Minutes: Twelfth Meeting of the Alaska Scientific Review Group
1-3 November 2000

This document is intended to summarize the main points of discussion at the 12th meeting of the Alaska Scientific Review Group. The document does not attempt to repeat everything that was said during the meeting.

1. Introduction

The 12th meeting of the Alaska Scientific Review Group (AKSRG) was held at the Federal Building in Juneau, Alaska from 1-3 November 2000. The objectives of this meeting were to 1) review new information on Alaska harbor seal stocks, 2) review U.S. Fish and Wildlife Service/U.S. Geological Service – Biological Resource Division issues, and 3) provide comments on the draft Stock Assessment Reports (SAR) for 2001. The draft agenda was reviewed and approved. The final agenda is provided in Appendix 1 and the list of participants is provided in Appendix 2. A list of documents provided to the AKSRG prior to and during the meeting is provided in Appendix 3. Appendix 4 contain copies of documents provided during the meeting that provide additional details not included in the minutes. Lloyd Lowry chaired the meeting and Robyn Angliss served as rapporteur. Lloyd Lowry agreed to chair the AKSRG during 2001.

2. Review of new information on Alaska harbor seals

One of the main objectives of this meeting was to review new information on Alaska harbor seals. To this end, the AKSRG meeting was attended by several staff involved in harbor seal research from the National Marine Mammal Laboratory (NMML), the Southwest Fisheries Science Center (SWFSC), and the Alaska Department of Fish and Game (ADF&G)

2.1 Harbor Seal Research Plan

K. Brix (NMFS) provided a brief summary of the Harbor Seal Research Plan, which was developed by the AKR, NMML, SWFSC and ADF&G staff in 2000. This Plan provides a summary of the AKR, NMML, SWFSC and ADF&G harbor seal research that is ongoing or planned for the immediate future. This plan will be a working document, which will be revised as research results become available or as priorities change.

2.2 Regional trends in harbor seal abundance

2.2.1 University of Alaska

B. Matthews (University of Alaska) provided a summary of recent harbor seal trends in Glacier Bay, Alaska. Harbor seals in Glacier Bay haul out on different types of substrates: 2/3 of the harbor seals in Glacier Bay are in Johns Hopkins Inlet and haul out on glacial ice, and the remaining harbor seals are located near the mouth of Glacier Bay and use terrestrial haulouts. These differences in haulout substrate necessitate different types of surveys in different areas.

Seals hauled out on glacial ice are typically counted from a high point near the glacial face; repeated counts from these elevated sites are within 10-20% of each other when observers have prior experience. Comparisons between shore-based counts and those made using large-format aerial photography indicate that corrected shore-based counts are only 9% lower than counts made from aerial photographs.

Based on research conducted since 1992, there has been a ~50% decline in harbor seal numbers in Glacier Bay. Potential causes for the decline include seal behavior (due to changes in the amount of time in the water or due to emigration), population dynamics (reduced births, reduced survival), or both. At this time, Matthews is trying to determine what is causing the decline in harbor seals.

One hypothesis is that there has been a change in the Glacier Bay ecosystem, and that this is driving a change in either seal behavior or a change in the population dynamics of the local seal population. Evidence for a change in the ecosystem includes a decline in the black legged kittiwake and murrelet populations and a decline in the numbers of harbor porpoise seen in the area. All of these species have some reliance on small schooling fish. J. Piatt began looking into the prey base in Glacier Bay in 1999.

One complicating factor in determining the cause of the decline is a recent increase in the number of harbor seal pups. This may be due to an observer bias (observers are more experienced so are "better" at finding/counting pups).

2.2.2 Alaska Department of Fish and Game

Historically, ADF&G has flown "trend routes" to evaluate trends in local harbor seal abundance. This approach was initiated by K. Pitcher; selection of most trend sites was based primarily on logistics (i.e., a trend route was selected based on how many haulout sites you could effectively survey in a 4 hour window). The aerial survey methods are very straightforward. Counts of haulout sites are made either visually or by photographing haulouts and making counts at a later date. Each haulout site on a trend route is surveyed 5-7 times each year. Researchers record whether there is either a known or possible disturbance that could have influenced the number of seals counted.

Analyses of trend route data indicate that harbor seal stocks have different population dynamics in different parts of Alaska. There is strong evidence based on the Ketchikan and Sitka trend routes that the harbor seal population in Southeast Alaska is stable or increasing, with the exception of the seals in Glacier Bay (see section 2.2.1). Since the confidence interval associated with the increasing Ketchikan trend estimate is quite narrow, ADF&G began surveying the Ketchikan trend route on a biennial schedule in 1997. Similarly, evidence from the Kodiak trend route indicates that the harbor seal population in that area increased 5.6% annually during 1993-1999. ADF&G established a trend route in Broistol Bay in 1998, and the route was surveyed again in 1999 and 2000. A preliminary comparison between the counts obtained during the 1995 NMFS abundance survey and the 1998 ADF&G trend survey indicate seal numbers have remained relatively stable, once the effect of survey date has been accounted for. A more

thorough trend analysis is planned for the counts collected during 1995-2000, that will account for other covariates known to influence the number of seals hauled out (e.g. time of day, tide), to provide a current population trend estimate for Bristol Bay.

It is common knowledge that the number of harbor seals hauled out will depend on a number of factors, including survey date, tidal height, and weather. Recent analyses of the different trend routes indicate that the effect of survey date may differ among routes. Haulout patterns also vary by weather, but this cannot yet be evaluated fully since ADF&G has only been collecting standardized information on weather for the past few years.

There are two ways to handle covariates when determining the trend in harbor seal abundance: 1) researchers can design the survey to eliminate covariate effects (e.g., always conduct the surveys in the exact same conditions), or 2) researchers can adjust for covariates after the survey by sampling across covariates and using this information to correct the numbers. ADF&G has developed statistical models to account for the effect of covariates on counts when estimating population trend. In theory, the trends at individual haulouts could be analyzed, but at this time there are not enough years of data to take this approach.

