AGENDA C-5
OCTOBER 2003

MEMORANDUM

TO: Council, SSC and AP Members

FROM: Chris Oliver
Executive Director

ESTIMATED TIME
2 HOURS

DATE: September 29, 2003

SUBJECT: Steller Sea Lion Issues

ACTION REQUIRED

Receive report from Steller Sea Lion Mitigation Committee and discuss next steps.

BACKGROUND

During its April 2003 meeting, the Council asked the Steller Sea Lion Mitigation Committee (the old name of this committee was the RPA Committee) to convene and begin work on a new charge. The Council's charge was two-fold: 1) to review the National Research Council Committee's report on SSL decline and determine the feasibility of implementing the Committee's recommendations, and 2) to review current Steller sea lion protection measures in the Gulf of Alaska for possible regulatory changes that would provide some economic relief to Gulf communities.

1. National Research Council Committee Report

The Steller Sea Lion Mitigation Committee (SSLMC) was tasked with reviewing the National Research Council committee's report on the decline of the Steller sea lion (SSL) in Alaska. The Executive Summary of the NRC committee report is attached (Item C-5(a)). In the NRC report, the NRC committee recommended conducting an experiment on fishing effects on SSLs. The SSLMC discussed how the recommended experiment might be conducted, and some of the scientific and legal issues that would have to be addressed in the design of such an experiment. Many of these issues were discussed in a document prepared by the Alaska Fisheries Science Center (attached as Item C-5(b)). A subcommittee of SSLMC members was assigned the task of recommending further action on this issue.

The SSLMC's Subcommittee on Experimental Design discussed the complexities involved in testing how fishing may affect SSLs, concluding that the key concern would be the design of the experiment. The subcommittee noted the experiment will be difficult to conduct given the large number of uncertainties and factors that could be influencing SSLs and the potentially significant obstacles to such an experiment because of the Endangered Species Act. The subcommittee felt, however, that there may be organizations, universities, or independent scientists that would have ideas or approaches, and that it would be worth while to solicit these ideas from the scientific community at large.

Therefore, the subcommittee recommended that a Request for Proposals be prepared and released by the Council. This RFP would ask for interested scientists to submit proposals for developing a conceptual design for an adaptive management experiment. If the Council approves, the RFP could be released to the public before the end of this calendar year. Elements of the draft RFP are provided in the attached Item C-5(c). The subcommittee or the full SSLMC would review the proposals that were received, make a selection of a contractor, and the Council would contract with the successful bidder. The terms of the procurement likely would include a requirement for a draft report/research design by mid to late 2004. The committee would then evaluate the design and recommend further action to the Council. Dr. Doug DeMaster, chair of the subcommittee, will be available for questions.

2. Review of Proposals for Regulatory Changes in the Gulf of Alaska

The SSLMC met several times (June, July, and August 2003) to receive and review proposals for changes in the groundfish fishing regulations in the Gulf. After screening 15 proposals, the SSLMC recommends a draft suite of measures that could be implemented in the Gulf to provide some additional fishing opportunities for fishermen yet preserve the level of protection to Steller sea lions embodied in the current sea lion protection measures.

In its deliberations, the SSLMC repeatedly encountered problem areas in Gulf fisheries that they felt need attention from the Council. The committee members believe that many of these problem areas could be resolved through the Council's Gulf Rationalization program. However, the committee also noted that completion of Gulf Rationalization may take many years, and therefore wishes to have Council approval to move forward with the regulatory changes described below and in the attached document. The committee strongly endorses the Council's efforts toward Gulf Rationalization, and asks that the Council proceed expeditiously to provide for more rational fisheries in the Gulf. More specifically, the committee would like the Council to consider, first, implementing quota splits among gear types and sectors, and then proceed with other measures to rationalize Gulf groundfish fisheries. See page 4 of the attached Minutes of the SSLMC's August 2003 meeting (Item C-5(d)) for a summary of the committee's sentiments.

Attached Item C-5(e) is a draft package of proposed measures the SSLMC refers to the Council for their initial review. If the Council wishes to proceed with these measures, the package would be submitted to NMFS for their review and comment and for informal consultation under Section 7 of the Endangered Species Act. The SSLMC is prepared to meet with NMFS if necessary to modify these proposed regulation changes based on the NMFS review. This package would then be developed by NMFS and Council staff into an EA/RIR/IRFA for Council review and initial action at its April 2004 meeting (pending other staff tasking priorities). After public review, and final Council action in June 2004, the package would then proceed through the process of notices and regulation writing, with the measures being effective for the 2005 fishing season.

The SSLMC proposes that the regulations implementing the GOA Groundfish FMP be amended to provide the following changes. These changes are grouped in two general categories:

1. Open to groundfish fishing additional area around three GOA Steller sea lion haulouts and one rookery, and close to groundfish fishing areas around four GOA Steller sea lion haulouts.

A. Open the closed area around the Marmot Island SSL rookery to 10 n mi for pollock trawling during the A and B seasons. All other fishing restrictions around Marmot Island would remain as is. Close the area around the SSL haulout on Sea Otter Island to 20 n mi to pollock trawling during the A and B seasons.

B. Open the closed area around the Puale Bay SSL haulout to 3 n mi for pollock trawl fishing during January 20 through June 10. All other fishing restrictions around Puale Bay would remain as is. Close the area around the Cape Douglas/Shaw Island SSL haulout to 20 n mi to pollock trawling during January 20 through June 10.

C. Open the closed area around the Kak Island SSL haulout to 3 n mi for Pacific cod pot fishing. All other fishing restrictions around Kak Island would remain as is. Close the area around the Kilokak Rocks SSL haulout to 10 n mi to Pacific cod pot fishing.

D. Open an area around the Castle Rock SSL haulout to the shoreline for Pacific cod pot fishing. Open an area around Castle Rock from 3 to 10 n mi for Pacific cod trawl fishing; this opening would be effected by changing the SSL protection measures around Atkins Island, which overlaps Castle Rock. Allow NMFS discretion to work with industry to design an enforceable open area that is equivalent to a wedge or approximately a quarter circle west and north of Atkins Island.

2. Amend regulations implementing the GOA groundfish FMP to provide changes in procedures for Pacific cod TAC apportionment and pollock TAC rollover in the Pacific cod and pollock fisheries, and eliminate the required stand-down periods between seasons in the pollock fishery.

A. This proposal has two options: 1) Change the season dates and apportion the annual Pacific cod TAC in the GOA so that 60 % of the TAC can be fished in an A season (January 1 through March 31), 20 % in a B season (April 1 through August 31), and 20 % in a C season (September 1 through November 1 for trawl gear, September 1 through December 31 for fixed gear). This recognizes that Pacific cod TAC would be first apportioned to non-Pacific cod directed fishery bycatch needs, with the remainder of the TAC apportioned 60/20/20; or 2) Retain the current season dates and apportionment but change regulations so that 60 % of the Pacific cod TAC in the GOA (both the directed cod fisheries and cod bycatch in other fisheries) is taken in the A season (January 1 through June 10). Between-season harvest of cod TAC (bycatch in other fisheries) would be subtracted from the B season TAC.

B. Remove the two-week stand-down period periods between the A and B seasons and between the C and D seasons in the GOA pollock trawl fishery. Allow continuous fishing from the A season into the B season (and from the C season into the D season) until either the quarterly TAC is reached in the A season (and C season) or the B season (and D season) ends.

C. Change the method for rolling over underharvested pollock TAC in the Western/Central Regulatory Areas in the GOA pollock trawl fishery. Roll over any unharvested TAC within the same region and up to the 20 % limit of the seasonal apportionment so that any unharvested TAC apportioned to an area may be further rolled over into the remaining open areas in proportion to the projected pollock biomass in those areas (as estimated by the Plan Teams at the beginning of each year).

Members of the SSLMC:

Larry Cotter, Chair
Dave Benson
Jerry Bongen
Julie Bonney
Shane Capron
Tony DeGange
Doug DeMaster
Steve Drage
John Gauvin
Sue Hills
John Iani
Terry Leitzell
Denby Lloyd
Chuck McCallum
Matt Moir
Bob Small
Beth Stewart
Jack Tagart
John Winther

DECLINE OF THE STELLER SEA LION IN ALASKAN WATERS

UNTANGLING FOOD WEBS AND FISHING NETS

Committee on the Alaska Groundfish Fishery and Steller Sea Lions

Ocean Studies Board
Polar Research Board

Division on Earth and Life Studies
NATIONAL RESEARCH COUNCIL
OF THE NATIONAL ACADEMIES

The National Academies Press
Washington, D.C.
www.nap.edu

Executive Summary

Theory helps us bear our ignorance of fact.
—George Santayana, *The Sense of Beauty*

Steller sea lions are found along the North Pacific rim from California to Japan with about 70% of the population living in Alaskan waters. The Alaskan population declined precipitously during the 1970s and 1980s and continued to decline at a slower rate during the 1990s. Overall, the Alaskan population has declined by more than 80% over the past 30 years. In 1990 the Steller sea lion was listed as a threatened species, and in 1997 the population west of Cape Suckling (longitude 144° W) was listed as endangered under the Endangered Species Act (ESA). The eastern population (southeast Alaska to California) has increased gradually throughout most of its range since the 1970s, but this stock remains listed as threatened.

The causes of the decline of the western stock have been the subject of much speculation and debate despite numerous analyses and many detailed reports. There is no widely accepted answer to the question of why the Steller sea lion population is declining. What might otherwise be an obscure ecological mystery has become an issue of great regional and even national interest because of the regulatory implications for management of the large commercial fisheries in the North Pacific. These fisheries target many of the fish species that comprise the prey base for Steller sea lions.

AGENDA C-5(a)
OCTOBER 2003

BOX ES.1
Statement of Task

This study will examine interactions between Alaska groundfish fisheries and Steller sea lions (*Eumetopias jubatus*) and the role of these fisheries in the evolving status of the sea lion population. The focus of the study will be (1) the status of current knowledge about the decline of the Steller sea lion population in the Bering Sea and Gulf of Alaska ecosystems; (2) the relative importance of food competition and other possible causes of population decline and impediments to recovery; (3) The critical information gaps in understanding the interactions between Steller sea lions and Alaska fisheries; (4) the type of research programs needed to identify and assess potential human and natural causes of sea lion decline; and (5) the components of an effective monitoring program, with yardsticks for evaluating the efficacy of various management approaches.

In November 2000 the ESA consultation prepared by the National Marine Fisheries Service concluded that the Alaska groundfish fishery posed a threat to the recovery of the Steller sea lion and imposed more restrictive measures on the management of the fishery. Concern that the new regulations would bring significant social and economic disruption prompted Congress to direct the North Pacific Fishery Management Council to sponsor an independent scientific review by the National Academy of Sciences on the causes of the Steller sea lion decline and the potential efficacy of the new management measures (Box ES.1). This report represents the results of that review.

CAUSES OF DECLINE

Over the past 200 years many populations of terrestrial and marine mammals have declined precipitously, some to the point of extinction. Most declines of marine mammals have been attributed to human activities, typically as a result of commercial harvest for fur, meat, and oil or because of fishery interactions, through incidental catch in fishing nets, disturbance from fishing activities, or predator control programs. Suspension of these activities reduces the risk of extinction, but for some long-lived species recovery may take decades.

The case of the dramatic decline in the Steller sea lion population has been less straightforward. Steller sea lions have not been subject to large commercial harvests since 1972, and the take of sea lions by fisheries has been estimated to be small relative to the size of the population. During the period of rapid population decrease during the late 1970s through the

1980s, there were also major shifts in abundance of many marine species in the North Pacific attributed to both climatological events and commercial harvests of fishes. Analysis of these trends has been complicated by the scarcity of baseline population data on the robust sea lion population that existed before 1975, which is needed for comparison with data on the current depleted population. Since there are few avenues for augmenting this historical database (e.g., reanalysis of existing data, testing of archived tissue samples for contaminants and disease agents, reconstruction of environmental events based on isotope anomalies or annual growth patterns), the cause, or causes, of the early phase of the sea lion population decline will likely remain a source of speculation and debate. However, existing information can be used to identify scenarios that could explain the historical decline, which will be valuable in understanding the prospects for recovery of the remaining population.

Under the ESA, federal agencies must ensure that their actions, or actions they authorize, are not likely to jeopardize the survival or recovery of protected species or damage the protected species' critical habitat. Therefore, if a federally regulated activity may affect Steller sea lions, the responsible agency must take actions to ensure that negative impacts are avoided. This requirement has made it imperative to identify human activities that may contribute to the decline of Steller sea lions so that regulatory actions can be adjusted to address threats to the western population's survival. Unlike the biological opinions required by the ESA listing, this report does not assess the statutory basis for regulating the groundfish fisheries.

At least eight plausible hypotheses have been proposed to explain the decline of the sea lion population. These include threats that result from human activities and naturally occurring events that affect sea lion survival. Human activities that may threaten sea lion recovery include direct takes such as illegal shooting and subsistence harvest, and incidental takes through capture or entanglement in fishing gear. Indirectly, commercial fisheries may disrupt feeding patterns, breeding, and other aspects of sea lion behavior. Also, fishing may decrease the carrying capacity of sea lion habitat through the removal of prey species or by shifting the distribution of species such that less nutritious fish dominate the prey base, the so-called junk food hypothesis. Pollution may pose another indirect effect by impairing the health of sea lions and increasing their susceptibility to disease.

But increased mortality of sea lions may not be just a consequence of human activities. There are natural cycles of abundance and decline in marine ecosystems that are driven by climate variability, predator-prey interactions, and invasions by infectious diseases or toxic algal blooms. It is difficult, and often impossible, to resolve the relative contributions of

human and natural sources of change, especially since complex interactions among species may cause the combined effects to be significantly different from the effects of any single factor.

In part because of the absence of definitive data confirming or excluding any particular hypothesized cause of decline, the regulatory measures taken in response to the protected status of the western population under the ESA have been particularly contentious. **Resolution of this conflict requires management that not only improves chances for the recovery of Steller sea lions but also facilitates scientific study of the efficacy of these protective measures.**

MAKING THE MOST OF EXISTING INFORMATION

The hypotheses proposed to explain the decline of the western stock fall into two categories. The first category, the bottom-up hypotheses, includes potential causes that would affect the physical condition of sea lions such as

- large-scale fishery removals that reduce the availability or quality of prey species,
- a climate/regime shift in the late 1970s that changed the abundance or distribution of prey species,
- nonlethal disease that reduced the foraging efficiency of sea lions, and
- pollutants concentrated through the food web that contaminated fish eaten by sea lions, possibly reducing their fecundity or increasing mortality.

The second category, the top-down hypotheses, encompasses factors that kill sea lions independently of the capacity of the environment to support the sea lion population. These include

- predators such as killer whales (or possibly sharks) that switched their prey preference to sea lions,
- incidental takes of sea lions through capture or entanglement in fishing gear that increased as a result of the expansion of commercial fisheries,
- takes of sea lions in the subsistence harvest that were higher than estimated,
- shootings of sea lions that were underestimated in the past and present, and
- pollution or disease that increased mortality independently of effects on nutrition (e.g., introduction of a contagious pathogen could decimate a population and give the same appearance as an efficient predator).

Observed characteristics of sea lion biology and behavior should be different under these two categories. The bottom-up hypotheses predict increased mortality through reduction in physical condition, manifested by changes in physiology, reproductive success, and foraging behavior. Top-down hypotheses predict no loss of individual fitness but require increased activity by predators, people, or pathogens. Hence, indicators of sea lion health and feeding behavior may be informative in distinguishing the likelihood of these two modes of sustained population decline. It is important to remember that some combination of both types of factors may have contributed to the population decline. For instance, evidence indicating a significant decrease in sea lion physical condition would not exclude the possibility that top-down causes also contributed to overall mortality. Also, geographic variations in environmental conditions across the range of the western population may mean that different factors are to varying degrees responsible for mortality in different parts of the range.

In the existing body of information on Steller sea lions, there is no conclusive evidence supporting either the bottom-up or the top-down hypotheses. Therefore, the available data must be carefully evaluated to ascertain the more plausible causes. First, the evidence can be categorized according to the time period during which it was collected. The rate of decline of the western population has changed since it began in the 1970s. From 1975 to 1985, the annual rate of decline averaged 5.9%. Over the next 5 years the population dropped precipitously, about 15.6% per year. Since the early 1990s (through 2001), the population has continued to decrease but at the more gradual rate of 5.2% annually. The loss of such a large fraction of the population during a relatively short time span (1985-1990) indicates that sea lions were subject to a threat, or threats, that spurred the decline in the 1980s but that by the 1990s these threats either had ended or had less impact.

Second, the evidence can be sorted geographically. In 1995 the National Oceanic and Atmospheric Administration determined that Steller sea lions west of 144° W constituted a distinct population unit based on dispersal patterns, population trends, and genetic differentiation. Because female Steller sea lions tend to return to their natal rookeries for breeding, the western stock may be considered a metapopulation. A metapopulation is a regional population comprised of semi-isolated local populations with limited exchange or interaction, which may fluctuate in response to regional as well as global impacts. Hence, variability in the geographic pattern of decline may point to causes that are specific to particular areas.

