

PRIBILOF ISLANDS COLLABORATIVE



Executive Summary of the Information Exchange and Collaborative Design Meeting

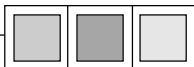
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The Nature Conservancy
World Wildlife Fund



Background and Purpose of the Proposed Collaborative

In November 2002, a diverse group of people from the Pribilof Islands met with representatives from World Wildlife Fund and The Nature Conservancy, federal resource management agencies and the Bering Sea fishing industry to discuss wildlife population and ecosystem changes and declines around the Pribilof Islands. From this dialogue grew the Pribilof Islands Collaborative. The Pribilof Islands Collaborative is a group of community, fishing industry, conservation, and agency representatives who intend to work together to identify areas of agreement on policies, strategies, and actions that promote a strong economy and a healthy ecosystem in and around the Pribilof Islands while maintaining viable communities, commercial fisheries and subsistence harvests in the central Bering Sea.

After numerous small meetings and discussions during 2003, over 60 people met again on September 22 -23, 2003 to start to identify specific issues the Collaborative will address, and to agree on the functional elements of the collaborative process design.

On January 15–16, 2004 over 70 people interested in the Collaborative met to:

- Exchange information and learn more about the resources the Pribilof Islands Collaborative might work on together, which were identified during the September meeting: Halibut, Crab, Fur Seals, and Seabirds; and
- To continue to develop the framework for a stakeholder designed and driven process that will enable those who want to work together in a constructive and productive manner to do so effectively.

Participants were from St. Paul and St. George Islands, fishing industry, conservation groups, and federal government agencies. All individuals spoke on behalf of themselves, not their organizations. Participants are listed at the end of this summary.

Meeting Overview

The first day and the next morning included a series of presentations to better understand the historical and cultural background of the Islands, and concerns regarding the natural resource and related economic issues from traditional, community, western science, and industry perspectives. The remainder of the meeting focused on the collaborative design.

Brief Summary of Presentations

The following is only a brief summary of the informative presentations that were given during the January meeting. For more detailed notes, please go to www.worldwildlife.org/beringsea_erbc/ or contact Denise Woods at wwfberingsea@alaska.net.

Anthony B. Mercurief of St. George Island spoke about the rich cultural history of the Pribilof Islands and the role that traditional culture plays today in binding the people together and keeping the communities strong. In particular Anthony noted the importance of the Islanders' native language; subsistence food sources and a subsistence diet; traditional knowledge of hunts and food gathering spots; spirituality and the Russian Orthodox church; and community gatherings and dances. Anthony

also spoke about the past government occupation of the Islands and described the changes he has observed around the Islands over the years. He also shared personal memories of his family's ill treatment and humiliation at the hands of the federal agents.

Henry Huntington of Huntington Consulting spoke on Traditional Ecological Knowledge (TEK), drawing from his experience documenting and utilizing TEK. For the purposes of the discussion, TEK was loosely defined as the collective, shared knowledge of the residents and resource users of a particular area. Henry spoke about the characteristics of TEK, why we need to use it, and how to more effectively integrate its use into Western Science and management decision-making. He also discussed some of the practical difficulties of using TEK, including the lack of written data/ documentation to accompany observations and lack of recognized peer review of such data. Better documentation of TEK is needed but there is a lack of funding to promote such work.

Lowell Fritz of the National Marine Fisheries Service's (NMFS) Alaska Fisheries Science Center provided a general overview on fisheries research and surveys being conducted in the Bering Sea, including locations of the various fisheries and the documented trends in biomass and recruitment of the fished species. Among the trends, Lowell noted that pollock, after increasing throughout the 1980's and declining during the early 1990's, have begun to increase again in numbers; perch/ rockfish biomass is also rebuilding from an earlier low. Cod, conversely, have continued to decline and are currently at half of their 1980's biomass. Flatfish species have declined or remained stable and mackerel biomass has continued to fluctuate.

Tim Loher of the International Pacific Halibut Commission reported on the well-documented decline in halibut CPUE around the Pribilof Islands and about efforts to understand what is causing this. He explained some of the possible causes, including climate change, and warned that the problem might not be limited to the Pribilof Islands but could reflect a decline throughout the Bering Sea and Gulf of Alaska. Tim expressed a need for better understanding the genetic stock structure of the various halibut populations, more data on the distribution and abundance of forage fish, and an analysis of halibut bycatch based on catch location and age.