L. Jemison provided a summary of the land-based counts made on Tugidak Island in the Kodaik Archipelago and at Nanvak Bay in Bristol Bay. Daily counts conducted at Tugidak during both the molting and pupping periods show an increasing trend from 1994-99. At Nanvak Bay, counts during the pupping season have increased, while counts during the molting period have been stable. Both date and time of day have been found to be important covariates at both sites. In response to a question from a AKSRG member, Jemison indicated that there are some spotted seals in Nanvak Bay.

J. Ver Hoef provided a summary of his recent use of Bayesian hierarchical models to determine trends in harbor seal abundance. One major benefit of this approach is that covariates, trends, and abundance at each site within a survey route can be analyzed simultaneously. Ver Hoef has used this approach to look at the effects of covariates on abundance and trends at individual haulout sites and in an entire area. This analysis has shown that seals at each of 25 haulout sites in Prince William Sound (PWS) have different haulout patterns in terms of time of day, time of year, and time since low tide. Peak haulout in PWS is early in the day and the numbers of seals on haulout sites decrease as the day progresses. In contrast, the numbers of seals on Kodiak haulout sites increases as the day progresses.

B. Kelly questioned whether the peaks in abundance in PWS during the morning could be related to disturbance impacts in the afternoons. Lowry indicated that the haulouts with high numbers of seals are very remote, thus a disturbance effect in unlikely. However, there is a tendency for the morning low tides to be significantly lower than the afternoon low tides in PWS, which could explain why the numbers of seals are highest in the morning. It may not be possible to separate the effects of time of day and the tidal magnitude on seal abundance if these variables are correlated.

B. Kelly questioned whether there were any plans to combine the trend data from ADF&G with the population assessment data from NMML. Small and Bengtson indicated that, at this time, there are no plans to combine the data but that the methods used to collect the information are very similar so that the data could be combined in the future.

M. Adkison provided a summary of recent work to evaluate the current harbor seal survey design used by ADF&G and NMML. His approach uses data on harbor seal numbers and covariates in PWS to create a "real world" situation, then computer simulations are used to generate surveys. Preliminary results indicate that the number of years surveyed is important (more years of survey data result in more precise trend information) and that the number of replicates collected within a year is not as important as previously assumed. Simulations also indicate that it will not be possible to estimate covariates if all surveys are conducted either before or after the peak haulout period.

One participant noted that NMML has only 3 years of data per stock (Southeast, Gulf of Alaska, and Bering Sea) and questioned whether the survey should be structured so that some survey days are flown both before and after the peak. Ver Hoef indicated that this would not be a good approach; instead, surveys should be designed to occur during the peak and should extend for some period on either side of the peak in order to get information on covariates.

Simulations were also conducted to examine the impact of unknown covariates on the trend data. VerHoef found that if there is one unknown covariate that fluctuates randomly and a known covariate that has a trend, it is still possible to determine trends if you have collected many years of data. However, if you have a trend in an unknown covariate, you can still estimate trends but your estimate will be very biased.

Ver Hoef's draft report will be circulated to the AKSRG at a later date.

2.3 Range wide abundance estimates

2.3.1 Overview

J. Bengtson (NMML) provided a summary of the range wide aerial surveys and abundance estimates collected by NMML over the past 10 years. The goal of the program is to determine total harbor seal abundance for each of 3 stocks of harbor seals every 5 years. Counts of harbor seals are primarily collected using aerial surveys, although military assets may provide information on numbers of seals in some areas in the future. Abundance estimates are calculated from raw counts of harbor seals by correcting the counts using data on haulout behavior collected from radio-tagged harbor seals. In 2000, NMML staff tagged 32 seals in Nanvak Bay; this tagging effort resulted in a correction factor of 1.8, which is similar to correction factors determined for harbor seals in other areas of Alaska. One participant noted that the corrections factors are only for one site and are not necessarily representative of other sites. NMML staff agreed with this statement.

In addition to the efforts to develop range wide abundance estimates, NMML is involved in several other harbor seal-related projects, including disturbance at pupping/glacial sites, evaluating potential long-term study sites, and co-management activities w/Alaska Natives.

Recently, NMML staff have conducted covariate analyses of the 1996 survey in the Gulf of Alaska to determine how haulout behavior changes in response to tide height, time of day, weather, date, etc. The objective of this work is to determine an index of abundance that is corrected for "sub-optimal" survey conditions. Clearly, it would not be appropriate to correct aerial surveys using both covariate analyses and radio tagged animals.

Bengtson identified the pros and cons of using a radio-tag/mark-recapture approach vs a covariate analysis:

Radio-tag/Mark-recapture:

Pro: integrates environmental variables & seal behavior to estimate proportion of seals hauled out at one site

Cons: may not be able to get a representative sample of sex/age classes, or results from seals tagged at one site may not reflect broader haulout patterns

Covariate analyses

Pro: considers environmental influences at each haulout site to produce an index of abundance

Cons: difficult to account for the "missing increment" of seals which do not haul out every day; index represents a "optimum" haulout condition that is unlikely to exist in nature

NMML staff are also in the process of evaluating whether it would be useful to try to assess harbor seals in some areas using remote camera systems. A remote camera system may be useful for looking at inter- and intraseasonal patterns.

Bengtson indicated that the following NMML projects will occur in 2001: 1) complete covariate analyses on all 5 range-wide survey zones, 2) work on how to account for the "missing increment", and 3) produce estimates of range-wide harbor seal population abundance in time for inclusion in the draft SARs for 2002.

2.3.2 Covariate analyses of range-wide survey data

P. Boveng (NMML) provided a description of the results of covariate analyses conducted on the range-wide survey data. Boveng's approach is similar to that being used by others to analyze trend sizes; however, instead of having several years of counts of a few sites, Boveng is examining one year of surveys at many sites.