Temporal and spatial evaluation of the population data show that the 5-year period of rapid decline (1985-1989) was a range-wide phenomenon and hence was most likely caused by an ecosystem-wide change in the Steller sea lion's environment. Hypotheses that are consistent with this pattern include nutritional limitation through competition with fisheries and changes in prey abundance due to the environmental regime shift in the late 1970s, predators switching from a depleted prey population to sea lions, or introduction of a lethal and highly contagious disease agent such as a virus. Evidence for nutritional limitation includes observations that sea lion condition, growth, and reproductive performance were lower during this time period. However, ecosystem models based on data from the eastern Bering Sea indicate that changes in the relative abundance of prey cannot account for the full magnitude of the decline. Either increased predation or epidemic disease could account for the high mortality rate, but systematic observations of killer whale (or possibly shark) predation were not conducted at that time and serological tests to date have been negative for common pathogens associated with disease epidemics in marine mammals. The large increase in the rate of decline was unlikely to be caused primarily by subsistence harvest, toxic algal blooms, or illegal shooting because these threats tend to vary by geographic location and there is no evidence to suggest that they greatly intensified during this time period. **Multiple factors probably contributed to the widespread population decline in the 1980s, including incidental and deliberate mortality associated with fishing activities, but elucidation of the complete spectrum of causes and consequences is unlikely because of gaps in the available data.**

The pattern of decline has changed since the early 1990s. Not only has the overall rate of decline decreased, but individual rookeries show different population trends as well. Over the past decade, the majority have continued to decline, some have stayed at the same level, and a few have shown modest increases. Based on the most recent census of trend sites, counts of adults and juveniles in 2002 show a 13.6% increase in the Gulf of Alaska and less than a 1% decrease in the Aleutian Islands relative to the 2000 census. However, it would be premature to conclude that the Gulf of Alaska population is recovering based on counts from a single year. The predominant cause of decline may have changed between the 1980s and 1990s. It is possible that minor factors during the 1980s have a larger relative impact now because the remaining population is much smaller. Observations made at one site may not apply to other areas or even to nearby rookeries. Research will be required at multiple sites to resolve whether survival is threatened by local, regional, or population-wide causes. **Finer-scale spatial analysis of Steller sea lion populations and environmental conditions will be required to uncover potential region-specific determinants that are affecting sea lion survival.**

The more recent period of decline (1990-present) is the primary concern of this report because of the need to provide scientific advice for the design of management actions that do not jeopardize the continued survival of the western Steller sea lion population. Although limited in sample size, geographic range, and seasonality, recent measurements of sea lion condition and foraging activity indicate that the western stock is not nutritionally stressed and that individuals are not spending a disproportionate amount of time or energy in locating prey. Analysis of scat components provides evidence that dietary diversity is lower in the western range than in the eastern range, but this may represent opportunistic feeding patterns rather than a decrease in availability of preferred prey species. Additionally, the levels of groundfish biomass during the 1990s were large relative to the reduced numbers of sea lions, suggesting that there has been no overall decrease in prey available to sea lions, although it is still possible that localized depletion of some fish species may affect particular rookeries. **Existing data on the more recent period of decline (1990-present) with regard to the bottom-up and top-down hypotheses indicate that bottom-up hypotheses invoking nutritional stress are unlikely to represent the primary threat to recovery.**

Because the preponderance of evidence gathered during the current phase of the decline runs counter to expectations based on bottom-up hypotheses, the committee gave serious consideration to each of the top-down (direct mortality) hypotheses. All four hypotheses in the top-down category identify sources of mortality applicable to both the earlier and the current phases of the decline. What has changed since the 1980s is the potential impact of this mortality on the much smaller remaining population. Although killer whale predation may have had a significant impact on the historical population, continued predation, as well as illegal shooting, incidental takes by fishing gear, and subsistence harvests may have had a proportionately larger impact on the current depleted sea lion population. In the absence of other significant changes in the ecosystem, the intensity of bottom-up threats is expected to decrease as the sea lion population decreases, but top-down threats are often less dependent on population size. Sea lions remain easy targets for humans and marine predators because they congregate at rookeries and haulouts at certain times of the year. Similarly, sea lions may continue to get ensnared by fishing gear because of the ample banquet of food available around fishing operations. Attraction of killer whales to these same fishing vessels could increase the vulnerability of sea lions to predation. Identifying the most likely top-down hypothesis may depend on matching the different threats to the spatial patterns of sea lion population decline. Different hypotheses may

apply to some but not all parts of the large geographic range of the western population. **Although no hypothesis can be excluded based on existing data, top-down sources of mortality appear to pose the greatest threat to the current population. Investigations of top-down sources of Steller sea lion mortality should be increased to evaluate the proportionate impact of these factors on the population decline.**

MONITORING TO EVALUATE MANAGEMENT EFFICACY

Although most evidence indicates that groundfish fisheries are not causing a range-wide depletion of food resources necessary to sustain the current western population of sea lions, there is insufficient evidence to fully exclude fisheries as a contributing factor to the continuing decline. In some areas, fisheries may compete with sea lions for localized fish stocks, increase incidental mortality due to gear entanglement and associated injuries, disturb animals on haulouts, increase exposure to natural predators through attraction to fish catches, and provide motivation for continued illegal shooting of animals to mitigate lost catches and damaged fishing gear. Moreover, fisheries are one of the few human influences on the Steller sea lion's environment and hence are subject to regulation under the ESA. Therefore, restriction of fishing operations in sea lion habitat remains a reasonable response to the continuing decline of the endangered western population.

The committee has identified five general management options that might be taken to address the potential impacts of groundfish fisheries on sea lions and recommends monitoring priorities to assess the efficacy of each option. These options are evaluated with regard to their scientific potential for discerning the role of groundfish fisheries in the Steller sea lion decline. Each of these options would require continuation of the existing monitoring program (i.e., continued census of trend sites and collection of demographic data based on pup branding and resighting). The committee made the assumption that it is possible to craft each option so as to satisfy the requirements of the ESA. The five options are presented below.

1. *Wait and see, maintaining current closures indefinitely.* Recent management actions, including area closures, may be sufficient to reverse or reduce the rate of population decline. **Under this option the most valuable monitoring information would be derived from annual reference rookery and haulout counts and new demographic data from branded pups.**

2. *Eliminate direct fishery impacts with greatly expanded closures.* This would require closing the Atka mackerel fishery in the Aleutians and reducing the main pollock fishing areas in the southern half of the eastern Bering Sea. **Under this option, monitoring of fish population dynamics, both locally and at the stock level, would be required to determine the effects of the fisheries on stock distribution and fish community composition.**

3. *Establish spatial management units consisting of two sets of closed and open areas where each treatment area is centered on a rookery.* The western population would be divided into management regions with at least two closed and two open rookeries per region. Because most monitoring activities are conducted at rookeries (pup counts, measurement of vital rates, juvenile tagging, etc.), it makes the most sense to use rookeries (rather than rookeries and haulouts) as the experimental units. Also, sea lions are thought to be more vulnerable near rookeries because of the age composition (presence of pups and juveniles) and because females must forage near the rookeries so that they can easily return to nurse their pups. The closed treatment units would be subject to fishery closures, and the open units would have sea lion-related fishery restrictions removed. **Under this option, the most critical monitoring needs would be detailed local Steller sea lion censuses and spatial analyses of fish population changes for each experimental unit in the overall design.**

4. *Implement a "titration experiment" where restrictions on fisheries (such as area closures) are increased progressively over time until a positive response is achieved.* This option is a variation on the strategy used during the 1990s. Fishery regulations continue to become more restrictive as long as the sea lion population continues to decline. **This approach requires monitoring of sea lion population trends, but results could be confounded by the lack of baseline data and natural environmental variability.**

5. *Micromonitor and manage localized interactions between sea lions and fisheries to reduce mortality where and when it occurs in the future.* **This option would require expansion of all basic monitoring activities (abundance, prey fields, mortality agent distribution) around key rookeries to pinpoint times and places of increased mortality so that appropriate management measures could be taken.** The expense of this program would be high because of a requirement for year-round continuous monitoring to allow detection of mortality events in all seasons and locations.

To resolve questions about the impact of the fisheries on Steller sea lion survival, the preferred option is #3 because it is the only approach that directly tests the role of fishing in the decline. Option #3 provides the benefits of an adaptive management experiment, reducing the possibility that regulation of the fishing industry is perpetuated without demonstrable benefit to the Steller sea lion population. Not only does the removal of all sea lion-related fishing restrictions in open areas create opportunities for the industry, it provides a contrasting management treatment necessary for a valid experimental comparison with closed areas. A careful evaluation of past fishing effort in the proposed experimental areas will be required to assess the amount of displaced fishing effort. Placement of open areas where fishing effort has historically been high would decrease the potential for negative impacts arising from shifting effort from the closed to the open areas.

Option #3 provides the setting necessary to carry out research studies on Steller sea lion behavior and performance in contrasting environments while controlling for common effects such as large-scale change in oceanographic regimes. This approach acknowledges that there is no best or precautionary policy because the origin of the decline is unknown. Hence, every segment of the population has an uncertain future with or without new restrictions on the fisheries. Multiple sites in various locations must be included in the experiment to control for site-specific variations in threats to the population. If there are multiple causal factors, such as food, predation, or fishing-related mortality, replication is critical to guard against incorrectly applying the results from any single treatment/control comparison to areas where the results would not apply.

Experimental treatment is a policy option that improves management and increases understanding of the interactions between fisheries and sea lions. Open areas restore opportunities for fisheries by removing restrictions; closed areas remove any potentially negative local impacts of fisheries on sea lions.

Although the incremental approach may be easier to implement, it contains two serious shortcomings. First, it cannot account for ecosystem change due to factors such as oceanographic regime changes. Hence, the efficacy of new management restrictions would not be distinguishable from environmental change that occurs on decadal timescales, confounding either positive or negative outcomes. Second, a false positive outcome would commit managers to prolong additional fishery restrictions without realizing significant improvement in the survival of Steller sea lions.

Listed below are several guidelines for implementing the spatial management units described under option #3:

- *Fished area (under normal management plans).* Design closures to minimize the displacement of fisheries to more distant, and less safe areas. The groundfish fisheries have been the focus of restrictions to protect sea lions based in part on the large amount of biomass removed, but the potential effects of other fisheries have not been as thoroughly examined. Hence, there are two basic experimental treatment options for area closures: (1) closure to groundfish fisheries only or (2) closure to all fishing. A positive response to the first treatment would measure the impact of the groundfish fisheries separately from the effects of other fisheries. A positive response to the second treatment would implicate fishing activities, but there would be uncertainty as to whether the response was due to exclusion of the groundfish fisheries or exclusion of another fishery—for example, herring or salmon. Closure of these areas to all fishing activity would provide the greatest contrast with the open areas for assessment of fishery-related effects on Steller sea lions. If only the groundfish fisheries are excluded from the closed areas, logbook data and as much observer coverage as possible should be obtained for other fisheries. Strict enforcement would be essential for correct interpretation of the effects of the closures.

- *Size and number of treatment areas.* The size of the closed areas depends on both fish movements and sea lion movements. The radius of the closure might range from 20 to 50 nautical miles (centered on a rookery). Replicates of each open/closed area comparison site will be required to assess the effects of environmental variability.

- *Timescale.* Some data gaps can be filled in less than 5 years (evidence of disease, localized fish depletion, improved estimates of direct mortality sources), but long-term monitoring (5 to 10 years) will be required to assess recruitment and mortality rates. If substantial numbers of Steller sea lions are taken as bycatch, open areas should be closed or fishing gears modified to prevent further decline of the population. This should apply to all fisheries that take sea lions as bycatch.

RECOMMENDATIONS FOR RESEARCH AND MONITORING

Research and monitoring should be directed toward measuring the vital rates and response variables most indicative of the status of the Steller sea lion population. This should include

- *Population trends.* The current program for monitoring the juvenile and adult populations by aerial survey should be continued along with direct pup counts at selected rookeries.

- *Vital rates.* Vital rates have not been measured since the mid-1980s and urgently require updating. This should include measurements of fecundity, age at first reproduction, age distribution, juvenile survival, adult survival, and growth rates. Cooperative programs with subsistence hunters could provide reproductive data without additional mortality. Other parameters may be measured through increased effort in branding and resighting programs, requiring a commitment of resources for a period of time equivalent to the lifespan of the Steller sea lion.

- *Critical habitat.* Although the rookeries and haulouts of sea lions have been cataloged and described, the at-sea distribution of sea lions and related foraging activity are less well documented. Mostly this reflects the difficulty of collecting such data. The most valuable information comes from telemetry data, but analysis is constrained by the relatively small number of animals tagged, biases inherent in the recovery of data, and inaccuracies from inferring foraging activity based on swimming and diving behavior. Stomach telemetry tags that monitor temperature shifts associated with ingestion of prey should improve correlations of at-sea distribution with feeding. In conjunction with the analysis of Steller sea lions' at-sea activities, the activity and impacts of fisheries should be documented. Studies should be undertaken to determine if fisheries cause localized depletion of the various groundfish stocks through monitoring of fish distribution and density during the course of the fishing season with consideration of the need to distinguish these effects from natural changes in abundance. Designation of critical habitat should be revisited based on the results of the research proposed above.

- *Environmental monitoring.* Assessment of various ecological features of the sea lion environment will provide a broader context for evaluating sea lion population trends. These should include assessments of oceanographic conditions, plankton composition, forage fish abundance and distribution, seasonal migrations by groundfish, cephalopod abundance and distribution, and arrowtooth flounder interactions with groundfish (competition and predation). Also, monitoring for harmful algal bloom frequency and distribution through sampling of coastal waters will be valuable for assessing sudden mortality events. Biological sampling of sea lions should include testing for known marine mammal disease agents.

- *Predator feeding habits and population size.* Much more information is necessary to evaluate the impact of predation by killer whales and sharks on the continuing decline of the western population. Current evidence suggests that sharks are unlikely to be a major source of mortality based on distribution, limited diet data, and the relatively infrequent observations of shark wounds on sea lions. Better estimates of killer whale diet, population size, and distribution (including patterns of movement and habitat use) throughout Alaska are required to estimate potential predation mortality. In addition, observer programs should be instituted to record killer whale feeding behavior that may be different in different regions. Salmon shark and sleeper shark bycatch data from longline fisheries should be collected to assess shark abundance, and shark stomach contents should be examined to determine whether sea lions are a significant component of sharks' diets.

Most studies of Steller sea lions have been conducted in the summer, when sea conditions are favorable and it is relatively easy to work with females and pups on rookeries. However, this introduces a strong bias into the results because this season may not be the time when Steller sea lions are subject to increased mortality. The fate of juveniles remains a potentially pivotal question justifying the recent emphasis on their capture and tagging. In addition to increasing efforts directed toward year-round research at more accessible sites, remote observation methods such as satellite telemetry and video monitoring at rookeries and haulouts will be necessary to assess seasonal activity patterns. Although some research programs will yield data in a relatively short time (1 to 5 years), many of the variables most critical to assessing the efficacy of the various management regimes will take a minimum of 5 to 10 years before conclusive results are available. This is a consequence of the biology of sea lions; their long generation time means a slow population response and increased time required for assessing vital rates. Hence, it is even more urgent to develop and implement a prioritized cohesive research plan to address these information needs. Under an adaptive management scheme, the requirement to reduce jeopardy can be effectively coupled with a rigorous research program to reduce uncertainty about the causes of the ongoing decline of the Steller sea lion population.

Evaluation of the Experiment Proposed by the National Research Council to Determine the Effects of Fisheries on Steller Sea Lions

Alaska Fisheries Science Center
National Marine Fisheries Service
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In its recent report on the decline of the Steller sea lion population in the North Pacific Ocean (NRC 2003), the National Research Council identified five different approaches that could be used to determine the effects of fisheries and fishery management practices on Steller sea lions:

- maintain the current suite of fishery management measures indefinitely and monitor the population response ('wait and see' with no changes)
- expand considerably the areas closed to fishing
- design an experiment with paired areas open and closed to fisheries around sea lion rookeries
- implement a titration experiment that progressively increases fishery restrictions range-wide
- micro-manage and monitor sea lion-fishery interactions around key rookeries

The NRC concluded that an experiment with paired areas that were open and closed to fisheries and centered on rookeries provided the best opportunity to increase the scientific understanding of the effect of fisheries on Steller sea lions. In their view:

> This is the only option that ... should reveal relatively quickly whether restrictions on fisheries will help prevent further decline. This option does not involve any pretense that the impacts of future changes in various "natural" factors like predator populations can eventually be unraveled through modeling and correlative studies. This option would provide a powerful comparative setting within which to carry out various detailed research studies on Steller sea lion behavior and performance in alternative ecological (prey field) environments while controlling for common effects of large-scale oceanographic regimes. (p. 159).