Gordon Kruse of the University of Alaska Fairbanks (UAF) spoke about the population trends of crabs fished for in the Bering Sea (St. Mathew blue king crab, Pribilof Islands red and blue king crab, Bristol Bay and Pribilof Islands tanner crab, and eastern Bering Sea snow crab); all species have declined in recent decades. Gordon also discussed mechanisms that affect population numbers and presented several theories to explain the declines, including over-fishing, bycatch and handling mortality, and recruitment changes. He also mentioned some of the work being done to rebuild the stocks and expressed a need for better data on stock assessment methods to set better quotas or establish closures.

Chris Merculief of St. George Island provided a TEK perspective on fisheries, which included observations that catch numbers are low and don't seem to be improving, that halibut have switched their diets, that local fishermen now catch few sculpin (which used to be plentiful), there are now many octopus and cod (which used to be rare), and that whales and porpoises have left the area. Fishermen now must travel much further to find good fishing. Recommended research needs included a study of food habits of seabirds and marine mammals (are their diets changing due to loss of prey species?) and an investigation of the apparent slow growth of halibut and lack of large males.

Rolf Ream of NMFS National Marine Mammal Lab provided a general overview of fur seal research, including who studies fur seals, where they occur/are studied, the foci of research, and the use of

research results. He reported that fur seal numbers on the Pribilof Islands have declined drastically (to 32% of their 1950's numbers) and that pup production has fallen 5% during each of the past 4 years. In contrast, fur seal numbers have increased at Bogoslof Island (up 59% each year from 1980-1997). The population at Bogoslof is relatively small, however, and does not account for the declines observed at the Pribilofs. Rolf also summarized fur seal food habits data and satellite tracking studies that outline summer foraging areas and winter migrations. Suggested research needs include: obtaining new estimates of abundance at Bogoslof Island, conducting additional satellite tracking studies, conducting foraging studies to determine the role of prey availability/density on fur seal foraging behavior, and investigating changes in survival, condition and reproductive rates. Rolf pointed out that the annual funding of northern fur seal research has been only about \$125,000/year and appears to be zero this year.

Andrew Trites of the University of British Columbia, Research Director of the North Pacific Universities Marine Mammal Research Consortium, provided an overview of population trends of various species of marine mammals. He reported that in the Bering Sea, there have been dramatic declines in Steller sea lions and northern fur seals (except for Bogoslof) beginning in the late 1970's. Declines have also occurred in numbers of sea lions, harbour seals and sea otters in the Aleutian Islands and Gulf of Alaska. Conversely, south of Prince William Sound, these species have increased. Andrew discussed different explanations for the declines, including: killer whale predation, food web effects from commercial whaling, toxins, climate change, over-fishing, and poor nutrition. Field and laboratory studies are needed to determine the combined effects of these factors as well as how the factors affect each other.

Richard Zaharof of St. Paul Island spoke briefly about the current northern fur seal subsistence harvest. He provided a historical perspective of the commercial harvest that ended in 1984 and described how the harvest today supplies meat for residents on the Island. He expressed concern that in recent years, the number of active fur seal rookeries on St. Paul has dropped from 7 to 4, and how this year for subsistence, they took only 1/3 of the number of seals as in past years.

Terry Spraker, a professor of veterinary medicine at Colorado State University, spoke about his research on the causes of mortality in northern fur seals recovered from rookeries during 1986-2003. He reported that pup mortality resulted primarily from emaciation (52% of recovered carcasses) and trauma (19%), mostly bites from other seals. There was low incidence of mortality from disease or infection but there has been an overall increase in pup mortality due to starvation in recent years. Subadult mortality resulted primarily from the subsistence harvest and adult males and females mostly died as a result of trauma (bites). Research needs include determining if pup mortality is increasing due to poor female nutritional health, but funding is non-existent. There is an urgent need to rebuild the catwalks used by researchers for observation at the rookeries.

Kent Sundseth with the U.S. Fish & Wildlife Service provided the group with an overview of seabird ecology, the value of seabirds to the local area, and current and recommended research. Most of the Pribilof's seabirds breed on St. George (12 species), including the largest thick-billed murre colony in Alaska and 85% of the world's red-legged kittiwakes. Seabirds are valued as research tools (they are visible and highly concentrated and feed at all water and trophic levels), as subsistence food, and for ecotourism. Current research includes: productivity and population monitoring, diet analysis, identification of important foraging areas, tissue sampling for contaminants, and survivorship. Research needs include more at-sea projects, telemetry studies, and a study of auklet productivity.