Preliminary results indicate the following:

When all Gulf of Alaska haulouts are considered, the peak haulout time occurs during mid day

The peak haulout date seems to occur during the first week of August, which is before the aerial surveys are flown

There are no apparent tidal effects on haulout behavior at ice haulout sites

Weather is a factor: counts are lower when it's raining, but there is no apparent effect of temperature

A low count at a haulout site due to disturbance may cause counts to be more variable if multiple counts are made of the same haulout site. The analysis may be compromised if a zero is recorded for a haulout where there should be 200 seals because the seals were scared off the beach. One AKSRG member indicated that it might be appropriate to eliminate any observations where there is evidence that animals have left a haulout site as a result of disturbance.

One AKSRG member questioned whether the counts in the GOA are likely to go up or down as a result of the covariates analysis. Boveng indicated that preliminary results of the covariate analysis support a correction factor of ~1.9. Since the preliminary results of the covariate analysis and the results of the radio-tagging work provide very similar correction factors, it suggests that the number of harbor seals not available to count on "optimum" days is pretty small.

One participant questioned whether there was an increase or decrease in the numbers of harbor seals at specific sites in the Gulf of Alaska between 1992 and 1996. Boveng indicated that a comparison between sites counted in 1992 and 1996 cannot be accomplished at this time because of the difficulty of ensuring that the sites are identical in both years.

Another participant indicated that, based on results from other researchers, the impacts of covariates are different in PWS versus in Kodiak, both of which are included in the Gulf of Alaska analysis. Boveng acknowledged that the NMML analysis averages the covariates throughout the Gulf of Alaska, and that local differences are not taken into account.

2.4. Harbor seal photo-id/mark recapture

B. Kelly indicated that as researchers collect more photographs, more resights of individual have occurred.

2.5 Observations on harbor seal haulout sites

L. Jemison provided a summary of the results of her study at Nanvak Bay and Tugidak, and B. Matthews provided a summary of her observations on the impacts of disturbance in Glacier Bay.

2.6 Telemetry studies

Results of several telemetry projects indicate that subadult harbor seals move greater distances than adults. Lowry et al. showed that adult seals did not move very far from PWS; in contrast, subadults sometimes moved further, but most subadults still spent the majority of their time near the haulout sites. Some individual harbor seals show fidelity to particular haulouts for up to four

years. Satellite tags on pups in PWS do not seem to last very long, which may indicate that pups have a high mortality rate.

2.7 Harbor seal genetics and stock identification

The SWFSC presented significant new information on harbor seal genetics. A brief summary of the findings follows; for additional details, refer to the documents provided prior to and during the meeting.

2.7.1 Background on molecular genetic analysis of population structure and a review of the history of this study

G. O'Corry Crowe and B. Taylor provided an overview of the use of molecular genetic analysis to describe population structure in Alaska harbor seals. Preliminary results presented are the result of a 6-year project carried out by O'Corry Crowe, R. Westlake-Storey, K. Martien, B. Taylor, D. Campbell, and A. Dizon, all from the SWFSC.

For background, there are two genetic markers that are of interest:

> mtDNA: maternally inherited (provides information on demographically relevant dispersal) and non-recombining (provides information on historical relationships)
> microsatellites – bi-parental inheritance (provides information on gene flow), highly variable (provides information on breeding behavior, pedigrees)

For population assessment and stock structure purposes, we essentially want to use genetics as a way to determine the level of demographic connectivity among sub-populations and ultimately estimate rates of dispersal between areas. There is an important difference in how evolutionary biologists and population dynamics biologists consider dispersal. Evolutionary biologists are primarily concerned about very low levels of dispersal because these are the conditions under which groups of animals can evolve independently. In addition, evolutionary biologists usually consider very large strata and simply want to know whether or not population structure exists. In contrast, population ecologists are concerned more about moderate levels of dispersal (e.g., > 1% per year) because these represent different degrees of demographic relationships among groups of animals and are of greatest relevance to the identification of management stocks. The exact rate of dispersal relevant to management will depend on management objectives and is a policy decision.

The harbor seal genetics sample collection spans the period of recent declines (1975-99) and 722 samples are available from 160 sampling sites, but there are still some geographical gaps in sampling.

2.7.2 Total evidence coalescent approach

There are at least two ways to approach the problem of dividing a continuously distributed population into discrete groups. G. O'Corry-Crowe described the approach used by himself and

R. Westlake-Storey as the "total evidence approach". Basically, this approach consists of the following steps:

> **Step 1** – define initial strata based on information on distribution, movements, and abundance
> **Step 2** – estimate the level of genetic differentiation
> - If groups of harbor seals are different at an alpha level of 0.05, population differentiation has occurred
> - If groups of harbor seals are not different at an alpha level of 0.05, (A) there may be no effective population differentiation, (B) the rate of dispersal is sufficiently high to make the detection fo "significant" differentiation difficult but still low enough to signify separate management units, or (C) the statistical power of the genetic data to detect underlying structure is low.
> **Step 3** – decide whether to combine strata where we failed to find genetic differences. This decision is based on the genetic findings andother corroborating evidence of relevance to dispersal. When the statistical power of the genetic study is low, more emphasis may need to be put on non-genetic evidence.

2.7.3 Hierarchical ranking

A second way to try to divide a continuously distributed population is through heirarchical ranking. This approach consists of the following:

> Step 1 – rank all potential boundary locations. Rankings are based on the differences between groups of seals
> Step 2 – estimate dispersal across putative boundaries (this has not yet been done)

Boundaries between groups of seals could then be selected based on a pre-determined number of desirable stocks (e.g., if the management goal was to have 10 stocks, one could select the 9 highest-ranking boundaries in order to define the 10 seal groups which are most different from adjacent groups). Alternatively, once the dispersal rates across boundaries are calculated, all boundaries for which dispersal is below some critical threshold rate could be retained in the definition of management stock.

One AKSRG member questioned how it was determined whether or not two areas were considered "adjacent". K. Martien responded that adjacency is determined entirely on the basis of the geographical relationships between areas and is somewhat subjective.

Another AKSRG member questioned whether this method would allow Glacier Bay and Copper River seals to be "lumped" if seals at Yakutat were different. K. Martien indicated that, because of geography, Glacier Bay, Copper River, and Yakutat would be considered separate groups if seals at Yakutat were different from those at the other sites.

