PRELIMINARY LIST OF ISSUES TO ADDRESS IN THE INDEPENDENT SCIENTIFIC REVIEW OF THE NOVEMBER 30, 2000 BIOLOGICAL OPINION ON THE GULF OF ALASKA GROUNDFISH FISHERY MANAGEMENT PLAN AND THE BERING SEA/ALEUTIAN ISLANDS GROUNDFISH FISHERY MANAGEMENT PLAN

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This preliminary overview of the November 30, 2000 Biological Opinion on the Gulf of Alaska Groundfish Fishery Management Plan and the Bering Sea/Aleutian Islands Fishery Management Plan ("BiOp") is submitted by United Catcher Boats, Pacific Seafood Processors Association, At-sea Processors Association, Aleutians East Borough, Westward Seafoods, Inc., Wards Cove Packing Company, North Pacific Processors, Inc., Nelbro Packing Company, UniSea, Inc., Peter Pan Seafoods, Inc., Kodiak Salmon Packers, Inc., Alyeska Seafoods, Inc., Western Alaska Fisheries, Inc., Kanaway Seafoods, Inc., Royal Viking Inc., Morning Star L.P., City of Unalaska, Fishing Company of Alaska, Groundfish Forum, Inc., Golden Fleece, Iquique U.S., F.J. O'Hara and Sons, Arctic Sole Seafoods, Beagle Enterprises, L.P., Cascade Fishing, Inc., Jubilee Fisheries, Kodiak Fish Company, Fisherman's Finest, Ocean Peace, and Seafreeze Alaska, Inc. The purpose of these comments is to identify in a preliminary manner deficiencies in the BiOp that should be considered in the independent scientific review to be conducted under the auspices of the North Pacific Fishery Management Council ("Council").

I. INTRODUCTION AND OVERVIEW

The issue examined in the BiOp is whether the groundfish fisheries of the Bering Sea/Aleutian Islands ("BSAI") and the Gulf of Alaska ("GOA") adversely affect Steller sea lions. The BiOp divides that issue into two questions. The first is whether there is "interactive competition" between the fisheries and Steller sea lions (*i.e.*, disruption of foraging patterns, abandonment of foraging areas, etc.). On that question, the BiOp states the answer "can not be evaluated with the information currently available." BiOp at 187. The second question is whether the fisheries compete with Steller sea lions for the same food to the disadvantage of the Stellers. Again, the BiOp states the data required to answer the question "are either unavailable or equivocal." BiOp at 182.

In the "absence of definitive data or conclusive evidence" showing that the groundfish fisheries adversely affect Steller sea lions, BiOp at 183, the BiOp relies on "assumptions" to find competition between Stellers and the fishery and, based on these "assumptions," imposes regulations effectively shutting down large segments of the fishing industry.

The BiOp's assumptions warrant close scrutiny. The BiOp assumes that because fishing removes fish from the environment and Steller sea lions eat fish that the fisheries must compete with Steller sea lions. BiOp at 183. This assumption does not provide a basis for finding that the fisheries adversely affect the sea lions.

- *Adequacy of Forage.* On a global scale, the BiOp notes that the annual consumption of forage by the existing 43,000 Steller sea lions in the Western population is less than 400,000 tons. BiOp, App. 3 at 1. The 1999 groundfish biomass in the BSAI and GOA was approximately 21.8 million tons. BiOp, App. 3 at 1. The 1999 groundfish harvest was under 1.5 million tons. BiOp, Tables 2.4

and 2.6. This leaves a minimum of 20.3 million tons of groundfish from which the Steller sea lion population must find and eat 400,000 tons, or less than 2% of the total. Based on these facts, the BiOp concludes that given the overall groundfish population "Steller sea lions have adequate forage available to them to recover to optimal population levels." BiOp, App. 3 at 1.

