

Alaska Marine Ecosystem Forum

MEETING SUMMARY

January 23, 2008, 1-5 pm
Boardroom, New Federal Building Annex, Anchorage, AK

The following member agencies attended the meeting. Underlined participants represented their agency.

North Pacific Fishery Management Council (NPFMC)

Eric Olson, Chair
David Witherell, Deputy Director
Diana Evans, NEPA Specialist

National Marine Fisheries Service (NOAA Fisheries)

Jon Kurland, Assistant Regional Administrator for Habitat Conservation

Fish and Wildlife Service (FWS)

Leonard Corin, Fisheries and Ecological Services Supervisor
Will Meeks, Deputy Refuge Manager, Alaska Maritime National Wildlife Refuge
Denny Lassuy, Invasive Species Coordinator

National Park Service (NPS)

Jeff Mow, Park Superintendent, Kenai Fjords National Park

Bureau of Land Management (BLM)

Gary Reimer, Field Manager, Anchorage Field Office

Minerals Management Service (MMS)

Dan Sharp, Fisheries Biologist

Environmental Protection Agency (EPA)

Marcia Combes, Director, Alaska Operations Officer

17th Coast Guard District (CG)

CPT Steve Hudson, Chief of Prevention

Alaskan Command (ALCOM)

Jerome Montague, Tribal Affairs / Natural Resources Advisor

U.S. Army Corps of Engineers (COE)

Clarke Hemphill, Acting Chief, Project Formulation Section

Department of Environmental Conservation (DEC)

Larry Hartig, Commissioner
Leslie Pearson, Program Manager, Prevention and Emergency Response Program
Doug Dasher, Environmental Engineer, Alaska Monitoring and Assessment Program
Terri Lomax, Environmental Program Specialist, Alaska Monitoring and Assessment Program

Department of Natural Resources (DNR)

Randy Bates, Director, Division of Coastal and Ocean Management

Also present at the meeting:

Brian Allee, Executive Director, Alaska Sea Grant
Susan Murray, Director for the Pacific, Oceana

Introductions

Jon Kurland, as Chair of the AMEF, opened the meeting and attendees introduced themselves.

Agency briefings

Each agency present at the meeting gave a brief update on activities of interest with respect to the Aleutian Islands or other Alaska marine ecosystems. Some agencies provided handouts, which are attached to this summary.

Jon Kurland – NOAA Fisheries (handout attached)

Mr Kurland provided a handout to update the Forum on NOAA Fisheries' activities since the July 2007 meeting. The agency will soon publish a proposed rule implementing habitat conservation measures for the Bering Sea, which restrict trawling to areas that have been trawled before, and prohibits trawling in some nearshore areas. In the Arctic, the Council and NOAA Fisheries are developing a Fishery Management Plan to prohibit fishing in the Chukchi and Beaufort Seas until more information is available to assess environmental impacts.

NOAA has also formed an Alaska Regional Collaboration Team (with the acronym ARCTic) which is trying to do outreach, and improve NOAA's integrated services. The lead for this team is Laura Furgione, regional director of the National Weather Service.

The agency is involved in a number of Endangered Species Act listing determinations, especially for Cook Inlet beluga whales, and Lynn Canal Pacific Herring. A determination on these species is expected by April 2008. The agency has also received a petition to list ribbon seals.

NOAA's Alaska Fisheries Science Center is planning a marine fish survey in the Beaufort Sea in August 2008, and hopefully a companion cruise in the Chukchi Sea (but they are still working on arranging vessel time for that).

Dr Jerome Montague – Alaskan Command

The Department of Defense is showing increased interest in the Arctic, especially considering increased Russian interest in that area. The Department is trying to pull together funds to look at effects of climate on training grounds.

Dr Montague also reminded the group that the Alaska Forum on the Environment takes place in a couple of weeks time, in Anchorage, at the Egan Center.

Randy Bates – Department of Natural Resources

Mr Bates is the director of a newly created division with DNR, the Division of Coastal and Ocean Management. One focus of the division is on activities that are happening on the outer continental shelf, and to make sure that all the State partners are working in coordination. Their mission is to implement coastal management, implement the coastal impact assessment program, administer the coastal land program, and to deal with Federal initiatives affecting the oceans (except for issues relating to fisheries or allocation).

Another upcoming meeting that the Forum may be interested in is Coastal America.

Marcia Combes – Environmental Protection Agency

Climate change is a big issue for the EPA, nationally and regionally. A climate change strategy for Alaska will be out in March or April, 2008, for public comment. Although EPA Region 10 comprises four states, Alaska, Oregon, Idaho, and Washington, for climate change, Alaska has a different situation than the other three states. The Alaska strategy is primarily focused on adaptation efforts; mitigation opportunities are not so abundant in Alaska, although there is some potential relative to greenhouse gas mitigation.

EPA is working with DEC and the State panel on the Arctic. Issues that affect marine ecosystems are eroding communities and associated issues, such as relocation. Also eroding coastal landfills are an issue, and the EPA is trying to sort out who has jurisdiction and primary responsibility for the issue, and where to find funding sources. This has proved to be more complicated than it would appear on the surface. The EPA is also looking at emergency response issues, whether resources are appropriately positioned, and are the collaborative frameworks in place to respond.