This approach is somewhat sensitive to the number of seals sampled in adjacent locations. Sites with low sample sizes tend to cluster immediately with their neighbors because the evidence is insufficient to differentiate the groups.

2.7.4 Conclusions from analysis of mtDNA

B. Taylor indicated that, based on the mtDNA analyses, there is clearly population structure within the "Gulf of Alaska stock" of harbor seals. It is also clear that the seals at Tugidak Island are distinct from the seals in Prince William Sound.

Future research should be focused on those areas of immediate management importance.

2.7.5 Comments on power and sample size

In general, geneticsts are not interested in specifying power because this would require specifying an effect size, and geneticists are not traditionally interested in specifying the amount of differentiation they are willing to accept.

One's ability to detect population structure will be strongly influenced by the sampling regime and marker choice. The number of samples, the geographic coverage of the sampling regime, and the haplotypic diversity will affect our ability to detect population structure.

2.7.6 Analysis of population genetic structure in AK harbor seals using microsatellites

SWFSC staff have also been examining polymorphism in a series of microsatellite markers to determine genetic structure. Microsatellites are inherited from both parents and are highly variable. It will be useful to compare the results of this effort with the results from the mtDNA analyses. In addition, microsatellite analysis may provide insights into breeding behavior, pedigrees, and recent catastrophic population dynamic events, and may help discriminate between demographic and reproductive isolation. At this time, the SWFSC has analyzed 354 samples for variation at 11 loci. There are differences among loci in the level of differentiation. Overall, substantial levels of differentiation have been found among the major centers fo abundance of harbor seals in Alaska, which indicates large-scale and reproductive as well as demographic isolation.

2.8 AKSRG discussion regarding harbor seals

The AKSRG members discussed the new information on harbor seals at length. The following are the key points and recommendations made on different topics during the discussion.

2.8.1 Stock structure discussion

One AKSRG member questioned whether methods other than the total evidence and hierarchical ranking approaches are available for eliminating "noisy" sites (e.g., a topiary pruning program).

K. Martien responded that a topiary pruning program was tried but discarded because it was designed to look at much larger genetic differences than those exhibited by harbor seals.

There were several questions about the genetics of harbor seals in Yakutat and Icy Bay. Unfortunately, because the sample sizes in these areas are very small, it is impossible to say anything definitive regarding whether these seals are more similar to those in Glacier Bay or to those in Prince William Sound, or if they are not similar to either.

Lowry questioned whether it was really critical to estimate dispersal between areas if you only use boundaries where the p-value is 0 (seals are genetically different). B. Taylor responded that it would not be necessary to estimate dispersal rates between these areas, but if one managed only based on these areas, you'd be managing evolutionarily significant units (ESUs). NMFS may not want to limit its management to only ESUs.

Taylor and Martien pointed out that there are harbor seals in some areas, such as along the south side of the Alaska Peninsula and in Cook Inlet, that cannot be assigned to any genetic grouping because there are no samples from these areas.

Lowry questioned whether NMFS is constrained by the MMPA with respect to stock designations. Eagle stated that the MMPA defines stocks as groups of marine mammals that do not interbreed when mature. It is pretty clear that some groups of harbor seals in Alaska do not interbreed when mature, so it would be consistent with the MMPA to define these as individual stocks.

In response to a question about additional data analysis, O'Corry-Crowe indicated that SWFSC currently has another 150 samples to analyze, but that most of the samples are from areas where they already have good sample sizes. There are still major data gaps in some areas. The AKSRG discussed how additional samples could be obtained. Two possibilities were mentioned: work with members of the Alaska Native Harbor Seal Commission to get samples from harvested animals or collect samples directly (by live capturing seals or by collecting hair, vibrisae, or scat) at specific haulout sites of interest.

Riedel indicated concern that defining multiple stocks of harbor seals will negatively impact subsistence hunting. She recommended that the genetics data and analyses receive independent peer review before any changes are made.

The AKSRG recommended the following:

> NMFS should complete the genetics analyses currently under way, and should conduct additional sampling as necessary to resolve boundaries.
> Because the available evidence from the genetic analyses indicates that the current stock structure in the harbor seals SARs is wrong, NMFS should use the results from the recent genetics analyses to revise the stock structure.
> A subcommittee (Adkison and Kelly) will review the statistics and genetics analyses.

2.8.2 Stock abundance/status and trends discussion

Kelly requested additional information on how NMFS intends to proceed the covariate analyses and the correction factor work. Bengtson indicated that NMFS' intention is to repeat the covariate analysis in the different areas in 2001 and provide abundance estimates for the draft 2002 SARs. Lowry pointed out that almost all of NMFS' budget for harbor seals is allocated to the rangewide survey and the correction factor work, and questioned whether NMFS could rely solely on the covariate analysis in the future. Bengtson pointed out that NMFS was conducting the correction factor work in response to an earlier recommendation from the AKSRG and that NMFS would consider redirecting resources if the AKSRG recommended a change in approach. Adkison and Matthews indicated that VHF data are potentially important because 1) it is possible to obtain repeat samples of the same site and at different sites and 2) this is an important way to get baseline data on seal behavior.

Kelly pointed out that in the past, managers have relied heavily on the trend surveys conducted by ADF&G to determine whether there are problems in particular geographic areas. Kelly questioned whether the trend surveys and rangewide surveys were duplicative. Small indicated that, because the trend surveys do not provide an estimate of population size, it would be is important to conduct rangewide surveys. Similarly, because rangewide surveys are only flown in a particular area every 5 years, it would be important to conduct trend surveys as well.

3. U.S. Fish and Wildlife Stocks

3.1 Sea otter decline in the Aleutian Islands

R. Meehan (USFWS) provided an overview of the recent sea otter decline in the Aleutian Islands. The first systematic surveys were conducted in the 1960s. No surveys were flown between 1965 and 1986. The USFWS then flew surveys in 1992 and again in 2000. Between 1992 and 2000, sea otter populations declined between 28% and 87%, depending on the location along the Aleutian chain. Overall, sea otters declined 70% between 1992 and 2000.