• *Localized Depletion.* Recognizing the adequacy of forage on a global scale, the BiOp "assumes" that fish are essentially stationary and their abundance at a specific time and place "is finite." BiOp, App. 3 at 3. The BiOp then assumes that fishing reduces that "finite" amount of fish and that if Stellers are foraging in the fishing area then fishing "must create at least a temporary localized depletion" which causes nutritional stress on Stellers. BiOp at 187.

The BiOp offers no substantive factual analysis or scientific data on whether localized depletion actually occurs in the pollock and Pacific cod fisheries. In that regard, the BiOp states that data on the distribution of fish within the ocean "is vital" to assessing fishing effects, BiOp at 204, but the BiOp contains no such data. Similarly, the BiOp contains no scientific analysis on the effect of fishing for pollock and Pacific cod on school distribution and density. The BiOp also does not include data showing that during the pollock BSAI A season, the catch per unit of effort ("CPUE") remains constant. The localized depletion hypothesis should be tested, in part by a review of CPUE data.

As to Atka mackerel, the BiOp refers to prior Biological Opinions which noted there is some evidence of localized depletion. But the BiOp ignores the conclusion of these prior Biological Opinions that the Atka mackerel fishery as currently managed is not adversely affecting Stellers. Instead, the BiOp reverses the conclusion in the prior Biological Opinions without new analysis or new information. The Council's review of the BiOp should examine whether there is information that warrants this reversal.

• *Harvest Proportionate to Stock Distribution.* NMFS has argued that fishing must occur proportionately to the fish biomass so that fishing is not so concentrated as to cause localized depletion. In prior Biological Opinions, NMFS took the position that critical habitat should not be closed to fishing because to do so would undermine NMFS' proportional fishing approach. However, the BiOp divides the BSAI and GOA critical habitat into thirteen areas and then closes eight entire areas to fishing for pollock, Pacific cod and Atka mackerel. BiOp at 277 and at Figure 9.1a.

• *GOA Ten-Mile Closures.* Similarly, when NMFS issued Revised Final Reasonable and Prudent Alternatives ("RFRPAs") for pollock fisheries in 1999, NMFS concluded that the RFRPAs provided sufficient spatial and temporal dispersion of the fisheries to avoid any adverse effects on Steller sea lions. Among other things, NMFS carefully considered the extent of closed areas around rookeries and haulouts in the Gulf, and concluded that 10 nm closures provided adequate protection. The BiOp implicitly rejects these conclusions for the pollock fisheries, but it never mentions them, and provides no analysis to explain why they were rejected.

• *Competition for Prey.* The BiOp's assumptions of competition with the fishery need to be carefully analyzed, including the historical data showing that very large amounts of fish are found within these closed areas. Such data exist and should be examined in the BiOp. The Council review should also examine more recent data collected in the last seven years about Steller sea lion movements and compare that to where the fishery occurs.

Each of the deficiencies discussed in this paper should be carefully examined in the independent scientific review required by Congress. In addition, the Council should give careful consideration to these deficiencies when

reviewing proposals to implement the management measures recommended in the BiOp.

II. MARINE MAMMAL ISSUES

The following is a preliminary review of the major issues related to marine mammal matters which the Council should examine as part of its review of the BiOp.

- *Focus on a single cause of the population decline.* The BiOp does not provide an in-depth analysis of the leading hypotheses put forward to explain the decline of Steller sea lions (i.e., nutritional stress, regime shift, junk-food, lack of diet diversity, killer whale predation). Instead, it contains hypothetical theories about localized depletions and cursory rejections of alternative hypotheses.

- *Nutritional stress hypothesis is not adequately discussed.* The typical symptoms that accompany nutritional stress in pinnipeds (*e.g.*, Trillmich and Ono 1991) are not outlined, nor is the available evidence about Steller sea lions contrasted with the predictions that flow from the nutritional stress hypothesis. See Donnelly and Trites (2000) for recent review.