The EPA is primarily involved in Alaska oil and gas issues through its role as National Environmental Policy Act (NEPA) analysis reviewer. The sector is pretty involved in the Chukchi and Beaufort Seas, and some action is anticipated for the North Aleutian Basin, relative to MMS' offshore lease sales. EPA is working with the Borough and other interested parties, to get their concerns on the table early. Lease sales, exploration, and permitting activities, all require NEPA review. EPA is trying to prepare for upcoming reviews by getting its resources in place to allow those activities to proceed in a timely and responsive fashion.

As an overlay to this and other activities, the EPA works very closely with the tribes. For example, they are involved in an environmental capacity development program, which is an opportunity for the tribes to assess their own needs and set their own priorities. EPA also has the lead for Federal agencies for environmental justice. Although different tribes understand the Executive Order to mean different things, it is still important to pay attention. Particularly as funding shrinks, and the government has fewer resources to deal with issues such as coastal erosion, it is important to have tribal input.

Relative to the marine ecosystem, the EPA also does monitoring of seafood processing, and water and wastewater treatment plants; whether these facilities are working within their permits. The EPA has an enforcement program, for example they are currently trying to work out issues in Unalaska.

Ms Combes is also working to try to get Alaska a fair share of funding for programs such as the coastal mapping project, which is to be discussed separately on the agenda. One potential opportunity for collaboration may be the upcoming visit of the EPA research vessel. The M/V Bold generally focuses on ocean and coastal monitoring on the east coast and the Gulf of Mexico, but it is making a trip in 2008 to the west coast and Alaska. The intent is to do baseline sampling work. The schedule has not yet been confirmed, nor the geographical range of the trip, but the timeframe is likely to be in Alaska in the June-July. Chris Meade in the Juneau office is the primary point of contact.

Captain Steve Hudson, US Coast Guard

The Coast Guard is working collaboratively with DEC to get the Aleutian Islands risk assessment off the ground, but that will be discussed more separately on the agenda. With respect to the Arctic, the Coast Guard has developed an operation plan for summer 2008. All Coast Guard services will eventually need to be carried out on the north slope, so the agency needs to figure out logistically how to accomplish that. The intent is to spend this summer first verifying what is going on in the Arctic (there has been anecdotal information about increasing traffic, etc.), and then, to determine what will the agency need to do

missions up there. The Coast Guard has C130 flights that fly up and over the Arctic about every 2 weeks, and they are open (given space constraints) to people who want to fly along, for science purposes. The Coast Guard cutter Healy, which is an ice breaker, is scheduled to be in the Arctic for most of the summer. The agency is trying to get the Polar Sea to come up too, to do specific missions, such as exploring shipping, and perhaps science. Then a buoy tender is going up, to look at what will be required for navigational aids if vessel traffic increases, particularly in Bering Strait.

The Coast Guard is heavily involved in coastal community engagement right now, in the Arctic. Admiral Brooks is traveling to many coastal communities, visiting with elders. Later in the summer, as an exercise, the Coast Guard will deliver a couple of “force packages” (a combination of vessels and aircraft) to Barrow, to see what it would take to do such a thing in the Arctic.

The group asked Captain Hudson about funding for the proposed Arctic exercises, and whether these activities will require funding to be reallocated from existing southeast and southcentral Alaska missions. Captain Hudson noted that headquarters had approved the concept for the Arctic exercises, and funding would be discussed in the next month. The Coast Guard does not want to pull money from other activities in the rest of Alaska. This summer’s Arctic activities are designed to allow the Coast Guard to determine what level of funding would be required to support Arctic missions in the long term.

Jeff Mow, National Park Service

The NPS has developed an national Ocean Parks Action Plan, as a tier-down from President’s Ocean Action Plan. Since that time, different regions in the NPS have come up with their own action plans with regard to ocean stewardship. In December there was a meeting of park superintendents and regional management, and one of the issues discussed was climate change and ocean areas. The Strategic Plan for the Pacific Ocean Parks is currently drafted, and the NPS is trying to finalize the plan this spring. Mr Mow noted that he could email the plan if anyone was interested in seeing it.

Clarke Hemphill, US Army Corps of Engineers

The COE hosted the 2008 Alaska Regional Ports and Harbors Conference in early January, which discussed ports of refuge, fishing ports, and deep draft ports. A summary of the conference is being written, and will be available soon on the COE website. The conference agenda and executive summary are already available at <http://www.poa.usace.army.mil/en/cw/index.htm>. Participants included State and Federal agencies, representation from native corporations, villages, and some of the boroughs. The purpose of the conference was to develop strategic and long-range planning for Alaska’s ports and harbors.