At this time, the cause for the decline is unknown. However, based on work by Estes, it appears that the decline in sea otters is not likely to be caused by starvation, disease, or contaminants. Subsistence harvest of sea otters is very low and is unlikely to be the cause of the decline. One hypothesis that was not rejected by existing information is that the decline is due to killer whale predation.

In response to the decline in sea otters, the USFWS designated sea otter in the Aleutians as a candidate species for listing under the ESA in 2000. A U.S.-Russia sea otter workshop will be held on November 14-16, 2000 in Monterey. Topics for discussion at the workshop include the recent aerial surveys, sea otter research, and future management strategies.

USFWS will conduct a survey along the south side of the Alaskan Peninsula during May 2001, and will survey Kodiak during June 2001. The SARs for this stock will be updated once the

results of recent genetics analyses are completed. The genetics information will be made available to the AKSRG at the next meeting.

Kelly questioned whether it is wise to put so much emphasis on killer whales as the most likely cause of declines in sea otters in the Aleutians. Other potential sources of mortality should be investigated further.

Lowry indicated several concerns about the USFWS actions with respect to sea otters. First, he indicated discomfort with the fact that the USFWS proceeded so far down the road to an ESA listing when they only have two data points and before they know anything about the causes of the sea otter decline. He pointed out that it is not necessary for a species to be listed under the ESA to develop a conservation plan. Lowry further indicated concern that, should it be demonstrated that something like killer whale predation or pollution were responsible for the sea otter decline, it is not clear what management actions could be taken to conserve the population.

Meehan indicated that listing sea otters as a candidate species under the ESA was a step the agency had to take because it met the criteria for a candidate species, and because it was important to do so in order to formally recognize that there is a problem with this population. In addition, the USFWS has already received two petitions to list sea otters under the ESA.

Gauvin pointed out that the USFWS had not considered potential impacts of fisheries (specifically Atka mackeral and halibut) on the stock, and that this should be further examined.

Reidel also indicated concern at the speed of USFWS actions to list sea otters as a candidate species under the ESA. She indicated that the decline could have been caused because sea otters were over their carrying capacity. In addition, she indicated that questions about stock structure should be addressed (e.g., are the Aleutian sea otters from the same stock as the sea otters in Southeast Alaska) prior to listing under the ESA.

Lowry questioned whether the USFWS had worked with the Alaska Maritime National Wildlife Refuge in collecting data. Meehan indicated that they had not worked with the refuge much to date, and that opportunities to collaborate may arise in the future. She also pointed out that some information on trends may be available from other sources, such as the Tiglax cruises, which record marine mammal sightings consistently over time.

The AKSRG recommended the following:

- Continue surveys to evaluate current trend in the Aleutian Islands.
- Survey additional areas to determine current trends.
- Additional contaminant work
- Study reproductive rates

3.2 Walrus

Meehan provided an update on the USFWS walrus program. A workshop to discuss the best way to survey walrus was held in spring of 2000; a final workshop report was distributed in September 2000. Mark Weber was hired in November to work on the walrus project.

3.3 Polar bears

The U.S. and Russia recently signed a treaty that calls for joint management of polar bears in the Chukchi Sea. This treaty requires Congressional legislation for implementation and provides a process for future bi-lateral agreements.

4. NMFS Issues

Status of Cook Inlet beluga whales

M. Payne provided a brief update of the status of Cook Inlet beluga. On 31 May 2000, NMFS published a notice in the Federal Register which designated beluga whales as depleted under the MMPA. On 22 June 2000, NMFS published a notice in the Federal Register which announced NMFS' determination that it is not appropriate to list Cook Inlet beluga whales under the ESA because Alaska Native hunting was the major source of mortality, and that source has now been eliminated by the Stevens amendment, which specifies that there is no harvest allowed until there is a comanagement agreement and associated regulations. Proposed regulations to govern a hunt were published in the Federal Register; these regulations propose to allow two strikes. As of early November, there was additional language in the Commerce bill that extends the moratorium on harvest; NMFS will propose regulations to comply with that language when appropriate.

In response to a question from a AKSRG member, Payne indicated that beluga surveys are very likely to continue.

Observer programs

SRG members suggested that the SARs should be changed to improve the amount of information provided on observer coverage. For instance, the SARs often identify a range of observer coverage (e.g. 2-5%), but it's unclear whether this means 2-5% of the days fished, 2-5% of the fish caught, etc. This should be specified. Also, the AKSRG suggested that observer coverage levels be indicated for each year, rather than as a range.

Subsistence harvest

K. Brix provided a brief overview of the AKR's recent progress in developing a way to better estimate the subsistence harvest of marine mammals in Alaska. At this time, there seem to be two options: 1) piggyback a NMFS-funded program on the U.S. Fish and Wildlife Service subsistence harvest monitoring program for walrus and polar bears, or 2) develop an independent program. Unfortunately, funding is an ongoing issue, because there are no dedicated funds for subsistence harvest monitoring.

Lowry observed that it appears that the AKSRG's recommendations with respect to subsistence harvest monitoring are being addressed, albeit slowly.

Stranding network & stranding network volunteers

B. Matthews pointed out that there have been some recent problems getting volunteers to collect samples from stranded marine mammals because people do not have the necessary authorization. She pointed out that it's actually quite easy to become authorized to collect these samples; interested people simply need to send a letter to the AKR requesting to be part of the stranding network. Upon receipt of this letter, AKR can send a letter authorizing that individual to collect samples. Depending on individual qualifications, training may be required prior to authorization.

Whale watching regulations for Alaska

K. Brix summarized the current status of the proposed whalewatching regulations for Alaska. On 26 June 2000, proposed regulations on whalewatching measures around humpback whales were published. These proposed regulations specified a minimum approach distance for approaching humpback whales. The AKR hopes to have final regulations in place by spring 2001.

5. NMFS' response to the last AKSRG letter

The AKSRG noted that NMFS doesn't seem to have responded formally to the last AKSRG letter. The following are the comments provided in the AKSRG's letter and responses provided by NMFS while at the meeting:

- NMFS should increase the effectiveness of the Alaska region stranding network

  K. Brix indicated that the AKR is working to improve the network. Unfortunately, lack of funds remains a major problem. A second major problem is that local stranding coordinators are not being contacted to get samples from stranded animals. She emphasized that AKR will continue to work to improve the network.