- *Quantity versus quality of fish.* The BiOp emphasizes the *quantity* of fish available to Steller sea lions but does not give adequate consideration to the nutritional *quality* of fish. It may not be physically possible for young sea lions to survive on a diet of low quality prey, regardless of the quantity available to them (Geraci 1975, Winship 2000). Thus, greater consideration needs to be given to the possibility that abundant pollock are in fact the problem, not the solution, to the declining population of Steller sea lions. The junk-food hypothesis (Rosen and Trites, 2000) and

the diet-diversity hypothesis (Merrick et al., 1997) are dismissed in a cursory and superficial manner. Yet both hypotheses have been published in peer-reviewed journals, while the localized-depletion theory has not.

- *Regime shift.* There is considerable agreement among knowledgeable scientists about the effects of regime shifts. Regime shifts may not affect ecosystems in repeatable or predictable manners. The fact that earlier regime shifts did not appear to have had the same devastating effect on Steller sea lions does not mean that the current regime shift does not underlie the present decline. See recent review by Benson and Trites (2000) and papers by Francis et al. (1998) and McFarlane et al. (2000).

- *Killer whale predation.* NMFS reviewed the work of Barrett-Lennard *et al.* and concluded that killer whale predation on the current population of Steller sea lions in western Alaska is potentially significant. However, the BiOp gives this information no further consideration.

- *Causes of the decline versus barriers to population recovery.* Factors that caused the population decline through the 1980s may no longer be the same factors preventing the population from recovering. The BiOp does not consider such a possibility. For example, mathematical models suggest that killer whales may not have caused the population decline, but may be the barrier to the recovery of Steller sea lions. See Barrett-Lennard et al. (1995).

- *Diet.* Details of the analyses presented in the BiOp are not documented or cited. Some of the conclusions drawn from the stomach content data are suspect because samples were pooled across time and space in ways that may bias the result.

- *Diets in southeast Alaska.* NMFS states that the diet of the increasing Steller sea lion population in southeast Alaska is comparable to the diet of the declining sea lions in the western stock. This statement is incorrect. Sea lions in southeast Alaska consume the most diverse array of prey compared to all other regions of Alaska. (Trites and Calkins, unpublished data).

- *Whiting.* Information presented about the importance of whiting in the diets of sea lions from California to British Columbia and the alleged effect of fishery closures on sea lion trends is misleading. No data are shown, and what data do exist are unlikely to support the contention that sea lions were limited by groundfish fisheries.

- *Size of fish consumed.* No information is presented on the size of fish consumed by sea lions relative to the sizes that are taken by commercial fisheries.

- *Consumption estimates.* NMFS undertakes an analytic calculation of food consumption and concludes that competition as a result of overall prey removal (under the FMP) does not adversely modify critical habitat. However, NMFS claims that this analysis raises issues that lead to the conclusion that fisheries compete with sea lions on a local level. There is no connection between this conclusion and the NMFS analytic analysis.

- *Ecosystem effects of fishing.* An ecosystem model (Ecopath) for the Bering Sea was published by Trites et al. in 1999. Results from this model consider the ecosystem effects of changing fishing effort, but are not mentioned in the BiOp.

- *Limited resources.* Most of the discussion about competition is formed around a nucleus of hypothetical possibilities. NMFS gives limited

consideration to whether resources are limited, and erroneously assumes that fisheries and sea lions must compete because they consume the same resource.

- *Foraging: behavioral observations.* A number of behavioral studies have been undertaken in the past 5 years that compare the lengths of trips and time spent on shore by sea lions in different seasons and regions of Alaska. See Porter (1997), Millette (1999), Trites and Porter (in review). This has bearing on whether sea lions are nutritionally stressed, but is not mentioned in the BiOp.

- *Foraging: telemetry studies.* Data are presented from only 53 animals (from 1990-1993) that carried satellite-tracking tags from 1-121 days (mean 37 days). The only foraging data presented is from Merrick and Loughlin . None of the data collected over the past 7 years is presented (*e.g.*, Andrews et al. 1999).