Andy Kashevarof of St. George Island provided his observations of seabirds on the Island and noted changes he has seen in recent years. These include vegetation growth and subsequent degradation of nesting sites where ground nesting birds used to be, and that there are fewer birds observed today since the commercial fur seal harvest ended (the harvest may have attracted and fed many birds). It was noted that some residents have observed fewer winter birds, too. Andy reported that, overall, things are good for seabirds on the Pribilof Islands.

Alan Springer, a researcher from the University of Alaska Fairbanks, provided an overview of seabird population fluctuations over the past several decades. He reported that many species, such as red-legged kittiwakes, declined in number from the mid-1970's until the late 1990's, but that numbers for most species are now on the rise. Numbers today do not indicate great cause for concern, but rather they show great variability in numbers across years and in different locations. For example, coincident with declines on the Pribilofs have been increases on Buldir and Bogoslof Islands. Research is needed to understand if this is due to better prey availability at these sites. Alan also provided an overview of Bering Sea ecosystem dynamics – the big picture, and how major changes such as time, climate, and humans play a role in changes we are observing today. He also provided recommendations on what research is needed to better understand ecosystem dynamics—we need to know more about every component of the ecosystem.

Larry Merculieff of the Alaska Native Science Commission and originally from St. Paul Island, provided a TEK perspective on ecosystem dynamics, which included observations of changes that Aleuts noticed and reported decades ago that seem to indicate food stress (seabirds in poor health, sea lions eating their pups, thin pelts). He also shared current observations and concerns, including that Western science alone is not effective in stopping the degradation of the ecosystem and that there is a need for greater humility among scientists. He identified a need for greater cooperation/coordination between U.S., Russian, and native scientists. Larry concluded by talking about the importance of Pribilovians helping to develop funding to conduct the research they think is necessary.

Kaja Brix, the Assistant Regional Administrator of NOAA-NMFS-Protected Resources for the Alaska Region, spoke about the agency's responsibilities regarding Alaska marine mammal management. She spoke of the specific statutes they abide by to protect northern fur seals, Steller sea lions, harbor seals, and whales. Specifics of the co-management agreement between NMFS and the tribal governments were discussed and the benefits of working in such a collaborative effort were highlighted. Suggested research needs included a better understanding of right whale critical habitat characteristics (the "essential elements") and a summary of past and present research efforts on northern fur seals. A lack of funding for northern fur seal research was again noted.

Todd Loomis, manager of the Anchorage Field Office for the NOAA Fisheries - North Pacific Groundfish Observer Program, provided an overview of that program, including its history, the number of current observers, the type of data that are collected, and requirements for becoming an observer. This resulted in a discussion about a request to change the educational requirements of observers to an experiential equivalent of a Bachelor's Degree. Current regulations require a degree from an accredited college or university with a major in one of the natural sciences. Some individuals expressed that local residents would participate in the program if a degree was not required.

Bill Wilson, who is the Protected Resources Coordinator of the North Pacific Fishery Management Council, provided an overview of the Council's responsibilities, its structure, and public participation

process. Bill also provided an update of the work being done by the North Pacific Fishery Management Council's northern fur seal committee.

Mike Williams, a wildlife biologist at LGL Alaska Research Associates, Inc., provided an update of the Northern Fur Seal Conservation Plan. A revised version of the 1993 plan was nearing completion by the tribes, but further funding and collaborators were not ready to be directly involved in the early revision. Revisions primarily involved updating information on population trends and abundances, behavior and ecology, entanglement, foraging ecology, and contamination. There has been a concerted effort to bring local TEK into the revised edition. For the plan to be successfully implemented it must be funded and supported by the stakeholders.

Karl Haflinger of SeaState provided an overview of the Bering Sea fishery, with some historical perspectives over the last several decades. He reported that the commercial industry has noted a decline in flatfish and cod from a high in the 1990's. Karl also provided a break down of halibut bycatch by fishery and species fished: trawl fisheries report approximately 3400 metric tons/year (especially from cod and yellowfin sole fishing) while longline fisheries report approximately 641 metric tons/year (especially from cod, sablefish, and turbot fishing). The pollock fishery does not appear to produce a large amount of halibut bycatch in the area of the Pribilof Islands.