An experiment must be properly designed to insure that the results obtained answer the original question posed: Are fisheries affecting the survival and recovery of Steller sea lions or adversely affecting their critical habitat in Alaska? In its review for the North Pacific Fishery Management Council (Council) of the November 2000 Biological Opinion on the groundfish fishery management plans, Bowen et al. (2001) outlined a framework upon which all successful experiments must be based:

> *Observations* lead to a *Conceptual Model, a Hypothesis* and *Alternative Hypotheses*. These form the basis of an *Experiment* that produces *Results* that support either the *Hypothesis* or one or more *Alternative Hypotheses*.

Therefore, it is very important that the hypothesis and alternative hypotheses to be evaluated are well-articulated and that the experiment is designed to produce results that can distinguish among the hypotheses. Before the Council undertook such an experiment, Bowen et al. (2001) cautioned that:

> It cannot be overemphasized how difficult it will be to conduct large-scale field experiments to test hypotheses about the effects of fishing on Steller sea lions. To our knowledge, experiments in the open ocean at this spatial scale have not been previously attempted. (p. 20)

Despite these cautions, Bowen et al. (2001) realized that the importance of finding out whether fishing is having any impacts on sea lions may outweigh the desire to do preliminary small-scale studies prior to launching a large-scale experiment. However, they listed a series of issues that must be resolved in the design of any Steller sea lion fishery effects experiment:

- what is an experimental unit (rookery, cluster of rookeries and haulouts)?
- how many replicates of the treatment (no fishing as defined by NRC) and control (fishing) experimental units should there be?
- what is the size of the experimental units?
- how long should the experiment last?
- what response variables will be measured (e.g., morphometric, energetic, demographic, behavioral, ecological) and how are they expected to change in the treatment and control populations?
- what level of change in the response variables will be detectable between treatment and control populations given various designs and sample sizes?
- how will the treatment be measured (fishing days, biomass removed, number of tows)?
- how will differences in the impacts of other factors (e.g., subsistence hunting, predation) be accounted for in the treatment and control experimental units?
- will replication of treatment and control units within ecosystems be sufficient to untangle climate and fishing effects which will likely affect response variables in similar ways?

Experimental design

The NRC made recommendations regarding only the first four issues listed above, but provided no details; these will be discussed below. The issues in the Bowen et al. (2001) list that were not addressed by the NRC are the most fundamental design considerations in any experiment, and the first that must be addressed.

(1) • **what response variables will be measured (e.g., morphometric, energetic, demographic, behavioral, ecological) and how are they expected to change in the treatment and control populations?**

Bowen et al. (2001) discuss at length a wide variety of response variables that could be measured in sea lions during a large-scale experiment:

- Morphometric or energetic response variables
  - birth mass
  - pup growth rate
  - weaning mass
  - body condition
  - milk output
- Behavioral response variables
  - female foraging trip duration
  - foraging effort
  - juvenile ranging behavior
- Ecological response variables
  - diet composition
  - diet diversity
- Demographic response variables
  - time to weaning
  - birth rate
  - age at first birth
  - juvenile survival
  - adult survival

In their Table 1, Bowen et al. (2001) outline the expected response of each variable under various hypotheses proposed to explain the decline and lack of recovery of Steller sea lions. This table provides a good starting point to determine which variables should be measured in a fishery impact experiment.

(2) • **what level of change in the response variables will be detectable between treatment and control populations given various designs and sample sizes?**

The number of replicates and sample sizes largely determine the level of change that will be detectable in one or more response variables between the treatment and control populations. This is often termed the power of the test (the probability of rejecting the null hypothesis when it is in fact false; Sokal and Rohlf 1969), and generally increases directly with sample size. However, it is also dependent on the precision and accuracy with which response variables are measured and the degree to which they distinguish among competing hypotheses (e.g., climate and fisheries-related changes in prey availability are likely to affect pup growth rates in the same manner; Bowen et al. 2001, Table 1). Some researchers have suggested that since separation of anthropogenic from natural effects is difficult or impossible in large-scale ecological studies, intensive monitoring of a number of individuals, rather than randomly sampling from a population, is more likely to yield statistically valid results (Smith et al. 1993). This is akin to the fifth approach the NRC considered (micro-management and monitoring of fisheries and sea lions) but discarded.

(3) • **how will the treatment be measured (fishing days, biomass removed, number of**

tows)?

Equally important in the design considerations is how fishing will be measured. Bowen et al. (2001) suggested fishing days, biomass removed and number of tows, and to that list, harvest rate should be added. Harvest rate would require knowledge of the pre-fishery distribution of the exploited species, but is the only one that would measure fishery impact since it scales what is measured (catch) to the size of the available prey population.

(4)

- **how will differences in the impacts of other factors (e.g., subsistence hunting, predation) be accounted for in the treatment and control experimental units?**
- **will replication of treatment and control units within ecosystems be sufficient to untangle climate and fishing effects which will likely affect response variables in similar ways?**

The NRC (2003) suggested that their paired open/closed design controls for other factors that affect the sea lion population, but exactly how is unclear. For instance, predation by killer whales can be highly localized (Matkin et al. 2003), and would have to be monitored (somehow) to account for mortalities during the experiment from that source. In addition, the NRC stated that their design controls for the effects of large-scale environmental variation, but this too would require considerable attention in the design to insure that changes due to fishing could be isolated.

After addressing issues related to the measurement of treatment and response variables, and the impacts of other factors, the experimental units; their size, number and location; and the duration of the experiment must be considered (the first four issues in Bowen et al.'s (2001) list above). The NRC briefly discussed them, but provided few details necessary to conduct the experiment:

(5)

- **what is an experimental unit (rookery, cluster of rookeries and haulouts)?**

The NRC recommended that each experimental unit be centered on a single rookery. Rookeries should be the focus since most monitoring activities (e.g., pup counts, measurements of vital rates, pup branding) occur there. In addition, female sea lions may be more vulnerable to food limitations around rookeries because of their need to return there to nurse their pups.

(6)

- **how many replicates of the treatment (no fishing as defined by NRC) and control (fishing) experimental units should there be?**

The range of the Steller sea lion should be divided into "management regions", and there should be at least 2 open and 2 closed areas within each region. This replication is necessary to account for environmental variability. The NRC made no recommendation on the number of management regions, nor their size.

(7)

- **what is the size of the experimental units?**

The NRC stated that the "Size of closed areas depends on fish and sea lion movements," and suggested a range of between 20-50 miles.

(8) • **how long should the experiment last?**

To allow for sea lion recruitment and mortality responses, the experiment should be conducted for at least 5-10 years. No mention was made of alternating open and closed areas after the first iteration.

Previous Recommendations of the AFSC on Fishery Effect Experiments

In 1999, the AFSC prepared a study plan to assess the effects of different size trawl exclusion zones on population trends and health of Steller sea lions. This plan was prepared following the recommendations in a report prepared by attendees of an experimental design workshop held at NMML on 6-7 May 1997. The objectives of the workshop were to (1) present a panel or independent scientists with a review of Steller sea lion population dynamics and foraging ecology, current state and federal protective measures, and relevant fisheries, and (2) provide an opportunity for the panel to formulate and propose and experimental design to test the efficacy of fishery exclusion zones. One of the recommendations of the panel was a "cross-over" design, in which treatment and control units were switched after the first iteration of 5-10 years. This was recommended as a way to deal with the confounding effects of fishing and climate, as well as other factors.

In the AFSC study plan, preliminary power analyses were conducted that examined the tradeoffs between sample sizes and the power of the experiment to distinguish between different treatment levels (size of exclusion zones) in their effects on the population trend and health of sea lions. For the population trend experiment, it had to be assumed that fishing had a large instantaneous effect on the rate of population growth (-5% per year or all of the population decline at that time) and that there were no spatial differences in this effect (e.g., individuals were not exposed to different treatments and remained within their experimental areas). Even with these simplifying assumptions, large numbers of replicate counts (8-10) were required to detect changes in the trends of the treatment and control populations over the course of a short term (6-year) experiment. For the sea lion health experiment, sample sizes of individual sea lions at each rookery that had to be screened for condition each year were quite large, ranging between 46 and 900 depending on the assumptions used in the model. Because of these sample size requirements and the costs associated with them, this experiment was not initiated by the AFSC.

In the Biological Opinion on the groundfish fishery management plans issued by NMFS in November 2000, the AFSC outlined a monitoring project designed to assess the efficacy of the management measures proposed as part of the reasonable and prudent alternative (RPA; pages 293-300). In this RPA, Steller sea lion critical habitat was divided into 13 areas within 3 blocks. Areas within each block were either open to the pollock, Pacific cod and Atka mackerel fisheries

in a controlled manner, or closed to them. Similar simplifying assumptions were made in the power analysis of the monitoring project as were made in the 1999 AFSC study: all of the current population decline was due to fishing and individuals did not stray from their treatment/control areas. This latter assumption, while still likely not valid, was probably less of an issue for the BiOp monitoring plan than for the 1999 AFSC study because the exclusion zones were considerably larger. However the BiOp monitoring plan still required a minimum of 6 years of annual surveys to detect differences in trends of 'open' and 'closed' sea lion groups.

Considerations for Size, Location and Number of Experimental Areas

Any design must incorporate what is known about Steller sea lion biology, foraging ecology and stock structure (York et al. 1996; Sinclair and Zeppelin 2002; Loughlin et al. In press). This is critical to the success of any experiment because if the vast majority of the foraging and movements of 'closed' and 'open' animals are not within the boundaries of the closed and open areas respectively, then the power of any experiment to reveal different responses of the sea lion population to the treatments will be low.

The experimental areas proposed by the NRC are too small relative to the areas actually utilized by sea lions to forage within to serve as treatment and control areas. In winter, evidence suggests that some adult females travel many hundreds of miles from shore, presumably to forage (Merrick and Loughlin 1997). While most juveniles < 2 years of age that have been tagged with satellite transmitters appear to stay relatively close to shore (within 10 nm), it was unclear whether they were foraging independently (Loughlin et al. In press). Little is known about the foraging distributions of older juveniles between 2-4 years of age, who are weaned, yet relatively inexperienced foragers and not fully grown. Having the experimental areas centered on rookeries (while apparently disregarding haulouts) ignores not only the metapopulation structure but also the reasons why sea lions move between these terrestrial sites. In the breeding season, reproductively-aged animals are primarily at rookeries or bachelor bull (males unable to hold a territory) haulout sites nearby. Juvenile sea lions are not necessarily attracted to rookeries during the summer and may be distributed at a number of haulout and rookery sites. In the non-breeding season, some rookery sites may be abandoned, since some of the reasons they are attractive in the breeding season (e.g. lack of predators, adequate area for establishing territories and raising pups) are not important during the remainder of the year. Sea lions utilize different groups of haulouts within a region depending on the weather (e.g., wind, swell direction) or other factors, such as prey availability (Sease and York, in press; Womble et al. 2003). While scientists monitor the sea lion population primarily at rookeries in the breeding season, the animals whose behavior and success is being measured in this experiment could be affected by fisheries occurring well outside a 20-50 nm zone around a single rookery.

Information on the dispersal, movement, and metapopulation structure of the western stock of Steller sea lions that must be considered in determining the size, location and number of any experimental areas comes from 4 sources:

- resights of branded animals (Raum-Suryan et al. 2002)

- locations at-sea derived from animals tagged with satellite-linked depth recorders (Merrick and Loughlin 1997; Loughlin et al. in press)
- genetic analyses and patterns of population decline (Bickham et al. 1996; 1998; York et al. 1996; O'Corry-Crowe et al. 2003)
- food habits data (Sinclair and Zeppelin 2002)

Raum-Suryan et al. (2002) analyzed resightings of 8,596 pups that were branded from 1975-1995 on rookeries in Alaska and reported almost all resightings of young-of-the-year sea lions were within 500 km of the rookery where the pup was born. Juvenile animals were seen at much greater distances from their rookery of birth (up to 1,785 km), while sightings of adults were generally less than 500 km away from the natal rookery. This information suggests that the size of any experimental areas (closed or open) should be on the order of many hundreds of kilometers wide (e.g., 500 km) to account for sea lion movement and dispersal.

Recent information on at-sea locations of juvenile sea lions (Loughlin et al. in press; Addendum to the October 2001 BiOp) suggests that young-of-the-year sea lions generally do not venture far from rookery or haulout locations (most less than 10 nm). As was noted in these analyses, sea lions less than 1 year old may not be weaned, so it is unclear how much this pattern of habitat use reflects foraging or play. However, with age, sea lions increasingly use areas more than 10 nm away from a haulout or rookery. This is particularly true for adult females in winter (Merrick and Loughlin 1997). In doing so, these animals may be less than 10 nm from shore, but outside of a 10 nm management zone around a particular rookery or haulout. Therefore, while the animals may not be using "offshore" habitat, they would be subjected to the fishery-treatment. Use of offshore areas by sea lions, as well as nearshore areas that are not within critical habitat (also shown in the Platform of Opportunity database; NMFS 2000) and in particular, how it changes seasonally and ontogenetically, must be considered in any experimental design.

Analyses of sea lion genetics (Bickham et al. 1996; 1998) and patterns of population decline (York et al. 1996) provide the strongest evidence to date of the structure of the Steller sea lion population in the north Pacific. Genetic evidence initially suggested that sea lions exist as two stocks, eastern and western separated at Cape Suckling (144°W). Recently, a third stock consisting of sea lions that breed on Russian rookeries has been identified as a subdivision of the western US stock. These data suggest that any experiment should be confined to the western US stock from Cape Suckling to Attu I.

York et al. (1996) analyzed patterns of population dynamics at local, meso- and population scales within the western US stock. Their analysis suggested that there were five groups of Steller sea lion rookeries from the Kenai peninsula to the western Aleutian Islands based on patterns of population trajectory over time and spatial proximity (Table 1).

Based on similarities in food habits, Sinclair and Zeppelin (2002) described four regions that have a geographic clustering of rookeries similar, but not identical to that described by York et al. (1996) (Table 2).

In both of the metapopulations described in Tables 1 and 2 (each with 5 or 4 regions), only rookeries have been listed. Each region, however, contains haulouts that are also used by sea lions throughout the year or seasonally. These should be included within any experimental design to insure that they have the same treatment (closed or open to fishing) as the rookeries within the region. This will also reduce the likelihood that individual sea lions will receive both treatments at different times, which would confound the results of an experiment.

Care should be taken to reduce the likelihood that some factors outside of our control are minimized. For instance in the western Aleutian Islands, sea lions may be affected by activities in Russian waters; it has been suggested that the decline in the western Aleutian Islands may be due in part to incidental take or shooting by herring fishers in Russia. In addition, Prince William Sound at the other end of the western stock's U.S. range, appears to be used differently by sea lions than other sub-areas (Pitcher and Sease 2003; Rea 2003). There may be an influx of juveniles from both the western and eastern stocks into Prince William Sound to take advantage of favorable foraging opportunities during certain seasons and years. This movement across stock boundaries could confound the results of any experiment.

Other Issues

- Keeping areas currently open to fishing open

The NRC stated that "Placement of open areas where fishing effort has historically been high would decrease the potential for negative impacts arising from shifting effort from the closed to open areas". The NRC recommended closing areas that had not had much historical effort in them and keeping areas open that were currently in use. However, this will decrease the potential of detecting positive responses in the sea lion population if the open areas are naturally attractive to both fishers and sea lions because they contain fish. Open and closed areas may not have similar prey populations within them from the beginning of the experiment if those that currently support exploitable populations are left open and currently unfished areas are closed. This also raises the issue of seasonal fish availability, particularly in spawning aggregations in relatively nearshore areas. A relatively small open or closed area might contain only one 'spot' that was utilized by fishers and sea lions during the fish's spawning season, after which the area might have considerably less value.

- Lifting fishing restrictions in open areas

The NRC recommended "lifting ... fishing restrictions in open areas." While this is necessary "to achieve adequate contrast among treatments in any experiment", it is unclear whether this means all fishing restrictions or only those promulgated specifically as measures to enhance recovery of Steller sea lions. For instance, in areas in the eastern Bering Sea that would be open to fishing under this experiment, would the bycatch caps for salmon and herring or the ban on bottom trawling for pollock be lifted? In the Gulf of Alaska, would spatial or temporal allocations of pollock TAC be ignored in open areas to increase contrast with closed areas? Other goals of

fishery management should not be overlooked in crafting the sea lion-fishery interaction experiment, but the specific regulations that will not be applied in the open areas must be clarified.

- Type of fishery closures

The NRC also identified two types of fishery closure areas that could be used: (1) closed to the groundfish fisheries only, and (2) closed to all fisheries. The NRC suggested closing areas to all fishing activity would be preferable because it would provide the greatest contrast with open areas (where fishery restrictions should be lifted) for assessing fishery effects.

- Overall fishing mortality rate(s)

The NRC design assumes that the overall fishing mortality rate used to set ABCs has, by itself, no effect on Steller sea lions. In other words, the assumption in an "open-closed area" design is that all fishing effects manifest themselves as local area effects that can be tested within these local areas. This is also true for experiments that use larger areas than those recommended by the NRC. Separation of ecosystem-wide and local effects of fishing at different rates would be very difficult, if not impossible, to discern in an experimental setting. However, the assumption that all impacts of fishing occur within defined areas is implicit in any design based on open and closed areas.