- *Census data.* A detailed analysis of census data by individual rookeries and haulout sites should be undertaken to provide a detailed understanding of population trends.

- *Population projections.* NMFS notes that a population viability analysis was conducted for the western population. However, the analysis that NMFS cites is a draft report that was never peer reviewed, and never submitted for publication. No mention is made of another population viability analysis that applied three different models to the sea lion population data (Gerber and VanBlaricom *in review*).

III. FISHERIES ISSUES

The following is a preliminary review of the major fisheries issues which the Council should examine as part of its review of the BiOp.

- *Regime shift.* A marked change in the climate and physical oceanographic conditions of the North Pacific occurred in the late 1970s. The phenomenon is termed the Pacific Decadal Oscillation ("PDO"). It is now widely accepted that the PDO was accompanied by large-scale changes in individual species productivity and in ecosystem characteristics. Such changes in species composition and trophic linkages may have reduced the carrying capacity of these areas for Steller sea lions independent of any interaction between commercial fisheries and the Steller sea lions. These changing ecological circumstances provide an alternative hypothesis for the Steller sea lion's decline (SSC 1998) as well as evidence that near-term recovery of the western stock to the level of its prior abundance may now be blocked ecologically. The Council should examine the impact of this and other factors on the decline and recovery of Steller sea lions.
- *Global Control Rule.* The global control rule proposed in the BiOp may expose the Steller sea lion forage base to increased predation beyond that allowed by the "Quality of Information" tiers now used to determine OFLs and ABCs in the groundfish fisheries. For pollock stocks, highly cannibalistic adults are known to consume large quantities of the small forage fish that are important to juvenile Steller sea lions (Livingston 1993). Adult cod are also highly piscivorous. By focusing a global control rule on the adult portion of the commercial biomass, instead of on the forage available to juvenile Steller sea lions, the BiOp does not account for

the detrimental effects of groundfish predation on juvenile pollock and cod.

- *Assess the overlap between the fishery and Steller sea lions.* To assess the hypothesis of food competition between Stellers and the fishery, the Council should determine the probability of the simultaneous pursuit of prey by juvenile sea lions and the fisheries (SSC 2000). The BiOp does not contain such an analysis. The analysis should focus at the population level, with the objective of quantifying the potential interactions between Steller sea lions and the fisheries. A quantitative approach is necessary to generate a perspective on the relative significance of potential interactions.
- *Compare other pinnipeds.* There are other areas of the world where commercial fisheries and the activities of foraging pinnipeds overlap in space and time. In these areas generally, commercial groundfish biomass per area is no higher than it is for groundfish biomass per area within Steller sea lion foraging areas. In most, if not all, of these areas, pinnipeds persist and in some cases the populations are expanding. (Shima et al 2000). An investigation of these pinniped/fishery interactions may prove informative.
- *Localized depletion.* The BiOp does not examine many years of observations on pollock catch rates and their location within the BSAI management areas. Other studies relied on in the BiOp also warrant closer scrutiny. For example, an analysis of commercial trawl cod catches provided by Smith (2000) was evaluated by the Council's Scientific and Statistical Committee and judged to contain certain flaws. Similarly, the unpublished analysis by Fritz (1998) contains assumptions that may affect its conclusions.

- *Biomass within 20 nm closures.* The BiOp does not, and the Council should, assess the prey available to Steller sea lions within the portion of critical habitat that encompasses the waters within 10 and 20 nm of rookeries and haulouts.

IV. ISSUES RELATED TO THE BIOP EXPERIMENTAL DESIGN

The following is a preliminary review of the major issues related to the experimental design which the Council should examine as part of its review of the BiOp.