Phillip Lestenkof, president of the Central Bering Sea Fishermen's Association, gave an overview of the local halibut fleet based on St. Paul Island. Phillip presented information on the number and sizes of the vessels and the types of gear used. He presented data on IFQ and CDQ halibut landings in Area 4C from 1995 to 2003 and pointed out the decline in catch rates in 2002 and 2003. Phillip stated that the local fleet essentially harvested 100% of its CDQ halibut allocations from 1995 through 2001, but were not able to fully harvest the CDQ halibut allocations in 2002 and 2003 because of declining Catch Per Unit Effort (CPUE). The Area 4C IFQ halibut fishery experienced the same low CPUE problem. Phillip also presented employment and income statistics on the CDQ halibut fishery showing the number of local residents employed and total income received from 1999 to 2003. Phillip informed the participants of a proposal CBSFA brought to the North Pacific Fishery Management Council in December 2003 requesting the Council allow Area 4C IFQ and CDQ halibut to be harvested in Area 4D to mitigate the low CPUE problem in Area 4C by providing access to larger and more productive fishing grounds.

Refining the Proposed Collaborative Design

During the afternoon of the second day, the facilitator provided a brief review of the outcomes from the September Pribilof Islands collaborative meeting. (See September 2003, *Executive Summary of the Preliminary Design Meeting*.) Participants then worked together to refine the proposed collaborative structure, which was originally developed during the September meeting, including:

- Proposed Primary Issues
- Discussion: Formal Stakeholder Participation
- Revised Formal Stakeholder Participation Proposal
- Proposed Definition of Consensus
- Other Collaborative Process Elements
- Additional Recommendations

Proposed Primary Issues

After the previous day and half of learning about and discussing the primary issues initially identified at the September 2003 Pribilof Islands Collaborative, the group was comfortable with the following list of proposed issues the Collaborative should focus on:

- Declines in halibut CPUE
- Fur seals population fluctuations and declines
- Crab population fluctuations and declines, and
- Seabirds (Note: The presenters at the January 2004 meeting presented that their work indicates fluctuations rather than large scale declines. The group did not have time to more fully discuss this proposed issue.)

Discussion: Formal Participants in the Pribilof Islands Collaborative

The various stakeholder groups—Islands, Conservation, Fishing Industry, and CDQs—engaged in discussions about how many “voting” participants they need to fully represent their interests.

The discussion was useful as it revealed criteria for participants to more critically consider how many and who should formally represent the stakeholders’ interests. *What makes sense?* seemed to be the underpinning for helping guide the discussion. Through this, participants identified characteristics of a formal participant and how many should formally represent their stakeholder group. Those underpinnings were identified as:

- They have adequate decision-making authority.
- They have the capacity to participate.
- They are knowledgeable about their stakeholder’s interests.
- They have funding to support their travel. (Note: The group recognized that some support for Islanders’ travel would be appropriate.)
- They have the time to be involved.
- They are willing to participate.

Revised Formal Stakeholder Participation Proposal

CDQ

- Two formal participants: CBSFA and APICDA
- Phillip Lestenkof and Larry Cotter will each present the proposal to their respective boards for appointment/approval within a month.

Industry

- Three formal participants from the Pelagic Trawl, Bottom Trawl, and Fixed Gear groundfish fisheries.
- Caveats:
 - All three must participate, or it may not make sense for Industry to participate in the Collaborative.
 - Must have 100% agreement within industry stakeholder group.
 - These three proposed participants assume that Crab is not the frontline issue. If Crab were identified as a primary concern, it would likely require other/additional industry participants.

Worth Noting: There were several times during the afternoon that the discussion touched on the possibility that an issue may drive stakeholder participation, e.g. different people may need to participate at different times depending on what issue is being addressed. This possibility needs further discussion/clarification.

Conservation (*after discussion the following emerged*)

- Five formal participants: The Nature Conservancy, World Wildlife Fund, Alaska Marine Conservation Council, The Ocean Conservancy, and possibly Alaska Audubon (to be confirmed).
- Participants appointed within six weeks.

