hooked regardless of whether they are brought onboard the vessel (i.e. drop-offs and fishes released from hooks outboard the vessel must also be counted).

2) **Taxonomic identification of fish sampled**. Species identification requirements vary among species and species groups. Species-level identification may be challenging for some species groups such as rockfish. For skates, requirements vary by taxonomic group. Species of the genus *Raja* (big skate *R. binoculata* and longnose skate *R. rhina*) are readily distinguished and need to be identified to species level. Distinguishing among species of the genus *Bathryaja* is more difficult and it would be sufficient to record these as *Bathyraja* species; currently many in-person observers record *Bathyraja* skates as such when they cannot closely inspect the skate (e.g. when they are not brought onboard the vessel). We anticipate that this fishery will mainly encounter big and longnose skates. It is a longer-term goal to have all skates identified to species, but it is uncertain how and when this might be achieved. For sharks and grenadiers, species-level identification is important.

3) **Representative sampling of the lengths and age structures of captured individuals**. Length data are essential for two reasons. Catch accounting relies on estimates of fish captured in biomass (weight), and a sample of length or weight will be required for estimating the total mortality of a stock. For non-targets, these samples may be obtained from a survey in the same area or other fisheries. If the survey and fishery size composition are very different, this can lead to large biases in the estimated total catch. For example, longline fisheries generally catch different sized fish than the trawl survey. Size composition and age data are needed to determine which part of the population is being impacted by fisheries.

4) **Sex ratios of a representative sample of captured individuals.** Data on sex ratios are similar to those on length data in that they are useful to determine which parts of the population are being affected by fisheries. This is particularly true for species (like grenadiers) where there are geographical or depth-related differences in the distribution of males vs. females.

References

Ormseth, O.A. 2011. Assessment of the skate stock complex in the Gulf of Alaska. IN: Stock assessment and fishery evaluation report for the groundfish resources of the Gulf of Alaska for 2011. North Pacific Fishery Management Council (http://www.npfmc.org/safe-stock-assessment-and-fishery-evaluation-reports/)

Ormseth, O.A. and P.D. Spencer. 2011. An assessment of vulnerability in Alaska groundfish. Fisheries Research 112: 127-133

Ormseth, O.A. 2013. Assessment of the skate stock complex in the Gulf of Alaska. IN: Stock assessment and fishery evaluation report for the groundfish resources of the Gulf of Alaska for 2013. North Pacific Fishery Management Council (http://www.npfmc.org/safe-stock-assessment-and-fishery-evaluation-reports/)

Patrick, W.S., P. Spencer, J. Link, J. Cope, J. Field, D. Kobayashi, P. Lawson, T. Gedamke, E. Cortés, O.A. Ormseth, K. Bigelow, W. Overholtz. 2010. Using productivity and susceptibility indices to assess the vulnerability of United States fish stocks to overfishing. Fishery Bulletin 108: 305–322.

Rodgveller, C., D. Clausen, P. Hulson. 2012. Assessment of the grenadier stock complex in the Gulf of Alaska, eastern Bering Sea, and Aleutian Islands. IN: Stock assessment and fishery evaluation report for the groundfish resources of the Gulf of Alaska for 2011. North Pacific Fishery Management Council (http://www.npfmc.org/safe-stock-assessment-and-fishery-evaluation-reports/)

Tribuzio, C.A., K. Echave, C. Rodgveller, P. Hulson, K.J. Goldman. 2011. Assessment of the shark stock complex in the Gulf of Alaska. IN: Stock assessment and fishery evaluation report for the groundfish resources of the Gulf of Alaska for 2011. North Pacific Fishery Management Council (http://www.npfmc.org/safe-stock-assessment-and-fishery-evaluation-reports/)

Table 1: Vulnerability analysis results for GOA groundfish. Reproduced from Ormseth and Spencer 2011.

Table 3
Results of the productivity–susceptibility analysis for the Gulf of Alaska management area. Target stocks are listed in bold and italicized text. *P* = productivity and *S* = susceptibility.