- Monitoring of subsistence take

  The AKSRG received an update on this issue earlier in the meeting.

- The text in the draft SAR for 2000 regarding the abatement of the decline in beluga whales should be eliminated.

  R. Angliss indicated that the text has been removed.

- NMFS should ensure that the ringed seal holes located by B. Kelly as part of monitoring and mitigation for the Northstar project be rechecked to determine whether they are still active.

B. Kelly rechecked the holes. Most holes found in December had been refrozen and were no longer active. Many new holes were also found during the survey.

6. Review of revised Stock Assessment Reports for 2001

The AKSRG requested that in the future, NMFS staff date the draft Stock Assessment Reports and include a table of contents.

North Pacific humpback whales

The AKSRG recommended that, in the next revision of he SARs, NMFS should designate stocks and PBRs for North Pacific humpback whales based on known major feeding areas. This would be consistent with the approach currently being used for North Atlantic humpback whales.

Gray whale SAR

The AKSRG noted that the gray whale SAR was not updated in 2000. Although this stock is not strategic, there were some who wondered whether, because of the increased numbers of strandings, this SAR should be updated in the near future. B. Kelly indicated that the increase in strandings is not a real management concern provided that they are largely due to natural mortality. S. Young pointed out that NMFS can update the SARs whenever new information becomes available, and that it might be important to update the gray whale SAR soon because the increase in strandings may indicate that the population has reached it's carrying capacity.

Ice seals

Angliss indicated that the ringed, spotted, bearded, and ribbon seal SARs have been updated to reflect some new information on population abundance, and a great deal of new information on subsistence mortality levels. The information on subsistence mortality levels was compiled and provided to Angliss by Robert Wolfe of the ADF&G's Division of Subsistence.

After some discussion, the AKSRG was generally supportive of including the new harvest information in the SARs. In addition, the AKSRG approved the use of extrapolated data for those villages for which little information on harvest exists provided that statements regarding the methods used for the extrapolation are included in the SARs.

However, because the harvest data is new and has been provided by someone outside NMFS, the AKSRG would like the opportunity to review the original reports from which the harvest estimates came prior to inclusion in the SARs. Kelly, Hild, and Hills agreed to review the original reports and provide a summary of them at the next AKSRG meeting.

Steller sea lions

K. Wynne indicated that the SARs should reflect that there were 2 Steller sea lions from the western stock shot in Kodiak in 1999. In addition, text should be added to explain why self reported information is being used in lieu of information from observer programs.

Cook Inlet beluga whales

One AKSRG member asked whether there is any new information on counts of calves in Cook Inlet. Lowry suggested that collecting this information is probably not possible from an aerial platform, as even high-resolution video cameras are unlikely to have sufficient resolution to record calves, yearlings, or even 2-year olds in Cook Inlet's turbid water.

Fin whales

SRG members were pleased that some information on fin whale abundance is now available. AKSRG members agreed with Angliss that the number of animals estimated from the recent vessel surveys (4,951) could not be used as a minimum population estimate because the surveys took place in only a small portion of the stock's range.

Northern fur seals -

Lowry noted that the AKSRG has recommended in the past that NMFS reconsider the depleted listing for northern fur seals. Angliss indicated that there are some recent data that suggest that this population is declining. Although analyses of recent data could not be included in the draft SARs for 2001, they will be included in the next round of SARs.

Lowry questioned whether the expansion factor for determining the total population size from pup counts is still valid. Another AKSRG member questioned whether the 49 self-reported serious injuries and mortalities for the Bristol Bay salmon drift gillnet was accurate.

Some AKSRG members expressed concern that the northern fur seal population must be remaining at it's current lower-than-historical level because of some unknown source of mortality or because the carrying capacity has changed. The AKSRG recommended that NMFS should try to determine whether the low numbers of fur seals reflect an ongoing, unknown impact on the population or a reduction in carrying capacity**.**

One AKSRG member indicated that there are still low levels of illegal high seas drift gillnet fishing going on. The SARs should be updated to include this fact and indicate that some mortalities incidental to illegal fishing may be occurring.

Killer whale SAR

C. Matkin presented a summary of Barrett-Lennard's recent research. According to genetics analyses, the AT1 transient pod is very different from the other transient pods in AK. There are some significant concerns about the AT1 pod: there has been no successful reproduction in this pod since 1984, individuals appear to have high contaminant loads, and the pod suffered losses at

the time of the Exxon Valdez oil spill. In addition, the AT1 pod typically frequents Prince William Sound, where numbers of harbor seals are depressed relative to historical levels.

The new genetics results also show that there is some interbreeding between northern BC residents and southern AK residents, but there seems to be no female dispersal.

The AKSRG recommended that NMFS use the new information on eastern North Pacific killer whales to split them into the following 7 stocks: northern AK residents, southern AK residents, Gulf of Alaska transients, west coast transients, AT1 pod, southern residents, and offshores. Futhermore, the AKSRG recommended that they and the NMML prepare SARs for all west coast transient killer whale stocks.

B. Taylor indicated that, based on the genetics information, killer whales appear to be naturally rare species similar to vaquita. Because of this, researchers should not be surprised that killer whale populations are small.

7. Summary of Recommendations

Harbor seals: The AKSRG recognizes and appreciates that the SWFSC has made great progress towards sorting out Alaska harbor seal stock structure. Because the genetics analyses show that the current Alaska harbor seal stock structure is incorrect, the following should occur:

- The SWFSC should complete the genetics work that has been started and should estimate dispersal rates and fine-tune boundaries between potential stocks.
- NMFS should start thinking about how to use the new genetics information to revise the Alaska harbor seal stock structure.

NMFS' harbor seal genetic analyses should now focus on filling in data gaps in areas such as southeast Alaska, northern Prince William Sound, and the south side of AK peninsula. The AKSRG recognizes that it's unlikely that substantial new information on genetics will be provided by the next round of SARs even if NMFS makes progress on filling in these data gaps. NMFS should plan to revise the Alaska harbor seal stock structure during the 2002 revision.