Table 1. Groupings of Steller sea lion rookeries derived from analyses of their location and rates of decline (York et al. 1996).

Region	Rookeries (Islands)	Boundaries
Central Gulf of Alaska	Outer, Sugarloaf, Marmot, Chirikof, Chowiet, Atkins (?)	~149°W to ~158°W in the GOA (Seward to Chignik)
Western Gulf of Alaska	Atkins (?), Chernabura, Pinnacle, Clubbing Rocks	~158°W to ~164°W in the GOA (Chignik to Isanotski Strait)
Eastern Aleutian Islands	Sea Lion Rocks, Ugamak, Akun, Akutan, Bogoslof, Ogchul, Adugak	~162°W to ~170°W in the EBS ~164°W to ~170°W in the GOA W to Islands of Four Mountains
Central Aleutian Islands	Yunaska, Seguam, Agligadak, Kasatochi, Adak, Gramp, Tag, Ulak, Amchitka (2), Ayugadak, Kiska (2), Buldir	~170°W to ~175°E in the AI Islands of Four Mountains to Pass west of Buldir Island
Western Aleutian Islands	Agattu (2), Attu	~175°E to ~170°E in the AI Pass west of Buldir Island to US-Russia Convention Line

Table 2. Groupings of Steller sea lion rookeries derived from analyses of food habits (based on Sinclair and Zeppelin 2002).

Region	Rookeries (Islands)	Boundaries
Central Gulf of Alaska (Region 1)	Outer, Sugarloaf, Marmot, Chirikof, Chowiet	~149°W to ~158°W in the GOA (Seward to Chignik)
Western Gulf of Alaska (Region 2)	Atkins, Chernabura, Pinnacle, Clubbing Rocks	~158°W to ~164°W in the GOA (Chignik to Isanotski Strait)
Eastern Aleutian Islands (Region 3)	Sea Lion Rocks*, Ugamak, Akun, Akutan, Bogoslof, Ogchul, Adugak (?)	~162°W to ~169°W in the EBS ~164°W to ~169°W in the GOA W to Samalga Pass
Central and Western Aleutian Islands (Region 4)	Adugak (?), Yunaska, Seguam, Agligadak, Kasatochi, Adak, Gramp, Tag, Ulak, Amchitka (2), Ayugadak, Kiska (2), Buldir, Agattu (2), Attu	~169°W to ~170°E in the AI Samalga Pass to US-Russia Convention Line

Literature Cited

Bickham, J. W., J. C. Patton, and T. R. Loughlin. 1996. High variability for control-region sequences in a marine mammal: implications for conservation and biogeography of Steller sea lions (*Eumetopias jubatus*). J. Mammal. 77:95-108.

Bickham, J. W., T. R. Loughlin, J. K. Wickliffe, and V. N. Burkanov. 1998. Genetic variation in the mitochondrial DNA of Steller sea lions: haplotype diversity and endemism in the Kuril Islands. Biosphere Conservation 1:107-117.

Bowen, W. D., J. Harwood, D. Goodman and G. L. Swartzman. 2001. Review of the November 2000 Biological Opinion and Incidental Take Statement with respect to the western stock of Steller sea lions, with comments on the draft August 2001 Biological Opinion. North Pacific Fishery Management Council. Anchorage, AK. 49 p.

Loughlin, T. R., J. T. Sterling, R. L. Merrick, J. L. Sease, and A. E. York. In press. Immature Steller sea lion foraging behavior. Fishery Bulletin, U.S.

Matkin, C., D. Maldini, and L. Barrett-Lennard. 2003. Steller sea lions and killer whales in Prince William Sound-Kenai Fjords-Kodiak. "Marine Science in the Northeast Pacific: Science for Resource-Dependent Communities", 13-17 January 2003, Anchorage AK. Abstract only.

Merrick, R. L., and T. R. Loughlin. 1997. Foraging behavior of adult female and young-of-the-year Steller sea lions in Alaskan waters. Can. J. Zool. 75:776-786.

National Marine Fisheries Service (NMFS). 2000. Endangered Species Act - Section 7 Consultation Biological Opinion and Incidental Take Statement on the Bering Sea/Aleutian Islands and Gulf of Alaska groundfish fisheries based on the fishery management plans. NMFS Alaska Region, Protected Resources Division. 352 pp plus appendices, tables and figures.

National Research Council (NRC). 2003. Decline of the Steller sea lion in Alaskan waters: untangling food webs and fishing nets. The National Academies Press, Washington, D. C. 204 p.

O'Corry Crowe, G., B. L. Taylor, M. Basterretche, T. R. Loughlin, T. Gelatt and J .W. Bickham. 2003. Using molecular genetics to estimate dispersal rates between Steller sea lion rookeries. . "Marine Science in the Northeast Pacific: Science for Resource-Dependent Communities", 13-17 January 2003, Anchorage AK. Abstract only.

Pitcher, K., and J. Sease. 2003. Equivocal indicators of Steller sea lion population trend in Prince William Sound, Alaska. "Marine Science in the Northeast Pacific: Science for

Resource-Dependent Communities", 13-17 January 2003, Anchorage AK. Abstract only.

Raum-Suryan, K. L., K. W. Pitcher, D. G. Calkins, J. L. Sease, and T. R. Loughlin. 2002. Dispersal, rookery fidelity and metapopulation structure of Steller sea lions (*Eumetopias jubatus*) in an increasing and a decreasing population in Alaska. Marine Mammal Science 18:746-764.

Rea, L. 2003. Differences in blubber levels of the fatty acid 20:1n-11 suggest free-ranging Steller sea lions (*Eumetopias jubatus*) ingest prey at a younger age in Prince William Sound than sea lions captured in southeast Alaska. "Marine Science in the Northeast Pacific: Science for Resource-Dependent Communities", 13-17 January 2003, Anchorage AK. Abstract only.

Sease, J. L., and A. E. York. In press. Seasonal distribution of Steller sea lions in Alaska. Marine Mammal Science.

Sinclair, E., and T. Zeppelin. 2002. Seasonal and spatial differences in diet in the western stock of Steller sea lions (*Eumetopias jubatus*). J. Mammal. 83(4): 973-990.

Smith, E. P., D. R. Orvos, and J. Cairns, Jr. 1993. Impact assessment using the before-after-control-impact (BACI) model: concerns and comments. Can. J. Fish. Aquat. Sci. 50: 627-637.

Sokal, R. R., and F. J. Rohlf. 1969. Biometry. W. H. Freeman and Co., San Francisco. 776 pp.

Womble, J. N., M.F. Willson, M.F. Sigler, B.P. Kelly, and G. R. VanBlaricom. Spring-spawning fish aggregations: a seasonal feast for Steller sea lions. "Marine Science in the Northeast Pacific: Science for Resource-Dependent Communities", 13-17 January 2003, Anchorage AK. Abstract only.

York, A. E., R. L. Merrick and T. R. Loughlin. 1996. An analysis of the Steller sea lion metapopulation in Alaska. Pages 259-292 *in* D. R. McCullough, ed. Metapopulations and wildlife conservation. Island Press, Washington DC and Covelo, CA.

North Pacific Fishery Management Council
Request for Proposal
Research for FY2004

Introduction

In its recent report on the decline of the Steller sea lion population in the North Pacific Ocean (NRC 2003), the National Research Council identified five different approaches that could be used to determine the effects of fisheries and fishery management practices on Steller sea lions:

- maintain the current suite of fishery management measures indefinitely and monitor the population response ('wait and see' with no changes)
- expand considerably the areas closed to fishing
- design an experiment with paired areas open and closed to fisheries around sea lion rookeries
- implement a titration experiment that progressively increases fishery restrictions range-wide
- micro-manage and monitor sea lion-fishery interactions around key rookeries

At present, directed fisheries for pollock, Pacific cod, and Atka mackerel in Alaska are considered to potentially result in competitive interactions with the western population of Steller sea lion. However, to date definitive studies demonstrating either an adverse interaction is occurring or is not occurring have yet to be undertaken.

The NRC concluded that an experiment with paired areas that were open and closed to fisheries and centered on rookeries provided the best opportunity to increase the scientific understanding of the effect of fisheries on Steller sea lions. In their view:

> This is the only option that ... should reveal relatively quickly whether restrictions on fisheries will help prevent further decline. This option does not involve any pretense that the impacts of future changes in various "natural" factors like predator populations can eventually be unraveled through modeling and correlative studies. This option would provide a powerful comparative setting within which to carry out various detailed research studies on Steller sea lion behavior and performance in alternative ecological (prey field) environments while controlling for common effects of large-scale oceanographic regimes. (p. 159).

An experiment must be properly designed to insure that the results obtained answer the original question posed: Are fisheries affecting the survival and recovery of Steller sea lions or adversely affecting their critical habitat in Alaska? In its review for the North Pacific Fishery Management Council (Council) of the November 2000 Biological Opinion on the groundfish fishery management plans, Bowen et al. (2001) outlined a framework upon which all successful experiments must be based:

> *Observations* lead to a *Conceptual Model, a Hypothesis* and *Alternative Hypotheses.* These form the basis of an *Experiment* that produces *Results* that support either the *Hypothesis* or one or more *Alternative Hypotheses.*

Therefore, it is very important that the hypothesis and alternative hypotheses to be evaluated are well articulated and that the experiment is designed to produce results that can distinguish among the hypotheses. Before the Council undertook such an experiment, Bowen et al. (2001) cautioned that:

> It cannot be overemphasized how difficult it will be to conduct large-scale field experiments to test hypotheses about the effects of fishing on Steller sea lions. To our knowledge, experiments in the open ocean at this spatial scale have not been previously attempted. (p. 20)

Despite these cautions, Bowen et al. (2001) realized that the importance of finding out whether fishing is having any impacts on sea lions may outweigh the desire to do preliminary small-scale studies prior to launching a large-scale experiment. However, they listed a series of issues that must be resolved in the design of any Steller sea lion fishery effects experiment:

- what is an experimental unit (rookery, cluster of rookeries and haulouts)?
- how many replicates of the treatment (no fishing as defined by NRC) and control (fishing) experimental units should there be?
- what is the size of the experimental units?
- how long should the experiment last?
- what response variables will be measured (e.g., morphometric, energetic, demographic, behavioral, ecological) and how are they expected to change in the treatment and control populations?
- what level of change in the response variables will be detectable between treatment and control populations given various designs and sample sizes?
- how will the treatment be measured (fishing days, biomass removed, number of tows)?
- how will differences in the impacts of other factors (e.g., subsistence hunting, predation) be accounted for in the treatment and control experimental units?
- will replication of treatment and control units within ecosystems be sufficient to untangle climate and fishing effects which will likely affect response variables in similar ways?

Rationale for the North Pacific Fishery Management Council Requesting Proposals

The North Pacific Fishery Management Council (NPFMC) has a legislative mandate to provide the Alaska Regional Office recommendations regarding the management of federally managed fisheries. This responsibility includes the development of recommendations to insure that the Agency is successful in meeting all of the mandates of all laws that apply to resource management in waters off Alaska, including those under

the National Environmental Policy Act and the Endangered Species Act. The NPFMC formed a committee to provide advice to the NPFMC regarding the need for conservations measures designed to mitigate the potential impact of groundfish fisheries on the western population of Steller sea lion, which is an endangered species under the ESA, in 2001. This committee was referred to as the RPA committee, but was subsequently renamed the Steller Sea Lion Mitigation Committee (SSL MC). The minutes of meetings held by the committee are available on the NPFMC website. In its prior work, the SSL MC had established a working group to provide advice to the SSL MC on experimental designs for management related activities that could be used to evaluate the efficacy of conservation measures imposed on groundfish fisheries in Alaska, including the development of an adaptive management approach.

At the June 2003 meeting of the NPFMC, the Council requested *inter alia* that the SSL MC provide advice regarding the development of an adaptive management experiment as recommended by the NRC in its report to the Council (NRC 2003). The SSL MC, based on a recommendation from its working group on experimental design, recommended that the Council issue a Request for Proposals for the purpose of soliciting expert opinion on how to best approach the design and implementation of an adaptive management experiment. At its October 2003 meeting, the NPFMC accepted this recommendation. The following information is provided to interested parties for the purpose of developing and submitting proposals.

The remainder of the RFP would contain specific information on required work elements, criteria for judging proposals, funds available for the work, a timeline, and other information bidders must consider when preparing proposals.

North Pacific Fishery Management Council
Steller Sea Lion Mitigation Committee
August 27-28, 2003 Meeting

Minutes

Chairman Cotter reviewed the agenda for this meeting, which focused almost exclusively on a review of proposals for amending Steller sea lion[1] protection measures in the Gulf of Alaska groundfish fisheries; a report from the SSLMC's subcommittee on experimental design was the other main subject of this meeting. Minutes of the July 28-29 meeting were approved as drafted and circulated prior to the meeting. The final July meeting minutes will be posted on the Council's web site.

Committee members attending this meeting were: Chairman Larry Cotter and members Dave Benson, Julie Bonney, Shane Capron, Tony DeGange, Doug DeMaster, John Gauvin, Sue Hills, Terry Leitzell, Chuck McCallum, Matt Moir, and Beth Stewart. Bill Wilson attended as NPFMC staff. Denby Lloyd attended as an ADF&G representative.

Bill Wilson reviewed a possible timeline for taking the measures this committee develops through the Council review, public review, and regulation implementation process. NMFS asked the committee to develop one action for NMFS review. This action would contain a suite of measures with supporting documentation and rationale; Cotter and Wilson agreed to take what the committee recommends, develop a draft package, and circulate it to the committee for review and approval. This draft amendment proposal package will then go to the Council for review at their October meeting, and if approved, will be forwarded to NMFS for review and informal consultation on protected resources issues. The committee may meet again to review NMFS comments, if necessary. The proposed amendment package would then be developed by NMFS into an Environmental Assessment, possibly by February 2004, possibly as late as April 2004. After Council review and then public review, the Council would review the final package in June 2004 for final approval. The amendment package would then proceed through the NMFS noticing, regulation writing, and implementation process. If the above proceeds as anticipated, measures approved in the above process would be effective for the 2005 fishing season.

Proposal Review Process

Cotter recommended that the committee first conduct an initial review of each proposal for clarity and to allow the committee to ask questions. NMFS reminded the proposers that the proposal should consider that changes in wSSL protection measures are a zero sum process. If changes are proposed to allow fishing in previously closed protection areas, then the proposal should suggest a closure at another site that would compensate

[1] Steller sea lions discussed in these minutes are the western population and are designated wSSL. When used, SSL refers to the combined western and eastern populations.

for the proposed action, with a net effect that is of approximately the same magnitude as the proposed action.

Beth Stewart expressed concern that this approach may be difficult to follow because of the uncertain linkage between wSSL declines and fishing activities, particularly regarding whether fishery removals of pollock and cod are a factor. She noted that communities in the GOA are suffering economic hardships, and some villages are seeing human population declines because of poor local economic conditions. Stewart noted that in the western Gulf, the few remaining eastern Aleut peoples are leaving villages to seek better economic conditions elsewhere. Fishermen are frustrated when they see population declines in Gulf communities while some wSSL rookeries and haulouts are experiencing increasing numbers of animals.

Doug DeMaster acknowledged that there are no widely accepted criteria for determining when the wSSL population has returned to a level of abundance that this population can be delisted under the Endangered Species Act. He noted the difficulty in determining at what point we go under the bar of jeopardy and adverse modification. Shane Capron also noted that the recent rebound of wSSLs in parts of the Gulf may be due to the fishing restrictions that are in place, and this gives some support to not relaxing these measures prematurely when we may be achieving success.

Julie Bonney noted that there are two main issues in the set of proposals before the committee: 1) a set of proposed openings of areas closed as wSSL protection measures, and 2) several apportionment and fishing season measures. Bonney asserted that in some cases, relaxing wSSL closures in some areas might have small effects on wSSLs because of other layers of fishing restrictions that would remain unchanged. She noted that industry in the central GOA primarily wants a change in how Pacific cod is allocated. Two possible approaches exist: either for fishermen to have access to more quota earlier in the fishing season, or to apportion Pacific cod quota by gear type.

The committee discussed further the process for reviewing proposals, and what kind of metrics might be used to judge the merits of each proposed action. Without a BUMP analysis, what other tools might the committee use? Cotter suggested that some of this will require a qualitative screening, perhaps using a 0 to 10 scale for evaluating impacts on wSSLs and a similar 0 to 10 scale for how the proposed action benefits fishermen. DeMaster noted that probably the most important issue to wSSLs is the 0 to 10 n mi zone; telemetry data show a strong affinity to the 10 n mi zone around haulouts and rookeries. Areas outside of 20 n mi probably are of much less concern to wSSLs (in terms of fishery harvest of prey).

Terry Leitzel recommended that the committee proceed with a reasoned review of proposals, and not worry too much about legal challenge or the potential for NMFS consultation on the package the committee develops. Let the science guide the committee actions, and if this takes us beyond the zero sum process, the committee should consider submitting such a package for NMFS review and consultation, even formal consultation if necessary.