Islands

- 10 formal participants; five from each Island:
 - Municipality, Tribal Government, Village Corporation, plus two at-large.
 - Proposals will be made to the respective Councils and Boards.
 - At-large participants will be identified through a community process.
 - At-large participants will likely need assistance from the Collaborative to pay for travel.

Other

- 3 non-voting participants, who are observers offering support to the major Island stakeholders:
 - The Aleut Corporation.
 - Aleutian Pribilof Island Association.
 - Aleut Marine Mammal Commission (along with Aleut International Association).

ACTION: Those present agreed that either a letter or resolution from an interest group or organization should be used to designate the formal representatives to the Pribilof Islands Collaborative.

Discussion: Definition of Consensus

Participants also focused on the proposed definition of consensus. Some suggested that each stakeholder group define for itself what their definition of consensus is. Another participant remarked that the number of participants from any one group doesn't really matter if consensus is the decision making rule.

Several participants at the meeting, as well as the facilitator, respectfully emphasized that the intent of the Pribilof Islands Collaborative is to be open and inclusive. The purpose of stakeholder groups designating formal participants is a means to ensure there is appropriate/sufficient representation for each group, that there is consistent participation in the Collaborative, and that if needed the decision-making rule(s) are clearly defined.

The participants then broke into stakeholder groups. For a half hour they deliberated about the appropriate number of participants from their interest group, and about their favored definition of consensus.

- Based on this discussion, those present recognized the need to define *consensus* for this effort.
- Due to the divergent interests each of the three proposed Industry participants would represent, those who knew the Industry perspective best were certain that consensus within their stakeholder group would be absolutely necessary.

Proposed Definition of Consensus

Based on further discussion, those present determined that the definition of consensus must be *full consensus*, meaning that any of the formal stakeholder participants will have the ability to veto a recommendation if they are unable to live with it.

Other Collaborative Process Elements

- *Proposed Process Timeline* (page 4 of the September *Executive Summary*). Those present suggested that a joint meeting with the NPFMC Fur Seal Committee would not be needed.
- *Proposed Interaction with NPFMC*, there was insufficient time to discuss this process element.
- *Budget and Funding Strategies* were briefly discussed—see Next Steps.
- *Definitions*, there was insufficient time to discuss this process element.
- *Information Needs*, many needs were identified during the day-and-a-half of presentations, but the group did not have time to discuss, refine or prioritize those identified.

Additional Recommendations

- Broaden the Awareness of the Pribilof Islands Collaborative
This will ensure that those who can help implement are involved early in the process. Those mentioned were:
 - Funding agencies
 - Economic Development organizations
 - Denali Commission
 - State and Federal agencies
 - Representatives from Congressional Delegation
- Ensure the issues the Pribilof Islands Collaborative addresses are not duplicative; this will help make the effort more fundable.

Next Steps

Actions useful to take before the next meeting:

- Formalize participation from each stakeholder group.
- Seek funding from Rasmuson Foundation, other private sources, and Congressional Delegation. (It was suggested that participation needed to be formalized first before any letters are sent.)
- Current Steering Committee continues to function as it has, including revising budget based on the discussions at this meeting.
- Determine date of next meeting: Either March 2–4 and April 7–9 as two possible dates (see note below). The date will largely be dependent on when the Pribilof Islands RAB (Restoration Advisory Board) meeting will be held, as the Collaborative wants to avoid any scheduling conflict with those meetings.

April Meeting Date: April 6 and 7 in Anchorage. Discussions after the January meeting revealed that April 6–7 would ensure the greatest level of participation, and have the least scheduling conflict with other important meetings.

May Meeting Date: Meeting date set for Sunday, May 2 on St. Paul Island.

Proposed Agenda Items for April

Purpose of the next meeting is to formalize the Pribilof Islands Collaborative by having the formal designees from stakeholder groups participating. The following agenda items were also identified:

- Administrative Issues
 - Items from January meeting not addressed:
 - Timeline
 - Interaction with NPFMC
 - Budget & Funding Strategy
 - Definitions
 - Organizational structure
 - Name
 - Logo
 - Usefulness of MOU's with other organizations
 - Locations of Meetings
- Proposed Issues to Address
 - Strawman Problem Statements
 - Linkages of issues, e.g., ecosystem approach and concerns with single species management
 - Identified Research Areas—Now What?
- ***FUN!* Create time for socializing.**

St. Paul Island Beach Clean-up

To conclude the meeting, Ron Clarke of the Marine Conservation Alliance and Phil Zavadil of the Tribal Government of St. Paul Ecosystem Conservation Office provided a short presentation of *Beach Clean Up* on St. Paul in previous years. They invited anyone who wanted to help, to please join them April 28–May 4. Volunteers are needed to help remove the massive amounts of fishing gear, nets and debris washed onto the beaches during the winter in preparation for the coming northern fur seal breeding season.