The AKSRG requested that NMFS provide manuscripts describing the genetics methods to the AKSRG (specifically M. Adkison and B. Kelly) for review.

The AKSRG asked that some consideration be given to combining, archiving and releasing harbor seal survey data. J. Bengtson and B. Small committed to include a plan for this in the next revision of the harbor seal research plan.

Humpback whales: The AKSRG recommended that the SARs should be revised so that humpback whales are separated into stocks based on their major summer feeding locations.

Fur seals: The AKSRG recommended that NMFS consider what would be appropriate criteria for downlisting. In addition, NMFS should consider how they will incorporate changes in K in

their management plans (this really applies to all AKSRGs, not just the AK). However, the AKSRG recognizes that this may be a good discussion item for a joint AKSRG meeting, or a symposium for the next biennial.

Killer whales: The AKSRG recommended that NMFS divide eastern North Pacific killer whales into 7 stocks. In addition, the AKSRG recommended that all west coast transients be placed under the purview of NMML and the AKSRG.

Fish and Wildlife Service/Biological Resources Division: The FWS/BRD should plan to provide a major presentation on sea otters at the March 2001 meeting. This presentation should include information on stock boundaries, data collection, and the results of the recent workshop.

The AKSRG also recommended that background materials for the meeting should be distributed sooner than was done for the November meeting.

8. Wrap-up

The next meeting of the Alaska AKSRG will be on 28/29 March in Anchorage. The meeting will be held at the Federal Building.

Topics to be discussed will include:

- Sea otter report from BRD/FWS – ½ day
- Ice seal harvest subcommittee report
- Harbor seal genetics methods subcommittee report
- Update on methods used to determine harbor seal abundance estimates
- Incidental take estimation
  – interested in knowing how the CI beluga program was designed
  – groundfish observer program going through some changes that may affect how marine mammal take is estimated
- Updates on. . .
  – harbor seals
  – beluga whales (other than CI)
  – beaked whales (?)
  – FWS species

The AKSRG asked that the designs of prior observer programs be distributed before the next AKSRG meeting in preparation for the above discussion. In addition, the AKSRG is particularly interested in looking at the Cook Inlet beluga population model, since it is being used as a basis for setting harvest levels. The AKSRG would like NMFS to present the model, review the model assumptions, and discuss ramifications for beluga whale recovery.

APPENDICES:

Appendix 1: Final agenda
Appendix 2: List of participants
Appendix 3: List of background documents provided prior to or during the meeting

Appendix 1: Final agenda

Alaska Scientific Review Group Meeting
1-3 November 2000
NMFS Conference Room
Federal Building
Juneau, AK

Major topics: 1. Review and discussion of harbor seal research and data
2. Review of Stock Assessment Reports to be revised in 2000-2001

Materials needed: Background documents supplied by NMFS, FWS, and USGS BRD

1 November 2000—Wednesday

8:30 am Introductory business
1. Introductions
2. Review and approve agenda
3. AKSRG Chair for next year
4. Other business (e.g., travel vouchers)

9:00 am Review of new information on Alaska harbor seals
1. Harbor seal research plan (Brix)
2. Estimation of regional trends—Small, Mathews, Jemison, Pendleton, Ver Hoef
   a. Survey methods
      i. Visual counts (aerial and land-based)
      ii. Large format vertical photography
   b. Data analysis
      i. Covariate analysis
      ii. Bayesian analysis
      iii. Adkison and Quinn simulation
3. Estimation of rangewide abundance—Withrow, Boveng, Simpkins
   a. Survey methods
   b. Covariate analysis
   c. Correction factors
4. Photoidentification/mark-recapture—Small and Kelly?
5. Observations on haulouts (sex-age composition, molting phenology)—Jemison, Mathews, Kelly

12:15 pm Break for lunch

1:30 pm Continue review of new information on Alaska harbor seals
6. Telemetry studies—Small, Lowry, Withrow
7. Genetics and stock identity—Taylor, O'Corry-Crowe, Westlake, Martien
   a. Review of general principles

b. Traditional testing with mitochodrial DNA
c. Geographically constrained hierarchical clustering
d. Microsatellites
e. Comparisons of genetic analytical approaches

5:00 pm Adjourn

2 November 2000--Thursday

8:30 am Discussion of Alaska harbor seals
1. Stock identity/management units
2. Stock abundance
3. Stock status/trend
4. Research and data needs

10:00 am FWS issues
1. USFWS/USGS-BRD plans for walrus population monitoring
2. Sea otter surveys and status
3. Chukchi sea polar bear surveys
4. Schedule for revising SARs

12:15 pm Break for lunch

1:30 pm NMFS response to AKSRG spring 2000 letter

2:00 pm NMFS issues
a. Cook Inlet beluga whales
b. Incidental take monitoring programs
c. Alaska Native subsistence harvest monitoring
d. Stranding network and SN volunteer program
e. MMPA reauthorization
f. Whale watching regulations for Alaska
g. Gray whale SAR incidental take levels
h. Others

4:00 pm Begin review of revised Stock Assessment Reports for 2001
1. killer whales
2. ice seals
3. minke whale
4. ESA species, Steller sea lions, humpback, right, bowhead, fin whales

3 November 2000--Friday

8:30 am	Complete review of revised Stock Assessment Reports for 2001
10:30 am	SRG discussion and recommendations
11:30 am	Topics for next meeting (Anchorage, last week of March 2001)
12:00 pm	Adjourn