ID #	Stock name	*P*	*S*	Vulnerability	Data quality		
					P	*S*	Mean
1	Capelin	2.75	1.50	0.56	2.58	3.08	2.83
2	Squid	2.63	1.71	0.81	2.79	3.33	3.06
3	***Starry flounder***	***2.19***	***1.63***	***1.03***	***3.21***	***3.08***	***3.15***
4	Eulachon	2.69	2.00	1.05	2.68	2.25	2.47
5	Octopus	2.14	1.63	1.06	2.89	3.67	3.28
6	***Flathead sole***	***2.12***	***1.70***	***1.13***	***2.05***	***2.00***	***2.03***
7	Great sculpin	1.88	1.71	1.33	3.11	3.00	3.05
8	Plain sculpin	1.88	1.71	1.33	3.11	3.00	3.05
9	***Dover sole***	***1.71***	***1.36***	***1.34***	***1.63***	***1.58***	***1.61***
10	***Rex sole***	***1.87***	***1.73***	***1.35***	***1.32***	***1.58***	***1.45***
11	***Yellowfin sole***	***1.88***	***1.82***	***1.39***	***1.74***	***2.25***	***1.99***
12	Arrowtooth flounder	1.73	1.64	1.42	2.05	1.75	1.90
13	***Northern rock sole***	***1.88***	***1.90***	***1.43***	***1.74***	***2.50***	***2.12***
14	***Walleye pollock***	***2.29***	***2.25***	***1.44***	***1.63***	***1.83***	***1.73***
15	***Atka mackerel***	***2.12***	***2.20***	***1.49***	***1.95***	***3.17***	***2.56***
16	Yellow Irish lord	1.75	1.86	1.52	3.11	3.00	3.05
17	***Greenland turbot***	***1.65***	***1.78***	***1.56***	***2.42***	***3.25***	***2.84***
18	***Sablefish***	***1.76***	***2.08***	***1.64***	***1.11***	***1.25***	***1.18***
19	Bigmouth sculpin	1.50	1.71	1.66	3.11	3.00	3.05
20	***Pacific cod***	***2.00***	***2.42***	***1.73***	***1.53***	***1.42***	***1.47***
21	Giant grenadier	1.44	1.79	1.75	2.05	1.92	1.98
22	***Pacific ocean perch***	***1.74***	***2.29***	***1.81***	***1.47***	***1.38***	***1.42***
23	***Rougheye rockfish***	***1.30***	***1.68***	***1.83***	***1.95***	***1.63***	***1.79***
24	Big skate	1.33	1.90	1.89	1.63	2.83	2.23
25	Aleutian skate	1.33	1.90	1.89	1.53	2.92	2.22
26	***Pacific halibut***	***1.53***	***2.25***	***1.93***	***1.68***	***1.42***	***1.55***
27	Salmon shark	1.19	1.75	1.96	1.95	3.50	2.72
28	***Northern rockfish***	***1.33***	***2.08***	***1.99***	***2.16***	***1.63***	***1.89***
29	Longnose skate	1.22	1.90	1.99	1.53	3.08	2.30
30	Spiny dogfish	1.11	1.91	2.10	1.84	3.00	2.42
31	***Dusky rockfish***	***1.20***	***2.08***	***2.10***	***2.05***	***1.63***	***1.84***
32	***Sharpchin rockfish***	***1.14***	***2.00***	***2.11***	***2.58***	***2.04***	***2.31***
33	***Widow rockfish***	***1.17***	***2.10***	***2.14***	***1.58***	***2.29***	***1.94***
35	Sleeper shark	1.00	2.00	2.24	3.63	3.67	3.65
36	***Harlequin rockfish***	***1.00***	***2.00***	***2.24***	***2.68***	***2.13***	***2.40***
37	***Shortraker rockfish***	***1.00***	***2.09***	***2.28***	***2.89***	***2.13***	***2.51***
38	***Yellowtail rockfish***	***1.00***	***2.10***	***2.28***	***1.58***	***2.29***	***1.94***
39	***Yelloweye rockfish***	***1.00***	***2.27***	***2.37***	***1.47***	***2.13***	***1.80***