John Gauvin cautioned that as the committee attempts to compare geographic areas as to their value to SSLs, the committee should remember that catch statistics do not provide a complete picture of sea lion prey availability. CPUE data indicate where fish have been caught, yes, but only where fishing effort has occurred. Many areas of the Gulf are not fished because of rough bottom conditions and other reasons; thus there are no CPUE data for such areas, even though they may provide habitat for fish – fish that are important to SSLs. This may confound the committee's ability to reasonably evaluate geographic area countermeasures to some of the proposals because of the lack of CPUE data in some areas – areas that may be good foraging habitat for wSSLs.

The committee recognized the limitations and constraints as discussed above. But agreed to press forward with a review. Fifteen proposals were submitted. The following is a recap of the committee discussions of each.

Proposal Review – Round One

Proposal # 1 Remove the requirement for quarterly two-week pollock trawl fishery stand-down periods (between the A and B seasons and between the C and D seasons) in the GOA. The seasonal TACs would still be allocated as they are currently. This measure would allow fishermen more fishing time, and would eliminate some of the costs in gearing up repeatedly over the year. Bonney noted that if CPUEs are high, however, a "stand down" might still occur between some seasons anyhow (fishermen would take the TAC allocation before the next season started). But fishermen desire to remove this regulation because it would give the fleet the flexibility to optimize fishing effort, and would enhance safety (would give more fishing time to the fleet and thus the choice to avoid periods of poor weather conditions). The Aleutians East Borough supports this measure. Initial NMFS reaction is that this would be a "sea lion neutral" measure that would not adversely affect wSSLs and likely could move forward. [Note: this proposal also has pollock TAC rollover consequences, but these were addressed with in the NMFS Proposal # 9.]

Proposal # 2 Allow pollock trawl fishing to 10 n mi near Marmot Island. Other fishing restrictions around Marmot Island would remain as is. A proposed countermeasure would be to close to directed pollock trawl fishing in an area of comparable size around Sea Otter Island. The effect of this proposal is to allow access to fishing areas that are close to Kodiak, which is of particular importance to smaller vessels, and to restrict fishing around a known wSSL haulout at Sea Otter Island. The proposal also suggests including the proposed fishing around Marmot Island in any future adaptive management experiment on fishing effects on wSSLs.

Capron expressed concerns that wSSLs are still declining at Marmot (the 1991 – 2000 decline is significant [p=0.10]). DeMaster noted that recent pup counts at Marmot Island increased between 1998 and 2002; however, it was too early to infer whether this represents an increasing trend in pup production at this rookery. Also the level of fishing at Sea Otter Island is currently unknown, and the tradeoffs between the two might not be

comparable. The committee noted that because of the size of geographic area that would be included in the proposed closure at Sea Otter Is, this could possibly provide some protection for wSSLs that forage near Marmot. DeMaster reminded the committee of a major research effort ongoing at Marmot; additional fishing closer to shore could impact those efforts. The committee noted that this proposal would still preserve a closure from 0 to 10 n mi, the area that is most important to wSSLs according to telemetry data.

Proposal # 3 Change the P cod seasonal TAC apportionment in the GOA to either a 60-20-20 or an 80-20 scheme. The AEB supports this measure. Bonney noted that GOA fishermen would prefer an apportionment that more closely reflects the fishing regime that existed before the current SSL protection measures. DeMaster noted that part of the reason for the current 60-40 split is to ensure that large amounts of cod are not removed during the winter months, a period of importance to weaning wSSLs. Capron also noted that concentrating fishing early in the year is part of what NMFS called jeopardy on several years ago, and the 60-40 split helped remove the jeopardy determination. She suggested that, if the proposed 80-20 split option wouldn't be acceptable, the proposed alternative with a 60-20-20 split might be a good compromise, preserving the 60% TAC harvest in the first part of the year thought to be important to weaning wSSLs. Stewart stated that this split would put fishing effort in proportion to the availability of cod, which are aggregated during winter months.

DeMaster noted that it could be argued that trawling disperses fish, making fish harder for sea lions to forage. Capron added that in recent years, NMFS managers have found it difficult to maintain the desired split, resulting in fishery harvests that have been closer to 75-25 which negates the desired 60-40 split recommended in the BiOp. NMFS desires to retain the 60-40 split, particularly because the State water fishery also is removing cod during the first season. NMFS' proposal (# 10) is to revise regulations to ensure that the TAC split returns to harvests that are closer to the desired 60-40 scheme. Thus proposals # 3 and # 10 are somewhat in opposition to each other.

Gauvin noted that a gear split of TAC in the GOA would go a great distance in relieving some of industry's concerns. The committee hopes that the Council will include gear allocations in the Gulf Rationalization process (see next proposal).

Proposal # 4 Fast track implementing a provision for allocating P cod by gear type and sector. This would enable industry to work out among themselves an optimal means of harvesting cod, with benefits to small Gulf communities and still preserving the goal of spreading out harvest. The committee noted that this proposal might be beyond our scope of work, but that the committee strongly endorses this as a necessary positive step the Council should take in improving fishing conditions in the GOA. The committee asks the Council to expeditiously move forward with Gulf Rationalization, in phases if possible, and do TAC splits among gear types and sectors first to provide economic relief to stakeholders as soon as possible.

Proposal # 5 Allow pollock trawl fishing at the Puale Bay haulout to 3 n mi from January 20 to June 10 and to 10 n mi from June 10 to November 1. A countermeasure is to close

to pollock trawl fishing more area at Cape Douglas (Shaw Island) – i.e. close the area out to 20 n mi. Industry feels this is a major safety issue; Shelikof Strait is dangerous, especially in winter and particularly for small vessels, and by allowing fishing closer to Puale Bay, vessels do not have to venture further offshore. Some on the committee speculated that this proposal offers a larger area as a countermeasure than the size of area proposed to be opened at Puale Bay. NMFS noted that the tradeoff, in terms of protection of sea lions, might not be equal (in the other direction) because of the significance of the decline at Puale and that fewer wSSLs may haul out at Cape Douglas.

Proposal # 6 Open to 3 n mi pollock and P cod trawl fishing in the closed area around Cape Chiniak. As a countermeasure, close more area around Latax Rocks (out to 20 n mi). This proposal would preserve the seasonal closure that is part of the NMFS fishing experiment in the Chiniak area should funding be restored for this work. Capron noted a strong concern that additional fishing within the Chiniak foraging area could adversely affect sea lions. Bonney stated that this proposal gives back to fishermen a previously important fishing area close to Kodiak, an area that has been part of the bread and butter of the Kodiak economy. Furthermore, Bonney noted that diet studies in this area suggest sea lions consume many fish species, including pollock, and thus fishing may not have a serious impact on wSSL diets near Cape Chiniak. Cotter asked if there aren't similar numbers of sea lions at both Chiniak and Latax, making this a comparable trade-off. Capron noted that Chiniak has historically supported larger numbers of wSSLs.

[The committee then discussed at length the process to be used for judging these proposals. Without a BUMP analysis tool, it is difficult to determine the merits of competing proposals. Capron suggested that a tool could be constructed using area, prey density, wSSL counts and trends, etc. Some on the committee expressed frustration over how to weigh different features of these proposals. And the committee asked: should historic high counts of wSSLs at rookeries and haulouts be used as some kind of benchmark, more heavily weighting sites that had historic high counts and weighting less those sites where historic counts were lower?]

Proposal # 7 Change the way incidental catch of P cod is calculated in those fisheries that target other species of groundfish. The committee noted that a large amount of hook and line and trawl fishing occurs between directed P cod seasons in the GOA, and with these fisheries comes a moderate incidental catch of P cod, thereby reducing the amount of TAC remaining for pot fisheries. Pot fishermen suffer the consequences since the entire B season TAC can be taken as bycatch in fisheries targeting species other than cod. The proposal suggests using observer data to calculate actual bycatch rates as a replacement for the currently established MRAs for these fisheries.

The committee discussed the difficulty in calculating "natural" bycatch rates because of the lack of comprehensive observer coverage in the Gulf. The committee also acknowledged that the proposal suggests an alternative – provide for sector splits of TAC for P cod in the Gulf. This is part of the Council's Gulf Rationalization efforts, which the SSLMC endorses and again asks that the Council move forward expeditiously to provide

for more rational fisheries in the Gulf. Stakeholders recommend a gear and sector TAC split measure as soon as possible.

Proposal # 8 Reduce the closures around Kak and Sutwik Islands to allow pot P cod fishing to 3 n mi. Provide as a countermeasure larger wSSL protection zones around Chirikof Island (to 40 n mi) and Kilokak Rocks (a new closure, to 20 n mi). Stewart noted that a closure at Kilokak Rocks might be of concern to some fishermen using this area now. The committee discussed that if too large an area were opened at Kak and Sutwik, vessels from other areas could move in and negate the desired effect of this proposal – i.e. to provide more fishing opportunity close to Chignik for local fishermen. DeMaster stated that the proposed countermeasure for closing more area around Chirikof would not likely help sea lions. Benson suggested that an alternative might be to reduce the size of the proposed open areas, perhaps limiting the proposal to Kak only.

Proposal # 9 Change the regulations on pollock rollovers. This would help fishermen take the entire allocated TAC; a more efficient fishery would result. But NMFS is asking industry for a preferred way of doing the rollovers. Discussion of the proposed options seemed to suggest a preference for rolling over unused TAC from one region into the remaining open areas in proportion to the projected biomass in those regions (as estimated by the Plan Teams at the beginning of each year). NMFS desires to do the rollovers in a manner to solve two problems: 1) to allow fish to be caught in some proportion to where they are thought to be distributed, and 2) to do the rollover so as to not contravene the intended allocation scheme currently in place.

Proposal # 10 Revise regulations to allow managers to ensure that P cod harvests in the GOA are closer to the desired 60 % in the A season. This would modify the current management process that in recent years has resulted in P cod harvests being closer to 75 % in the A season. The proposal would count P cod harvest taken after June 10 (the end of the A season) but before September 1 against the TAC for the B season. The committee noted that this proposal is the same issue addressed in a competing proposal - # 3. Galen Tromble reviewed how inseason managers account for P cod by season. The committee then discussed at length various options for changing the P cod fishing seasons in a manner that would benefit fishermen yet accommodate the intent of the sea lion measures (that cod harvests not be concentrated early in the year). Stewart suggested using the proposed three-way split outlined in Proposal # 3: a 60-20-20 split with the seasons set as January 1 to March 31, April 1 to August 31, and September 1 to December 31.

Gauvin noted that the real solution to this issue would be embodied in Gulf Rationalization. The committee asked that the Council move forward with a gear split now as in initial measure in the overall Gulf Rationalization process.

Proposal # 11 This proposes several measures to improve groundfish fishery management in the GOA including fast tracking the Council's Gulf Rationalization process, discouraging topping off of P cod in other directed fisheries (including reducing the MRAs for P cod in other GOA fisheries and minimizing P cod discarding), re-

evaluating the P cod seasonal allocation scheme and NMFS' management of harvests in these seasons, and ensuring that all gear types are equally bearing the impacts of the sea lion protection measures in the GOA.

The committee noted that all of these proposed measures are, in one way or another, being addressed in other proposals before the committee and that they will be addressed in these other proposals.

Proposal # 12 Change the seasonal fishery for pollock in Area 610 to an A and B seasonal apportionment with 50 % of the TAC in each season, not quarterly as prosecuted currently. Fishermen now harvest the TAC in this area very quickly because of high abundance of pollock. Allowing more TAC in the first part of the year would benefit local fishermen. NMFS is concerned that such an apportionment scheme would allow too large a harvest of pollock early in the year, which contradicts the intent of spreading out harvests to improve wSSL foraging opportunities.

Proposal # 13 Allow increased cod pot fishing at Chernabura Island to 3 n mi. NMFS noted that this is already provided for in current regulations. The proposal was subsequently withdrawn.

Proposal # 14 Allow fishing close to Castle Rock. To effect this, NMFS would have to open a portion of the SSL closure around Atkins Island because the Atkins closure overlaps Castle Rock. The intent is not to allow fishing near Atkins, but to facilitate fishing near Castle Rock. Fishermen desire to fish to the beach at Castle Rock with jig and pot gear, and to trawl to within 3 n mi of Castle Rock.

Proposal # 15 Allow pot fishing to the beach at Caton Island. NMFS noted that this is now provided for with a recent change in regulations. This proposal was subsequently withdrawn.

Metrics for Proposal Evaluation

Cotter recommended that a small group of SSLMC members meet to develop ideas for how to measure the biological impacts of each of the proposals before the committee. DeMaster suggested using the Experimental Design Subcommittee as the core of this group, with others from the committee joining in as desired. A small group met during the afternoon of August 27, and from this effort a rating sheet was developed. The rating sheet included these metrics: pup and nonpup wSSL counts and trends; area affected by the proposal (in the 0-3, 3-10, 10-20, and beyond 20 n mi zones); would the proposal affect a rookery or a haulout; availability of food habits and telemetry data; target and nontarget fish harvest in area. The full committee recommended also including consideration of the economic value to fishermen and communities of the proposed measure.

The full committee discussed how to evaluate proposals that do not involve changing SSL protection area but rather address allocational or apportionment issues. A primary

measure is how closely would the proposed measure retain the desired TAC split recommended in the BiOp. The committee also questioned evaluating proposals based on the highest ever-recorded wSSL counts; are these counts relevant? Capron noted they give a measure of the potential of a site for supporting sea lions. Considerable committee discussion focused on this issue. Discussion included concerns that these counts were conducted by various agencies and under various conditions, possibly compromising their comparability. Some counts could have been errors.

Sue Hills noted that the review process could be considered "filtering" the proposals for their neutrality to wSSL concerns. The committee felt that this process also must include weighing the potential economic impact of a proposal, since this is the primary charge to this committee from the Council.

Stewart noted that wSSLs were routinely intentionally killed in the 1950s through the 1970s and 80s in the Gulf; when shooting was prohibited in the early 1990s, the dynamics of the wSSL population likely changed. Stewart felt that recent rookery and haulout counts likely have been greatly influenced by the historic intentional kills. It is likely that some (much) of the wSSL decline could be attributed to intentional shooting by fishermen who viewed this as a means to protect fish catches and fishing gear.

The committee heard a brief report from Martin Dorn and Anne Hollowed about the GOA pollock stock assessment. The assessment is not complete. Considerable data are being evaluated, including data from a new Gulf-wide summer acoustic survey in 2003 as well as the recent Gulf summer 2003 bottom trawl surveys and the winter 2003 Shumagin Islands and Shelikof Strait acoustic surveys. Dorn noted that these surveys are not additive, and some overlap of signal return occurs between acoustic surveys and bottom trawl surveys. These concerns are being factored into the pollock stock assessment process.

Experimental Design Subcommittee Report

At its June meeting, the SSLMC reviewed the NRC committee's report on the SSL decline in Alaska. During that meeting, the committee tentatively concluded that such an experiment would be very difficult to conduct given the large number of uncertainties and factors that could be influencing SSLs and the potentially significant obstacles to such an experiment because of the Endangered Species Act. The SSLMC formed an Experimental Design Subcommittee to further evaluate the NRC committee's recommendations and to report back to the SSLMC with some recommendations. DeMaster reported that the Experimental Design Subcommittee has developed a draft Request for Proposals that could be released by the Council. The RFP would call for interested scientists to propose to develop a design for an adaptive management experiment that would rigorously test how fishing affects wSSLs. The National Research Council's committee recommended such an experiment. The objective of this procurement would be to see if members of the scientific community at large might have innovative approaches or other perspectives on this issue. The subcommittee recommends that sufficient funds would need to be allocated by the Council to this effort

so that the proposed project would attract quality proposals. The RFP would spell out what data are available, and would reference the National Research Council's report on the decline of SSLs in Alaska. The subcommittee also noted that there would be flexibility in the RFP for bidders to suggest various kinds of studies that would look at effects of fishing on SSL prey.

If the Council releases the RFP, DeMaster suggested that the SSLMC or its Experimental Design Subcommittee could review the proposals. DeMaster noted that if the RFP were released in December 2003, proposals could be reviewed by Spring 2004 and perhaps the work could be completed by the end of 2004 or early 2005.

The SSLMC suggested a few changes to the draft RFP. DeMaster indicated he would finalize the draft and obtain subcommittee reviews so that it could be presented to the Council at their upcoming October meeting (concurrent with the SSLMC's proposed amendment package developed from among the proposals reviewed at this meeting).

The SSLMC urged the Council to support continued and adequate funding for NMFS to continue the Chiniak/Barnabas pollock fishery/wSSL study.