There was a discussion of a Pribilof Islands Collaborative meeting on May 5–6 or on Sunday, May 2 (see note previous page) associated with the *Beach Clean Up*.

Research and Funding Needs Identified by Presenters and Through Discussions

Halibut

- Changes in food habits of mammals and birds.
- Changes in distribution and abundance of forage fish.
- Temperature effects on halibut distribution.
- Spatial recruitment patterns.
- Better genetic stock studies.
- More tagging sites along the Aleutians.
- Distribution and abundance of forage fish.
- Analysis of spatial data and age of bycatch.
- Investigate changes in the food habits of seabirds and fur seals. Are these changes a result of depletion of preferred forage fish?
- Investigate apparent slow growth rates of halibut. Lots of small fish are caught—hard to find large males. Both sexes and across the range, growth rates seem slow.

Crab Around the Pribilof Islands

- Better stock assessment methods.
- ADF&G pot surveys/ habitat associations: Try to locate areas (none known) where Red King Crab (RKC) can be caught without bycatch of Blue King Crab (BKC).
- BKC rearing study.

Seabirds

- More at-sea projects (what's happening out there drives what happens at the colonies).
- More telemetry studies to determine what at-sea areas are critical.
- Study of auklet productivity.

Ecosystem Dynamics

- There are many needs to understand ecosystem dynamics. For example:
 - What the various species of concern eat.
 - How that affects their reproduction.
 - Why they die.
 - Where they winter.
 - What are the unseen and unpredictable consequences of big removals of biomass (such as most of the great whales)?
- Funding Support
 - Pribilovians can help scientists get the money they need for research (since they are the stewards of the Islands).

Community-Based Monitoring

- Pribilof Islands Stewardship Program has a small grant from the U.S. EPA to establish community-based monitoring projects on the Pribilofs and in other Alaskan and Russian Bering Sea coastal communities.
- The Stewardship Program needs input from communities about what to monitor.

Note: World Wildlife Fund has also recently received funding from the National Science Foundation to establish a community-based monitoring program on the Pribilof Islands and several other Bering Sea coastal communities.

Traditional Ecological Knowledge

- Better documentation of ecosystem, species, and changes over time.

Whales

- Large whales: Right whale critical habitat petition is being advanced, but no designation yet. Need research to see what that critical habitat is (need to define “essential elements”).

Northern Fur Seal Conservation Plan Update with Revisions

- A new plan has been drafted but not yet finalized under the co-management agreement between the tribes and NMFS.

Fur Seals

- Focus on juvenile seals:
 - Health of pups when they leave the Islands.
 - Where they go.
 - Where they return to.
 - Has there been a change in average length of foraging trips in recent years? Is the length of a foraging trip correlated with food density? Do individuals have to go farther/ longer to catch food today? (Note: This is relevant for females on the breeding grounds, but not so much for juveniles.)
- Bogoslof Island: Origin and composition of this population requires further study.
- Changes in survival, condition, and reproductive rates.
- Explore how fur seal research can be better coordinated with research on other species, e.g., seabirds.
- How do we separate the effects on these species of suspected overfishing/resource extraction and climate change?
- Is there really competition between fisheries and these species? Just because they consume the same items doesn't mean they are competing to the detriment of the marine mammals.
- There are plans to continue the study on causes of mortality, but funding is appallingly low.
- Need to repair/rebuild catwalks to allow access of researchers to breeding sites.
- Develop comprehensive research strategy and funding requirements by initially determining:
 - Where research funds currently are, what and who they fund.
 - What research is needed.
 - Prioritize research needs.
 - Develop awareness to ensure necessary funding.
 - Fur seal research funding desperately needed.
 - Summary of types of research done/ being done on fur seals would be helpful.
 - This Collaborative could help identify novel sources of funding.

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