Appendix 2: List of participants

Milo Adkison	**JCSFOS-UAF**	**milo.adkison@uaf.edu**
Robyn Angliss	NMML/NMFS	robyn.angliss@noaa.gov
John Bengtson	NMML	john.bengtson@noaa.gov
Karen Blyways	UAS Biology	kblywas@nature.berkeley.edu
Peter Boveng	NMML	peter.boveng@noaa.gov
Kaja Brix	NMFS/AKR	kaja.brix@noaa.gov
Andrew Dizon	SWFSC, LaJolla	adizon@ucsd.edu
Tom Eagle	NMFS, Silver Spring	tom.eagle@noaa.gov
Carl M. Hild	ICHS/UAA	ancmh@uaa.alaska.edu
Sue Hills	**IMS/UAF, Fairbanks**	**shills@ims.uaf.edu**
John Gauvin	**Groundfish Forum**	**gauvin@seanet.com**
Lianna Jack	TASSC	asoc@alaska.net
Lauri Jemison	ADF&G	lauri_jemison@fishgame.state.ak.us
Brendan Kelly	**JCSFOS-UAF**	**ffbpk@uaf.edu**
Matt Kookesh	**S.E.N.C. (Tlingit & Haida)**	
Denby Lloyd	**ADF&G**	**denby_lloyd@fishgame.state.ak.us**
Lloyd Lowry	**AKSRG**	**llowry@eagle.ptialaska.net**
Karen Martien	SWFSC, LaJolla	kmartien@ucsd.edu
Craig Matkin	**North Gulf Oceanic Society**	**comatkin@xyz.net**
Stacey Marz	Center for Marine Conservation	chinook@arctic.net
Rosa Meehan	USFWS	rosa_meehan@fws.gov
John Moran	JCSFOS-UAF	ftjrm2@uaf.edu
Greg O'Corry-Crowe	SWFSC, LaJolla	gocrowe@caliban.ucsd.edu
Peter Olesiuk	Pacific Biological Station	olesiukp@pac.dfo-mpo.gc.ca
Grey Pendleton	ADF&G	gray_pendleton@fishgame.state.ak.us
Monica Riedel	ANHSC	aksealmr@ptialaska.net
Bob Small	ADF&G	bob_small@fishgame.state.ak.us
Jan Straley	**University of Alaska, Sitka**	**jan.straley@uas.alaska.edu**
Barbara Taylor	SWFSC, LaJolla	barb.taylor@noaa.gov
Jay VerHoef	ADF&G, Fairbanks	ffjmv@uaf.edu
Dave Withrow	NMML	dave.withrow@noaa.gov
Sharon Young	HSUS	sbyoung@capecod.net
Kate Wynne	**UAF - Kodiak**	**ffkmw@uaf.edu**

Appendix 3. List of documents distributed to the AKSRG

An asterisk (*) identifies those documents which were distributed as background reading prior to the meeting.

Alaska Native Harbor Seal Commission. 2000. Nuyaq. Volume 1 (3). 8p.

Barrett-Lennard, L.G., G. M. Ellis, C. O. Matkin, and J. K. B. Ford. A propensity for isolationism: genetic analysis of social segregation within and between sympatric killer whale ecotypes

* Brownell, R. L., T. Kasuya, W. P. Perrin, C. S. Baker, F. Cipriano, J. Urban R., D. P. DeMaster, M. R. Brown, and P. J. Clapham. 2000. Unknown status of the western North Pacific humpback whale population: a new conservation concern. Paper SC/52/CA/0S/WP1 presented to the IWC.

Cody, M. 2000. Round Island Field Report: May 6-August 16, 2000.

* Daniel, R. L. Jemison, S. Crowley, and G. Pendleton. Molting phenology of harbor seals on Tugidak Island, AK

Dickerson, L., J. Snyder, G. Henry, D. Sockpick, C. Bailey, J. Barnum, and D. Burn. 2000. 2000 Walrus Harvest Monitoring Annual Report. 70p.

Fadely, B. Marine Mammal Observer Program Summary.

* Hastings, K., B. Small, J. VerHoef, and M. Rehberg. Movements and diving behavior of harbor seals examined through satellite-linked time-depth recorders.

* Jemison, L. and B. Kelly. Pupping phenology of harbor seals on Tugidak Island, AK

* Jemison, L. and G. Pendleton. Harbor seal population trends and factors influenceing land-based counts at Nanvak Bay and Tugidak Island.

* Lowry, L. F., K. J. Frost, J. M. VerHoef, and R. A. DeLong. Movements of satellite-tagged non-pup harbor seals in Prince William Sound, Alaska, 1992-1997.

* National Marine Fisheries Service and Alaska Department of Fish and Game. 2000. Alaska Harbor Seal Research Plan. 46p.

* Martien, K. and B. L. Taylor. Results of ranking of potential management unit boundary locations for Alaskan harbor seals.

* Martien, K. and B. L. Taylor. The influence of abundance on estimates of dispersal rate.

* Matthews, E. A. and G. W. Pendleton. 2000. Declining trends in harbor seal (Phoca vitulina richardsi) numbers at glacial ice and terrestrial haulouts in Glacier Bay National Park, 1992-1998. Final Report to Glacier Bay National Park and Preserve. Cooperative agreement 9910-97-0026

* Perry, S. L., D. P. DeMaster, and G. K. Silber. 1999. The Great Whales: History and Status of Six Species Listed as Endangered Under the U.S. Endangered Species Act of 1973.

Rinteimit, V., M. Agnakisyak, G. Smirnov. 2000. Walrus Harvest Monitoring on Chukotka in 1999. Technical report prepared for the U.S. Fish and Wildlife Service. 65p.

* Small, R. and G. Pendleton. Harbor seal aerial population trend surveys.

Smirnov, G., A. Kochnev, Y. Kompantseva, V. Tyneskin, and V. Strizhanov. 2000. Environmental Monitoring fo Coastal Walrus Haul-Outs in the Gulf of Anadyr, 1999. Summary report prepared for the U.S. Fish and Wildlife Service. 70p.

* Storey, R. L. W. and G. M. O'Corry-Crowe. Resolving population structure and defining management units in a continuously distributed species: harbour seals in Alaska.

* Summary table for 2001 draft SARS and estimates of subsistence harvest of ice seals for each village

* Taylor, B. L. and K. Martien. A consideration of sample size and statistical power

U.S. Department of the Interior. Contaminants in Alaska. Is America's Arctic at Risk? 10p

USFWS. Research and Management Activities – Pacific Walrus. 2p.