Proposal Review – Round Two

Cotter summarized the status of the proposals and suggested how the committee could proceed back through the proposals to make their recommendations. Cotter suggested the proposals be grouped as follows:

Proposals that have been withdrawn or set aside: # 4, 7, 11, 13, and 15
Proposals that are approved and will be supported by the committee: # 1
Proposals that are tentatively supported but require more discussion: # 9
Proposals that require more review: # 2, 3, 5, 6, 8, 10, 12, and 14

Cotter then suggested that the proposals still under consideration be lumped into categories:

Proposals that deal with geographic area openings/closures: # 2, 5, 6, 8, and 14
Proposals that address the pollock season: # 12
Proposals that deal with a P cod TAC split: # 3 and 10
Proposals that deal with the pollock rollover: # 9

The second review of proposals was organized around the groupings listed above, starting with # 12.

<u>Proposal # 12</u>

Stewart presented some of the issues associated with the Gulf pollock fishery in Area 610. Pollock have been abundant in the area and fishermen can take the TAC fairly quickly. To be more economically efficient, fishermen would prefer a 50/50 % TAC seasonal apportionment. Pollock roe is of highest quality early in the year; with 50 % of the TAC allocated to the period when roe is of high quality, this could provide more economic return to the region. Another option would be a 50/25/25 % apportionment with the A and B seasons combined, leaving the C and D seasons with 25 % each. The committee reviewed catch statistics for 610 and discussed pollock roe quality as it relates to season and area and economic value of Area 610 versus other areas. Some concerns were expressed by NMFS over the potential effects of a combined A and B season; if, in the future, pollock were not as abundant in 610 yet 50 % of the TAC were still taken from a single season, this could perhaps compress the harvest; the current SSL protection measures seek to spread out the harvests over time. This proposal was subsequently withdrawn.

Proposal # 8

Discussion of this proposal centered on the countermeasures proposed at Chirikof Island and Kilokak Rocks. Closing the fishery beyond 20 n mi at Chirikof would be of little additional benefit to wSSLs, and the population of wSSLs at Kilokak is small and not of major concern to NMFS. There may be some difficulty tracking the harvest in some areas; electronic logbooks could help. DeMaster suggested an alternative: open just the western portion of the proposed area around Kak Island. This is closest to Chignik and is a fairly small area, and would likely not have a major effect on wSSLs. McCallum noted this might be suitable, although Chignik fishermen were looking for a larger area opened at Kak and Sutwik. DeMaster noted that the wSSL population at Kak is a haulout and numbers appear to be stable. McCallum clarified that the requested Kak open area would be for jig and pot P cod fishing only; since jig fishing is already permitted, the request is for pot fishing only. Stewart noted that such an opening would likely not draw many fishermen from other areas. Other discussion focused on how to develop an appropriate offsetting closure to compensate for an open area at Kak; closures at Kilokak and Ikolik were discussed. DeMaster suggested that with an open area on the west side of Kak, perhaps the offset could be a closure to pot fishing offshore from Kilokak to 10 or 20 n mi, noting that either might result in pot fishermen giving up more than they would be gaining. The consensus was to only open Kak to 3 n mi for P cod pot fishing, and the offset would be to close Kilokak to 10 n mi for P cod pot fishing.

Proposals 2, 5, and 6

These proposals deal with proposed open areas at Marmot Island, Cape Chiniak, and Puale Bay, in order of importance to Kodiak fishermen (Marmot is desired the most). These proposed open areas are also in order of concern to NMFS (Marmot is of most concern). Capron pointed out the telemetry data available at Marmot and the apparent heavy use of the area by wSSLs. Capron stated NMFS' preference would be to not change measures at Cape Chiniak. Capron suggested looking at the proposed closure at Sea Otter Island as an offset for a change at Marmot. To open fishing to 3 n mi at Puale

Bay, industry proposed closing more area at Cape Douglas; Capron suggested a closure around the Cape Ikolik haulout as an offset rather than enlarging Cape Douglas. Matt Moir noted the importance of Ikolik to Kodiak area fishermen, and suggested looking at Kilokak as a pollock fishing area offset.

Proposal # 2 (Marmot opening) was discussed further. NMFS and the proposers suggested a compromise: drop the request for P cod fishing. Allow trawling for pollock around Marmot in the A and B seasons to 10 n mi (in the C and D seasons this would revert back to 20 n mi). Increase the closed area around Sea Otter Island from 10 to 20 n mi in the A and B seasons.

Proposal # 5 also was discussed further with the following compromise tentatively reached: Proceed with the proposed opening at Puale and allow trawl pollock fishing to 3 n mi January 20 to June 10 only (status quo after that). Close Cape Douglas/Shaw Island January 20 to June 10 to pollock trawl fishing out to 20 n mi, reverting to status quo after that.

Proposal # 6 was withdrawn.

Proposal # 14

The proposal seeks to have the closure around Atkins Island modified such that fishermen can fish around Castle Rock (which is currently closed because of the overlap of the Atkins closure). The committee discussed how this might be effected. Stewart noted the proposal includes allowing fishing to the shoreline for pollock, but DeMaster stated this would be a difficult measure to get approved as it would set a major precedent (allowing trawling to the beach at a wSSL haulout). The committee reached a tentative compromise to open a wedge in the current closure at Atkins so that cod trawl fishing can occur from 3 to 10 n mi on the Castle Rock side of Atkins; also, pot gear could be used within 3 n mi at Castle Rock. The committee proposed to let NMFS and local fishermen design an appropriate shape and size of the wedge in the Atkins Island closure to provide for the proposed cod trawl fishery.

Proposals # 3 and 10

These proposals were reviewed as a group, all dealing with P cod apportionment. Cotter reviewed the issues around changing the apportionment of P cod TAC in the Gulf to a 60-20-20 scheme, and recounted some of the past history of P cod apportionment in the Bering Sea. Cotter thought that there was not a biological concern with a 60-20-20 split in the Bering Sea and suggested this might be an acceptable scheme for the Gulf as well. Cotter offered the following: apportion the remaining TAC (after a bycatch set-aside for other fisheries): 60 % to March 31, 20 % April 1 to August 31, 20 % from September 1 to October 31 (for trawl gear; to December 31 for fixed gear). Under this scheme, Cotter noted that there would be no trawl fishery in November and December, a period in early winter when cod may be beginning to aggregate, which is also a period of importance to SSLs that feed on aggregating cod schools. Capron noted that NMFS' goal was to limit

the catch in the first half of the year to roughly 60 % of the TAC, which would require a change to Proposal # 3 that allowed no directed P cod fishery in the second season (April 1 to August 31). The committee discussed the issues around having a second season as bycatch only versus bycatch plus a directed fishery. Galen Tromble suggested that regardless how the second season is defined, in reality it probably would be a bycatch only fishery with the possibility of a small directed fishery if permitted, but that a directed fishery would likely be fairly limited. The committee noted that fishermen need to know in advance if a season is to be directed or bycatch only so they can plan effectively. Cotter suggested that perhaps a biomass trigger could be added, such that if cod stocks were high, a directed fishery could occur in the second season, and if low, NMFS could make it a bycatch only second season. The committee tentatively agreed to forward this proposed scheme, but with two sub-options for the second season: bycatch only, and bycatch plus a directed fishery. Later in the meeting the committee felt the proposal should be forwarded to the Council and NMFS with a second season directed fishery with the TAC limited to 20 %, acknowledging that some or most of this second season TAC would be for bycatch. The Committee is also forwarding NMFS' Proposal # 10 as well along with the modified Proposal # 3 as two possible options.

The committee again noted the importance of rationalization in the Gulf. A sector split for these fisheries would greatly alleviate some of these concerns. The committee also expressed some frustration because Gulf Rationalization may be many years in the future, and some of these economic hardships to Gulf communities and fishermen need resolution now.

The committee also discussed the issue of P cod MRAs and topping off with cod in other directed fisheries. Should the MRA for P cod in some of these fisheries be lowered? The issues around setting MRAs are complex and require more analysis before adjustments might be proposed. The Council's IR/IU Committee is working on this issue.

Proposal # 12

This proposal was withdrawn.

Proposal # 9

The committee suggested that NMFS proceed with a pollock TAC rollover scheme that apportions left-over TAC in an area to the next season, first to the area from which it came, and any additional underharvested TAC to the other areas in proportion to the estimated biomass for those areas for that year.

Amendment Package

Cotter and Wilson agreed to develop a draft proposal package that summarizes the intent discussed in the above and circulate this to the committee members for review and comment. An approved draft amendment package will then be presented to the Council

at their October meeting. (The schedule for processing the amendment package is provided earlier in these minutes.)

Next Meeting

The SSLMC has not scheduled a meeting at this time. Chairman Cotter will notify members if/when such a meeting is called.

For questions or comments, contact Bill Wilson (bill.wilson@noaa.gov) at the NPFMC, 605 West 4th Avenue, Suite 306, Anchorage, AK 99501. Phone: 907-271-2809, FAX: 907-271-2817.

COUNCIL REVIEW DOCUMENT

Proposal to Amend Regulations Implementing the Fishery Management Plan for Groundfish of the Gulf of Alaska

Exempt Groundfish Fishing Vessels from Fishing Restrictions in Four Steller Sea Lion Rookery or Haulout Protection Areas and Increase Protection Areas Around Four Additional Steller Sea Lion Haulouts

and

Change Regulations for Groundfish Total Allowable Catch Apportionment, Pollock Rollover Procedures, and Pollock Fishery Stand-Down Periods

Date:	October 2003
Lead Agency:	National Marine Fisheries Service Alaska Regional Office Juneau, Alaska
Responsible Official:	Jim Balsiger, Alaska Regional Administrator
For More Information contact:	Susan Salveson, National Marine Fisheries Service Melanie Brown, National Marine Fisheries Service

INTRODUCTION

In April 2003, the North Pacific Fishery Management Council instructed its Steller Sea Lion Mitigation Committee (SSLMC) to examine the existing Steller sea lion (SSL) protection measures in the Gulf of Alaska. The purpose of this review was to develop a proposed suite of measures to change the SSL protection measures in the Gulf that could provide economic relief to Gulf groundfish fisheries and local communities. These measures were to include, if practicable, components of an adaptive management experiment recommended by the National Research Council's committee report on the SSL decline in Alaska.

The SSLMC met several times during May through August, and at its August 27-28, 2003 meeting approved a group of proposed changes to the Gulf of Alaska groundfish fishery SSL protection measures. These proposed changes are summarized in this document. The Council is requested to make a preliminary review of the SSLMC's proposed measures, and approve this package for review by the National Marine Fisheries Service (NMFS). If approved by the Council, NMFS would conduct an informal consultation as required by the Endangered Species Act and determine if these measures can be evaluated in an Environmental Assessment (EA). If necessary, the SSLMC would meet with NMFS to modify the proposal based on the NMFS review. The proposed changes would then be developed by NMFS into an EA/RIR/IRFA which would be presented to the Council at its April 2004 meeting. After public review of the Council-approved amendment package, the Council would take final action on the package in June 2004. Regulations implementing any approved measures would be in effect for the 2005 fishing season.

BACKGROUND

The SSLMC reviewed proposals for changes in regulations in the Gulf of Alaska groundfish fisheries. A variety of proposals was received, many of which proposed relaxing fishing restrictions around certain SSL haulouts or rookeries, while others proposed changes in fishing seasons, TAC apportionment, and other measures that affect how the fisheries are prosecuted. The committee grouped the proposals into two types: those that proposed changing geographic area restrictions and those that proposed changing other kinds of regulations. For those proposals asking for changes in sizes of SSL protection areas, the committee used a zero sum process. This process involved recommending a countermeasure to the proposed change that would provide a similar level of protection to SSLs in a nearby area. For the other proposals, the committee attempted to preserve the intended seasonal apportionment of groundfish quota to spread out harvests in time and area.

The objectives of the committee's recommended changes in Gulf fishing regulations are to provide for access to fisheries while (1) maintaining protection for the western distinct population segment (DPS) of SSLs (i.e., avoid jeopardy to the western DPS of SSL or result in the destruction or adverse modification of its critical habitat), and (2) avoid unnecessary burdens on the fishing industry. NMFS advised the committee that any changes to the Gulf groundfish fisheries must not erode Steller sea lion protection measures in order to provide economic benefits to the fishing industry without having reasonable mitigation measures (such as other closure areas).

The committee was assisted in its deliberations by NMFS scientists and legal and regulatory experts. The committee also was provided economic and biological data including information on SSL counts and trends at haulouts and rookeries in the Gulf, SSL telemetry data, groundfish fishery catch statistics by area and sector, killer whale counts, and general reference materials on SSL biology.

Fifteen proposals for changes in Gulf fishing regulations were received and reviewed by the SSLMC. This group of proposals was reduced in number through a process of data analysis, committee

debate, and compromise, all of which included consideration of impacts on SSLs. The committee approved seven proposals.

PROPOSED REGULATORY CHANGES AND RATIONALE

The committee presumes that NMFS must review these proposed regulatory changes in terms of their potential adverse impacts on SSLs. NMFS also will review these measures in light of the Steller sea lion protection measures supplemental environmental impact statement (SSL SEIS) (NMFS 2001a) and the associated draft and final biological opinions and the 2003 BiOp Addendum. Further, NMFS also will conduct an informal consultation on these actions. The objective of the NMFS review is to determine that the implementation of the preferred alternatives would fall under the umbrella of actions that have already been analyzed and comport with both the ESA and NEPA. The committee presumes that analysis of the alternatives will conclude that the alternatives considered in the EA would have incremental effects that are sufficiently minor on the spatial and temporal harvest of groundfish so as to not deviate from the conclusions of the cumulative impact assessment presented in the SSL SEIS.

Implicit in this package of proposed measures to change fishing regulations in the Gulf is a No Action alternative. The EA/RIR/IRFA prepared for the proposed suite of measures would include a status quo/no action/baseline alternative for each measure that proposes a change in fishing regulations

The following are the measures recommended by the SSLMC for implementation in the Gulf groundfish fisheries.

1. Open to groundfish fishing additional area around three GOA Steller sea lion haulouts and one rookery, and close to groundfish fishing areas around four GOA Steller sea lion haulouts.

A. Open the closed area around the Marmot Island SSL rookery to 10 n mi for pollock trawling during the A and B seasons. All other fishing restrictions around Marmot Island remain as is. Close the area around the SSL haulout on Sea Otter Island to 20 n mi to pollock trawling during the A and B seasons.

Background

Gulf pollock fishermen have traditionally fished around Marmot Island. Currently the area around Marmot Island is closed to the pollock trawl fishery to within 15 n mi of the island's SSL rookery. This proposal seeks to provide pollock trawl fishing opportunities to within 10 n mi of the Marmot rookery. As a countermeasure the proposal includes closing to the pollock trawl fishery an extended area around the Sea Otter Island SSL haulout to 20 n mi (currently closed to 10 n mi). The opening at Marmot and closure at Sea Otter would be only during the pollock A and B seasons.

Rationale

The SSL closure measures instituted under the SSL protection measures have adversely impacted trawl fisheries in the Central Gulf by closing fishing grounds that local vessels have traditionally fished. The closure has forced these vessels further offshore. This has created some economic hardships because of longer distances traveled.

Also, the Marmot closure has created unsafe fishing conditions. During the 2002 and 2003 A and B seasons, more than 30 vessels fished along the 15 n mi closure line, resulting in tangled gear in the

open strip between the Triplets and Spruce Island. Relaxing the closure around Marmot Island would provide fishermen some economic gain and improve safety. The additional closure at Sea Otter Island would provide additional SSL protection for animals using that haulout.

B. Open the closed area around the Puale Bay SSL haulout to 3 n mi for pollock trawl fishing during January 20 through June 10. All other fishing restrictions around Puale Bay remain as is. Close the area around the Cape Douglas/Shaw Island SSL haulout to 20 n mi to pollock trawling during January 20 through June 10.

Background

Gulf pollock fishermen have traditionally fished the area in and around Puale Bay on the west side of Shelikof Strait. The Puale Bay area is currently closed to the pollock trawl fishery to within 10 n mi of the island's SSL haulout. This proposal seeks to provide pollock trawl fishing opportunities to within 3 n mi of the Puale haulout. As a countermeasure the proposal includes closing to the pollock trawl fishery an extended area around the Cape Douglas/Shaw Island SSL haulout to 20 n mi (currently closed to 10 n mi). The opening at Puale and closure at Cape Douglas/Shaw would be only during the January 20 to June 10 fishing season.

Rationale

The SSL protection measures at Puale Bay have adversely impacted fishermen in the central Gulf by closing fishing grounds that local vessels have traditionally fished. The closure has forced these vessels further offshore, which has not only created some economic hardships because of longer distances traveled, but also has fairly serious safety issues as well. Fishermen would benefit from fishing closer to the bay during periods of harsh weather that is often experienced in the Shelikof Strait area.

The trawl fleet is having difficulty meeting the pollock quota apportioned to Area 620 (Chirikof). Fishermen note that there is a large spawning biomass in the 3 to 10 n mi zone around the Puale haulout that would benefit the fleet fishing in Area 620. The additional closure at Shaw Island (Cape Douglas) would provide additional SSL protection for animals using that haulout.

C. Open the closed area around the Kak Island SSL haulout to 3 n mi for Pacific cod pot fishing. All other fishing restrictions around Kak Island would remain as is. Close the area around the Kilokak Rocks SSL haulout to 10 n mi to Pacific cod pot fishing.