- *Measure of Success.* It is generally agreed there are multiple reasons for the Steller's decline. As noted above, the BiOp states there are no data to prove that fishing has caused, or is causing, the Steller's decline. Consequently, the BiOp should not make an increase in the Steller's population the measure of success for a management program which controls an activity (*i.e.*, fishing) which may not have had, and which may not be having, any effect on Steller sea lions. The issue the BiOp addresses is NMFS' theory of localized depletion. The correct measure of success for the BiOp's reasonable and prudent alternative ("RPA") is whether the RPA successfully addresses localized depletion. The experimental design should focus on measuring the availability of forage. This approach would deal directly with Steller sea lion food availability and would provide for measured results over a relatively short time frame.
- *Comparability of Areas.* The essential component of the ecosystem that must be monitored in the experimental design is the local densities of fish. Areas that are closed or opened to fishing must be comparable (i.e., they must be matched so that the only real difference between the two is whether there is fishing or no fishing). Furthermore, the amount of

fishing effort in an open area must be at a commercial level to ensure there is enough contrast between two areas to detect an effect, if it occurs at all.

- *Block II.* The BiOp establishes thirteen open and closed Steller sea lion areas which extend from the eastern GOA to the western Aleutian Islands as shown in Figure 9.1 of the BiOp. The BiOp then groups open and closed areas into Blocks. Block II, which contains Areas 7-11, includes the primary BSAI pollock fishing grounds. However, Block II does not provide that open areas and closed areas are comparable as required in the design criteria developed by NMFS during the May 1997 experimental design workshop. Thus, within Block II, only Area 7 is open while four areas are closed (Areas 8-11). Area 7 comprises only 20,500 square km while the closed areas (Areas 8-11) comprise 107,500 square km. Similar problems occur in Block I within the GOA, particularly with respect to Shelikof Strait.
- *Fishing Levels.* The quantities of pollock and Pacific cod allowed to be harvested under the experimental design are so limited that their removal will be insignificant relative to daily fish movements and will be undetectable within the Steller sea lion "prey field."
- *Fish Movement Within Areas.* The thirteen Steller sea lion management areas were established without regard to the naturally occurring environmental regions of pollock and Pacific cod habitat and without regard to the short-term major fish movements within these areas. For example, Bering Sea Area 7 is open while Area 8 is closed, but Areas 7 and 8 are a unified environmental region for pollock and Pacific cod. Open and closed area boundaries should not divide regions that constitute a natural ecological habitat. Fish movements within such regions are

extensive and typically involve the movement of hundreds of thousands of tons of fish due to tides, currents, temperature changes, feed patterns, or storms.

- *State Fisheries*. Fisheries conducted within waters of the State of Alaska, and the harvest from those state waters, were not considered and were not incorporated into the experimental design. The effects of these state fisheries must be considered if there is to be a valid experimental design because the state removals are likely to mask the impact of the experimental design.
- *Area Boundaries*. Except for Areas 12 and 13, the thirteen Steller sea lion management areas are inconsistent with the GOA and BSAI fishery regulatory management areas. Because of the inconsistency between the BiOp's thirteen Steller sea lion management areas and the GOA and BSAI fishery management areas, fishing vessel compliance and enforcement will be extraordinarily difficult for the industry and the Coast Guard.
- *Further Design Issues*. Assuming Steller sea lion population levels are the proper measure of the RPA's effectiveness, the experimental design in the BiOp does not meet the design criteria developed by NMFS at the May 1997 experimental design workshop. One criterion required that Steller sea lion population levels and trends be comparable. But, in Block II, only 2 of 30 non-pup sites (7%) are in waters open to fishing while 28 non-pup sites (93%) are in waters closed to fishing. Furthermore, the statistical tests set forth in Tables 9.11 and 9.12 of the BiOp that purport to demonstrate the statistical power to detect improvements in Steller sea lion populations should be evaluated by a statistician. In view of the assumptions underlying the experimental design, it is unlikely that the tests set forth in Tables 9.11 and 9.12 will provide an accurate result.

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