Background

Fishermen from the Chignik area are unable to fish for Pacific cod using pot gear within 20 n mi of several haulouts and rookeries in this region because of the current SSL protection measures. In effect, most of the cod fishing areas near Chignik are closed. This proposal seeks to open an area around the Kak Island SSL haulout to Pacific cod pot fishing to 3 n mi. As a countermeasure, a closure to Pacific cod pot fishing is proposed to 10 n mi offshore from the Kilokak Rocks SSL haulout.

Rationale

The small boat fleet at Chignik and adjacent areas is unable to effectively participate in the pot Pacific cod fishery near port because of the current SSL closures, particularly around Kak and Sutwik Islands. This has caused some adverse economic impact on local fishermen and the Chignik

area communities. Fishermen in this area traditionally fished around Kak and Sutwik and other nearby areas, and opening even part of this currently-closed area would provide the flexibility for the local fleet to shift to the Federal Pacific cod pot fishery when other fishing opportunities are unavailable. Fishermen believe that by providing even a small opportunity for a local cod pot fishery would have a large positive economic impact on Chignik, surrounding area communities, and local fishermen. Since only a few fishermen would likely fish in this newly opened area, and only with pot gear, the impacts on SSLs would likely be minimal, and more than offset by the proposed countermeasure.

Implementing a closure to pot fishing in an area around the SSL haulout at Kilokak Rocks would afford more protection to SSLs using this haulout. Currently, Kilokak is unprotected under the SSL protection measures.

D. Open an area around the Castle Rock SSL haulout to the shoreline for Pacific cod pot fishing. An alternative action is to open an area near Castle Rock from 3 to 10 n mi to cod trawl fishing. Changing the SSL protection measures around Atkins Island, which Overlaps Castle Rock, would effect this latter opening. Also, to implement this latter measure, allow NMFS discretion to design an enforceable open area that is equivalent to a wedge or approximately a quarter circle north of Atkins Island (preserving the 0 to 3 n mi closure at Atkins Island).

Background

Sand Point area Pacific cod pot fishermen have traditionally fished the area near Castle Rock. Castle Rock is currently closed to any fishery within 3 n mi of the island's SSL haulout. This proposal seeks to provide for a Pacific cod pot fishery within 3 n mi and to the shoreline, where practicable.

An alternative measure desired by local fishermen is to provide an area near Castle Rock for Pacific cod trawl fishing. Because the current SSL protection measures require a 0 to 20 n mi closure to cod trawl fishing around Atkins Island, this closure overlaps the area around Castle Rock. Several methods could be used to describe an open area for cod trawl fishing around Castle Rock, including delineating a wedge in the Atkins closed area on the north side of Atkins, with the sides of the wedge tangent to the circle describing a 0 to 3 n mi closure (to cod trawl fishing) around Castle Rock.

Rationale

Because of the unique bathymetric features around Castle Rock, fish tend to occur very near shore, and fishermen traditionally fished up to the beach in some areas around Castle Rock. But this area is now unavailable to the local cod pot fleet because of the 3 n mi closure around Castle Rock. Sand Point fishermen would benefit economically from the opportunity to fish cod at this site. Since only a few vessels would likely participate, impacts on the SSL population at the Castle Rock haulout would likely be minimal.

Similarly, fishermen from the Sand Point area are unable to fish for Pacific cod using trawl gear in a previously fished area around Castle Rock. While Castle Rock itself is not specifically closed outside of 3 n mi to cod trawl gear, the area south of Castle Rock is effectively closed because of the 0 to 20 n mi closure for cod trawl gear around Atkins Island. Providing fishing opportunity in this area would give needed economic relief to cod fishermen living in communities in this area, particularly small vessel fishermen. An area open to fishing near Castle Rock would also be a safety measure since fishermen would have an option during poor weather conditions to fish closer to port.

2. Amend regulations implementing the GOA groundfish FMP to provide changes in procedures for Pacific cod TAC apportionment and pollock TAC rollover in the Pacific cod and pollock fisheries, and eliminate the required stand-down periods between seasons in the pollock fishery.

A. This proposal has two options: 1) Change the season dates and apportion the annual Pacific cod TAC in the GOA so that 60 % of the TAC can be fished in the A season (January 1 through March 31), 20 % in the B season (April 1 through August 31), and 20 % in the C season (September 1 through November 1 for trawl gear, September 1 through December 31 for fixed gear). This recognizes that in the B season, Pacific cod TAC would be first apportioned to non-Pacific cod directed fishery bycatch needs, with the remainder of the B season TAC, if any, apportioned to a B season directed Pacific cod fishery. Or 2) Retain the current season dates and apportionment but change regulations so that 60 % of the Pacific cod TAC in the GOA (both directed cod fisheries and cod bycatch in other fisheries) is taken in the A Season (January 1 through June 10). Between-season harvest of cod TAC (bycatch in other fisheries) would be subtracted from the B season TAC.

Background

Two problems have been observed that are the consequences of the current Pacific cod seasons and TAC apportionment scheme. One, NMFS has been unable to precisely manage the directed cod fishery harvests such that only 60 % of the TAC is taken in the A season; in recent years the A season harvest has been closer to 75 %. A second problem is that in recent years, Gulf cod fishermen have experienced a *de facto* reallocation of the cod TAC among gear groups because of several issues (see below).

To mitigate these problem areas, it is proposed that two options be considered. Option 1 would specify that the Pacific cod fishing season periods, and the TAC apportioned to each, would be changed so that, after a set-aside for bycatch in other fisheries, 60 % of the TAC is harvested in an A season (January 1 through March 31), 20 % in a B season (April 1 through August 31), and 20 % in a C season (September 1 through October 31 for trawl, through December 31 for fixed gear). Option 2 would retain the *status quo* seasons and apportionments but change regulations to allow NMFS to manage the fishery to limit the A season harvest to 60 % of the annual TAC.

Rationale

The above changes in fishing season dates and TAC apportionment would still provide for a temporal spread in the harvest of Pacific cod, which is the intent of the SSL protection measures in the Gulf. Under Option 1, the A season would be shorter, but would be provided a 60 % TAC apportionment, and part of the "early season" needs of foraging SSLs would still be met by the closure of the cod trawl fishery in November and December, winter months when cod start aggregating and become more available to foraging SSLs.

Currently, the SSL protection measures include a provision for temporally spreading the Pacific cod catches in the Gulf such that no more than 60 % of the annual TAC is harvested early in the year (during the A season which is January 1 [nontrawl] or January 20 [trawl] through June 10). The remaining 40 % of the TAC can be taken during the B season from June 10 through November 1 [trawl] or December 31 [nontrawl]) with a directed fishery occurring on September 1. NMFS Sustainable Fisheries generally closes the cod A season around the beginning of March because the

60 % of the TAC is harvested by then; but cod are taken as bycatch in other fisheries from then until the B season starts, and this bycatch is considered part of the A season cod harvest. The result is an A season cod harvest well over the target 60 % level. Option 2 would change this so that NMFS could manage the fishery to limit the harvest to 60 % in the A season.

Fishermen have noted that there has been an increase in the hook and line fleet fishing for Pacific cod in the Central Gulf because cod CPUEs have been higher than in areas to the east, thereby attracting vessels to areas where catch rates are higher. Also cod prices have been higher in recent years, which has increased cod trawl fishing effort in the A season. Also the annual TAC for cod has decreased 43 % for 2002 compared with quotas during 1995-1999; this has resulted in an increase in the percentage of cod quota reserved to meet bycatch needs in other fisheries. These changes have resulted in a decrease in fishing opportunity for fixed gear, and within the fixed gear group there has been a greatly reduced opportunity for pot fishermen.

By adjusting the fishing seasons (Option 1), and the apportionment of TAC into each season, fishing effort would likely occur in proportion to the availability of aggregated cod (early in the year). The A season would be closed by NMFS when the directed catch plus bycatch amounts from other fisheries reach the 60 % target, which currently occurs around the beginning of March. It is likely that a small amount of TAC would be available in the B season (anticipated bycatch needs for other fisheries could use most, if not all, of the B season TAC). Option 2 would provide NMFS management authority to maintain the 60 % cod TAC harvest in the A season as specified in the SSL 2001 BiOp.

B. Remove the two-week stand-down period periods between the A and B seasons and between the C and D seasons in the GOA pollock trawl fishery. Allow continuous fishing from the A season into the B season (and from the C season into the D season) until either the quarterly TAC is reached in the A season (and C season) or the B season (and D season) ends.

Background

Regulations require fishermen to stop fishing for pollock for two weeks (a "stand-down") between each of the four (A,B,C,D) seasons. These periods of no fishing are inefficient and are causing economic hardships to the fleet, particularly in Area 620. NMFS indicates there is no SSL conservation issue in removing the stand-down periods. This proposal asks that the two-week stand-down requirement between the A and B seasons and between the C and D seasons be removed.

Rationale

By removing the current stand-down provision, fishermen could fish continuously from the A season through the B season. Fishing also could occur from the C season through the D season. Fishermen would not be required to stop at the end of the A season (and the C season), reducing the economic costs of returning to port and then gearing up again two weeks later.

C. Change the method for rolling over underharvested pollock TAC in the Western/Central Regulatory Areas in the GOA pollock trawl fishery. Roll over any unharvested TAC within the same region and up to the 20 % limit of the seasonal apportionment so that any unharvested TAC apportioned to an area may be further rolled over into the remaining open areas in proportion to the projected pollock biomass in those areas (as estimated by the Plan Teams at the beginning of each year).

Background

An adjustment is needed in the method used to roll over underharvested pollock TAC to subsequent seasons. Currently industry does not always have the full opportunity to harvest the available TAC in the Western and Central Regulatory Areas in the Gulf. A new method is suggested that would provide for the above opportunities, and would also ensure that the seasonal harvest of TAC is in proportion to the estimated amounts of biomass occurring seasonally in an area.

Rationale

Current regulations state that the underharvest of pollock in the Gulf may be rolled over "provided that any revised seasonal apportionment does not exceed 30 % of the annual TAC apportionment for a GOA Regulatory Area". This language does not account for the use of biomass projections to establish seasonal apportionments by Regulatory Area, as intended by the SSL protection measures. By restricting TAC apportionment to a GOA Regulatory Area, NMFS managers are given less flexibility in distributing the underharvested pollock TAC to subsequent seasons.

A recommended method for rolling over unused TAC would first limit the amount of TAC that could be rolled over to 20 % of the seasonal apportionment in that area as specified in the final harvest specifications. The amount that could be rolled over into the next season would be applied to that same area such that the combined quota is less than 120 % of the seasonal apportionment to that area. Any amount over that limit would be apportioned to other areas in the W/C Area in proportion to the estimated seasonal biomass for those areas – with a maximum amount available in any one quarter for all areas combined limited to 30 % of the annual quota.

EXPERIMENTAL DESIGN

At its June meeting, the SSLMC reviewed the NRC committee's report on the SSL decline in Alaska. During that meeting, the committee tentatively concluded that such an experiment would be very difficult to conduct given the large number of uncertainties and factors that could be influencing SSLs and the potentially significant obstacles to such an experiment because of the Endangered Species Act. The SSLMC formed an Experimental Design Subcommittee to further evaluate the NRC committee's recommendations and to report back to the SSLMC with some recommendations.

The Experimental Design Subcommittee subsequently developed a draft Request for Proposals that could be released by the Council. The RFP would call for interested scientists to propose to develop a design for an adaptive management experiment in the GOA that would rigorously test how fishing affects wSSLs. The National Research Council's committee recommended such an experiment. The objective of this procurement would be to see if members of the scientific community at large might have innovative approaches or other perspectives on this issue. The SSLMC acknowledges that sufficient funds would need to be allocated by the Council to this effort so that the proposed project would attract quality proposals. The RFP would spell out what data are available, and would reference the National Research Council's report on the decline of SSLs in Alaska. It was also noted that there would need to be flexibility in the RFP for bidders to suggest various kinds of studies that would look at effects of fishing on SSL prey.

If the Council releases the RFP, the SSLMC or its Experimental Design Subcommittee could review the proposals. If the RFP were released in December 2003, proposals could be reviewed by Spring 2004 and perhaps the work could be completed by the end of 2004 or early 2005.

The SSLMC notes that one experimental design program at Chiniak/Barnabas has ceased due to a lack of funding. The committee believes this is an extremely important experiment and should be continued. The SSLMC urges the Council to support continued and adequate funding for NMFS to continue the Chiniak/Barnabas pollock fishery/wSSL study.

GULF RATIONALIZATION

Not unexpectedly, the implementation of wSSL protection measures has had significant effects upon the fishing industry. These range from higher operating costs to dramatic changes in the harvest ratios among gear types, components and vessel size categories. Implementation of wSSL protection measures in the Bering Sea were substantially easier to design and implement given the rationalization that exists in the Bering Sea. Again and again the SSLMC was stymied in its ability to concurrently address the needs of the industry and protection of wSSLs in the absence of rationalization.

One of the proposals received and reviewed by the committee was to fast track a provision for allocating P cod by gear type and sector. This would enable industry to work out among themselves an optimal means of harvesting cod, with benefits to small Gulf communities while still preserving the goal of spreading out the harvest. The committee noted that this proposal is beyond its scope of work, but the committee strongly endorses this as a necessary positive step the Council should take in improving fishing conditions in the GOA. The committee asks the Council to expeditiously move forward with Gulf Rationalization and include TAC splits among gear types and sectors.

Map Attachments to "Proposal to Amend Regulations Implementing the Fishery Management Plan for Groundfish of the Gulf of Alaska"

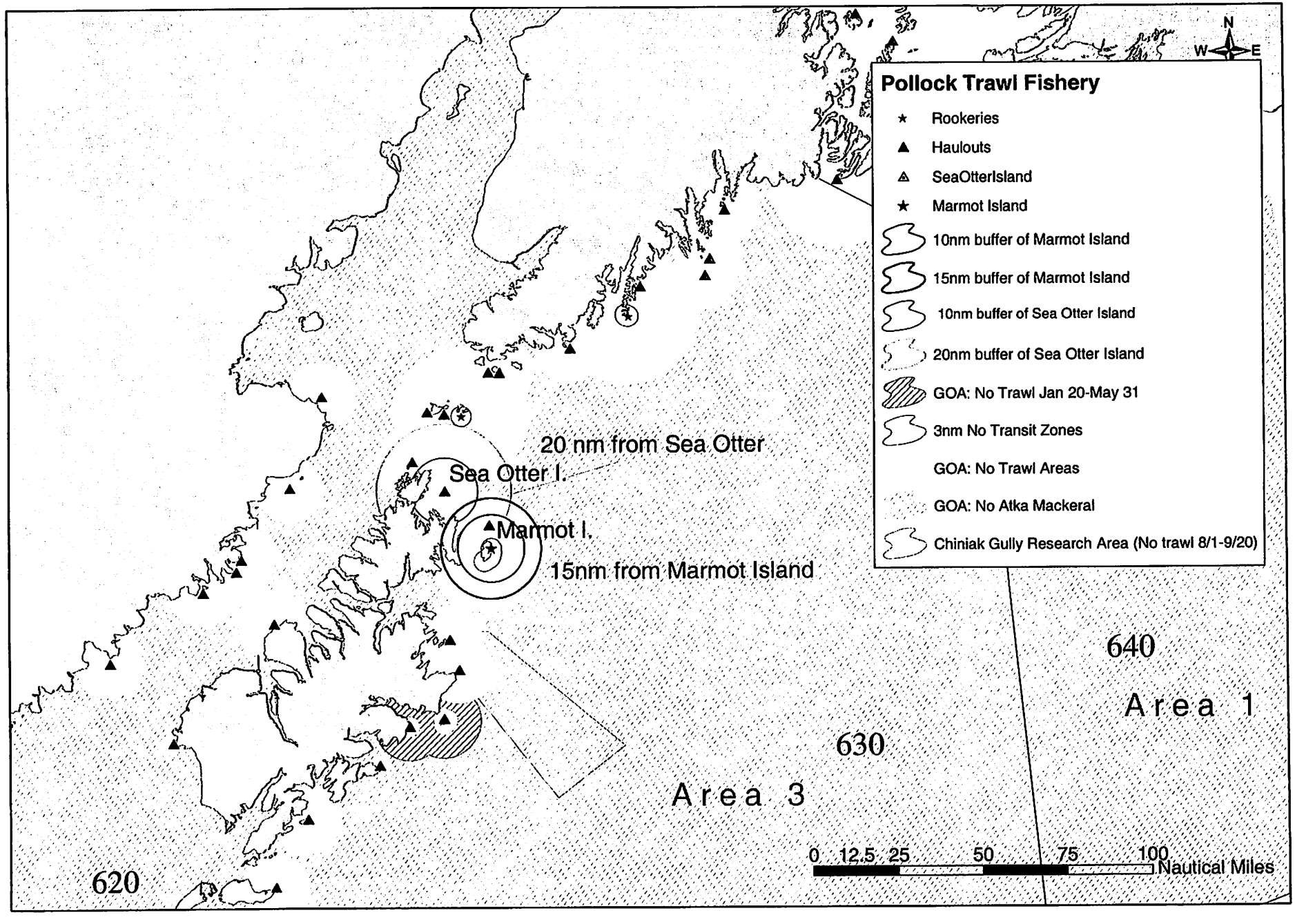
Steller Sea Lion Mitigation Committee
October 2003

Five maps are attached:

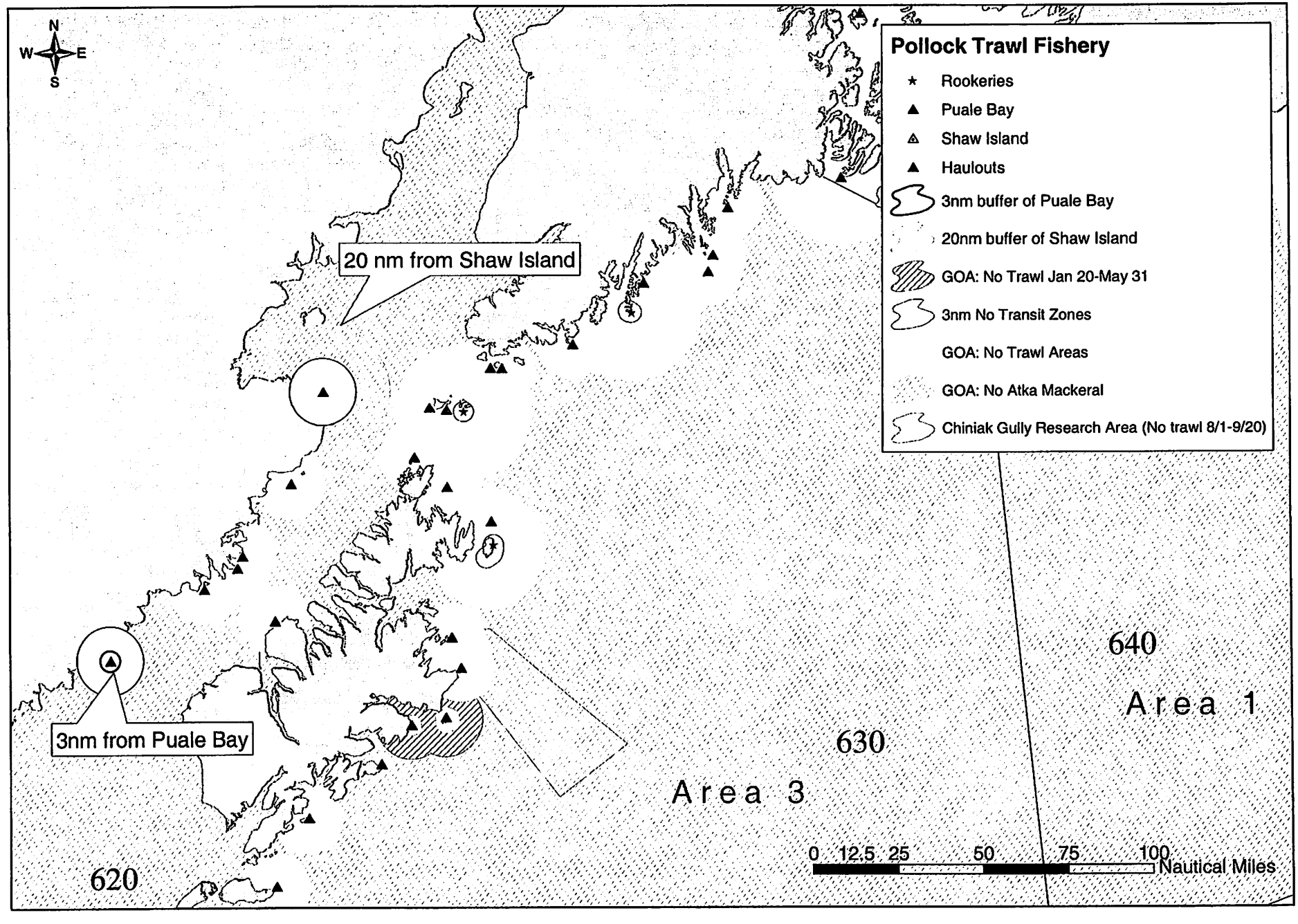
1. Proposed Regulatory Change 1a:. Marmot Island rookery/Sea Otter Island haulout
2. Proposed Regulatory Change 1b: Puale Bay haulout/Cape Douglas-Shaw Island haulout
3. Proposed Regulatory Change 1c: Kak Island haulout/Kilokak Rocks haulout
4. Proposed Regulatory Change 1d: Alternative 1 - Castle Rock haulout
5. " Alternative 2 - Castle Rock haulout/Atkins Island rookery

These maps are reference materials for Agenda C-5, Item C-5(e).

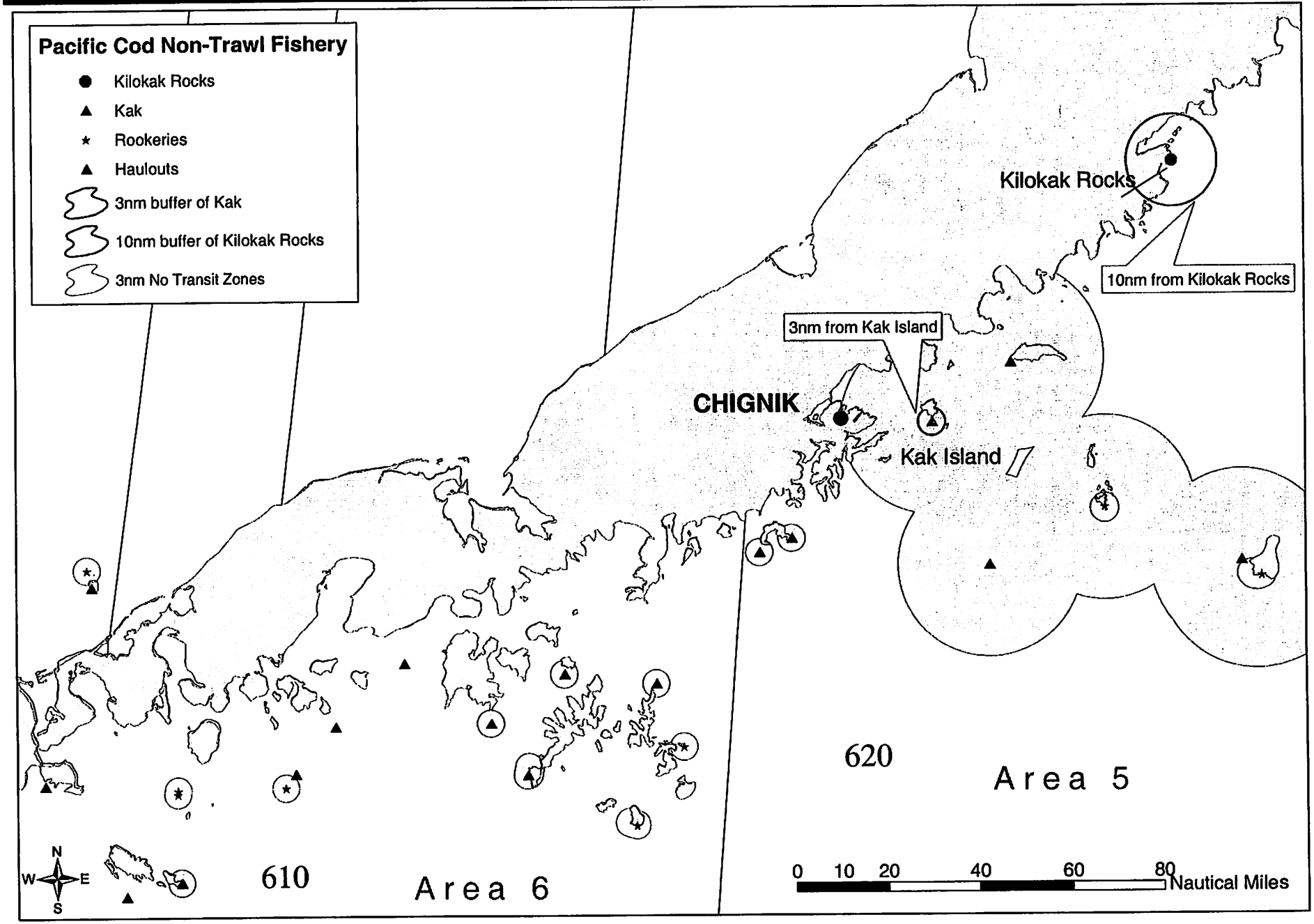
Marmot Island Proposal



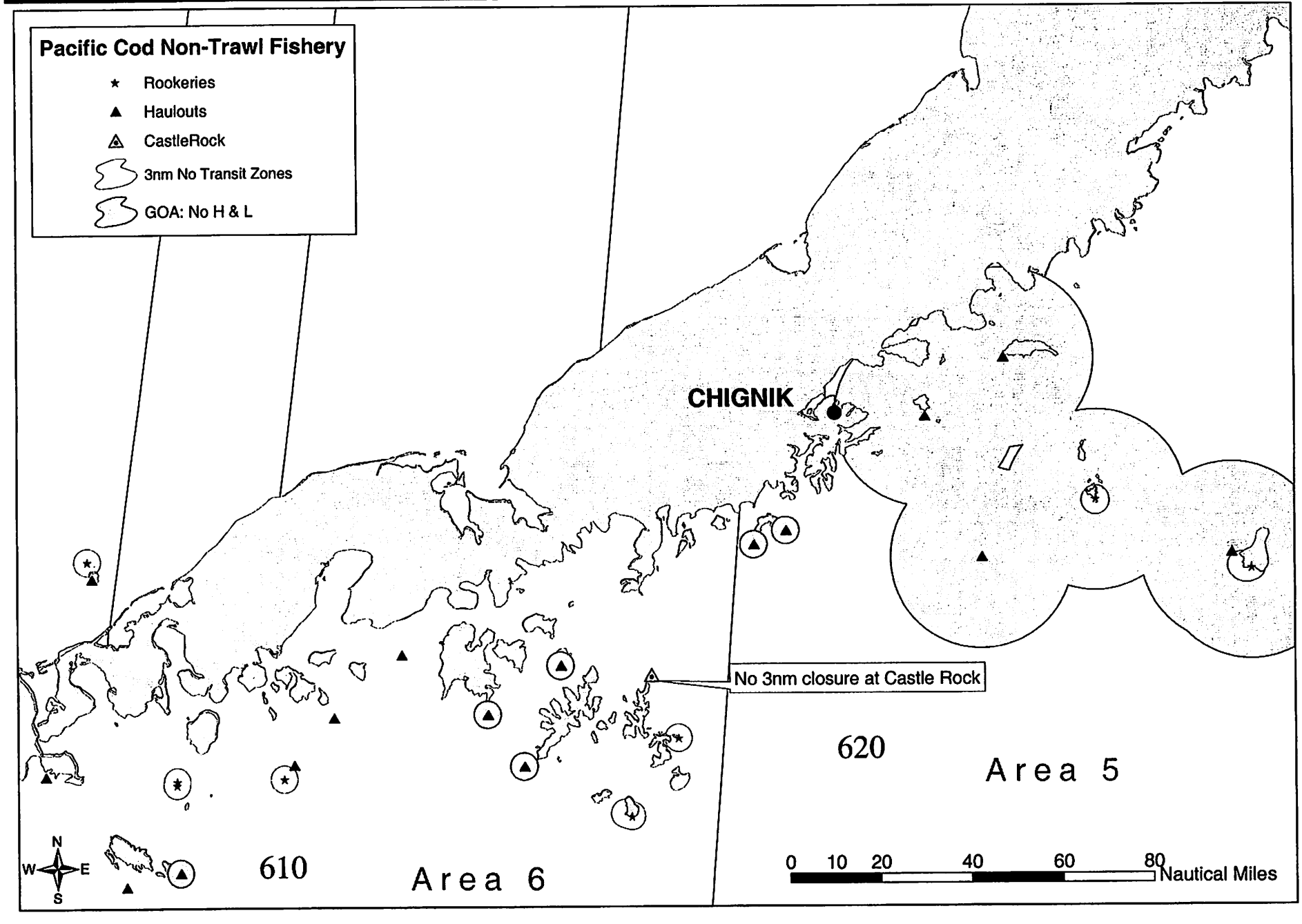
Puale Bay Proposal



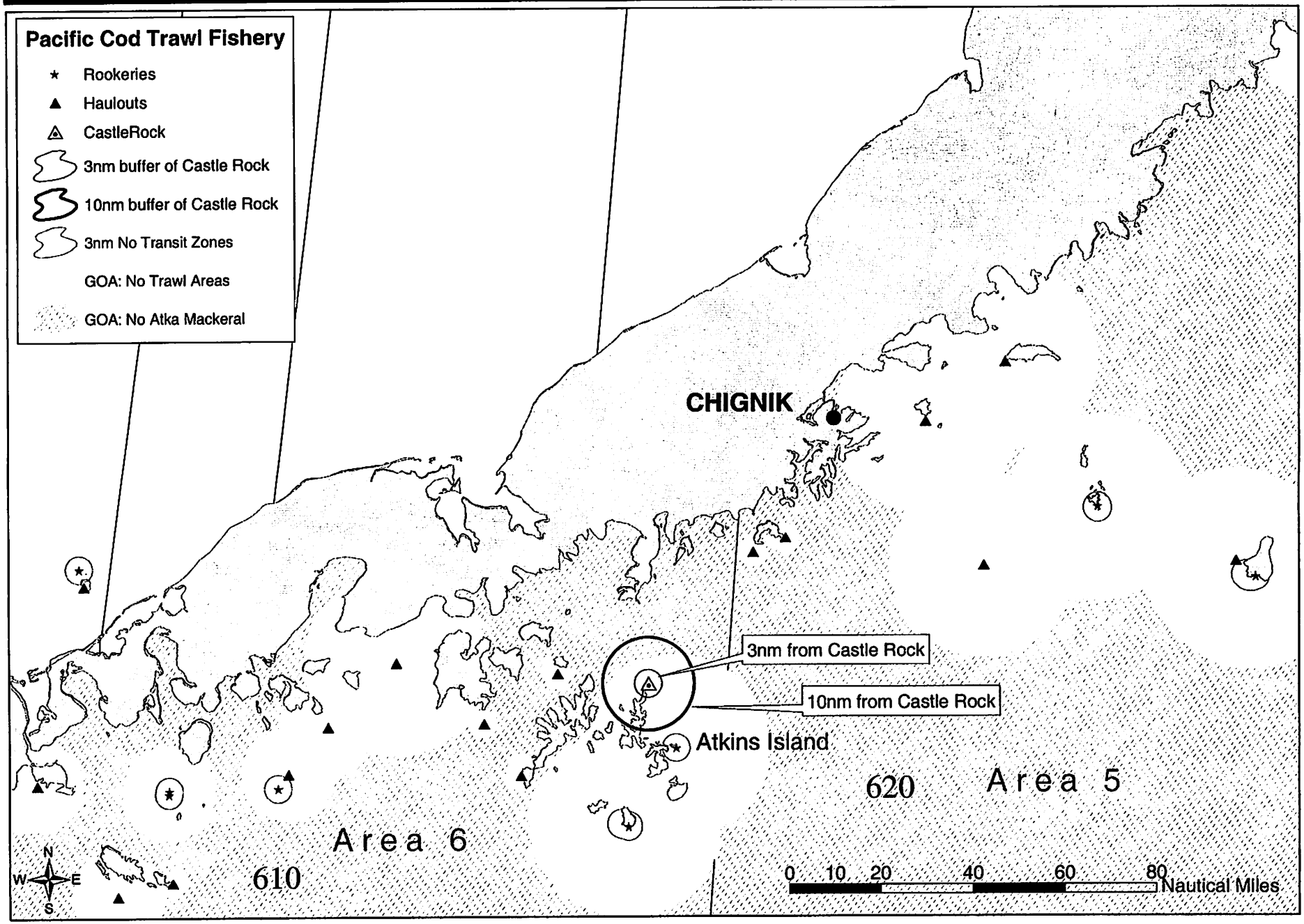
Kak Island Proposal



Castle Rock P. cod Pot Proposal



Castle Rock P cod Trawl Proposal



PUBLIC TESTIMONY SIGN-UP SHEET FOR AGENDA ITEM C-5 SSL

	NAME (PLEASE PRINT)	AFFILIATION
1	Beth Stewart	AEB
2	Julie Bonney	AGDB
3	Chuck McCallum	Lyles & Pen.
4	Craig Cochran	MTC
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NOTE to persons providing oral or written testimony to the Council: Section 307(1)(I) of the Magnuson-Stevens Fishery Conservation and Management Act prohibits any person " to knowingly and willfully submit to a Council, the Secretary, or the Governor of a State false information (including, but not limited to, false information regarding the capacity and extent to which a United State fish processor, on an annual basis, will process a portion of the optimum yield of a fishery that will be harvested by fishing vessels of the United States) regarding any matter that the Council, Secretary, or Governor is considering in the course of carrying out this Act.