Lenny Corin – US Fish and Wildlife Service

Endangered Species Act (ESA) trust species. The USFWS proposed listing the polar bear under the ESA last year, and a final decision was expected by mid-January. The decision has been delayed, and hopefully will be ready by mid-February. The agency received over 500,000 comments on that proposal, more than for any other species ever, and the comments have overwhelmed the marine mammal office. Sea otters have been listed from western Cook Inlet through the Aleutians (one of the three populations in Alaska). The next meeting of the recovery team will be in mid-April, in Anchorage. Under the court order, the agency is required to propose critical habitat or determine that none is required by October 2008. The agency has allocated funding to investigate Kittletz murrelet, and may now go ahead with study to list the species under ESA. The bird species is found out towards the Aleutian Islands, associated with glaciers or places that had glaciers (bare rock).

Marine Mammal Protection Act (MMPA) trust species. In 2006, with the support of other agencies, the USFWS did airborne thermal imagery on walrus, to get a population estimate (the agency has never had a population-wide estimate before). This June, the agency will meet with an expert at USGS to interpret the data, and will meet with the Russians in July. Hopefully, the agency will have something available for the public by end of year. The estimate is only a point estimate, though, and does not give information on the population trend. Under MMPA, the agency is also looking at incidental take regulations for oil and gas exploration/seismic work in the Chukchi Sea, for the next five years. In order to allow for this next year's seismic work, the agency needs to publish its finding in the FR by May 1.

Also, the agency is doing a coastal change analysis in Western Alaska. USFWS previously looked at coastal change in a limited area of the north slope, and hopefully the report on this work will be out this year. The agency's other big project to report is the Rat Island Eradication Program, which Will Meeks, the Deputy Refuge Manager, will discuss.

Will Meeks – US Fish and Wildlife Service – Rat Island Eradication Program (handout attached)

The USFWS has been successful at removing fox from islands before; fox introductions depress seabird populations and result in low reproductive success. The agency has also worked on programs to remove ungulates; ungulates are harder to remove as they provide economic benefits, and it is more controversial to try to remove them from islands, even though they are destructive to the native habitat. This project is the agency's first effort in Alaska to remove rats. Rats are responsible for 50% of species extinctions worldwide. Rat introductions are more of a problem than oil spills, as oil degrades over time, and rat populations just increase. The USFWS is behind the curve globally when it comes to rat eradication other parts of the world and nation have been much more proactive, for example, New Zealand and Hawaii. This project is garnering national attention. When it is successful, it will be the third largest eradication worldwide, although the island represents only 7,000 square miles.

It is believed that the rats became established on Rat Island in the 17th century, following a Japanese shipwreck. There is evidence that rat eradication will be beneficial for seabirds on the island, as there is a little island off Rat Island that does not have rats, and still has nesting for various birds. The agency has one summer of monitoring on the island as baseline information, and it will take two years of post monitoring to assure that the procedure has removed every single rat. Helicopters will spread a rodenticide via bait, which will be delivered twice to every rat territory on the island over a 14 day period. The project is scheduled for October, which will minimize any impact on birds and their nesting, and animals and their pupping. As part of the project, the agency wants to do other things such as a midden heap analysis, to look at types of birds that were there before rats.

The agency just finished an environmental impact statement on this project, and there is a lot of support for it. The USFWS is partnering with The Nature Conservancy, and the Island Conservation (an environmental group out of California), and plans to begin fieldwork in 2009. It is partially funded out of money from the Selendang Ayu settlement (money came to the agency for restoring habitat for seabirds). There are many opportunities for cooperation and collaboration with member agencies of the AMEF: the project still has to work out EPA registration issues, coastal zone management planning (DEC), Steller sea lion issues with NMFS (due to the historic haulout on the island), and Section 7 consultations internally with USFWS. Mr Meeks is willing to come and talk to anyone who is interested in the project, either himself or sending one of his staff.

The group also questioned Mr Meeks about the ungulate eradication programs. Mr Meeks noted that all refuges are going through re-evaluation of conservation plans, to be finished by 2012. Many of the refuge's current policies indicate that ungulates on the Aleutian Islands are not appropriate or compatible. Obviously the public will have an opportunity to comment through the re-evaluation of the plan.

Currently, USFWS cannot tell anyone not to put ungulates on their land, they can only enforce the prohibition of animals on refuge land. An example of the destruction of habitat by ungulates is the island of Chirikof – the habitat now consists of sand dunes, instead of the Aleutian tundra habitat. But this issue is political, and each island has its own flavor and flair.

It was noted that BLM is currently beginning an environmental analysis on reindeer grazing on the Seward peninsula, and will be collecting a lot of information on the effects of reindeer grazing in that document.

Dan Sharp, Minerals Management Service

The next lease sale for the north slope is scheduled for next month. Some people are linking the lease sale with polar bear issues. If the lease sale get approved, then MMS will prepare for a multi-sale, two in the Chukchi Sea, and two in the Beaufort Sea.

The North Aleutian Basin lease sale is in the MMS 5 year plan, and loosely scheduled for 2011. There will supposedly not be a seismic EIS with respect to that initiative, as seismic explorations have already been done for that area. This may change once lease blocks are selected.

MMS is supporting a study for forage fish and nearshore juvenile salmon on the North Aleutian peninsula. The agency is definitely interested in new information about the Arctic; analysts are continually citing studies from the 70s. Under an EIS, MMS tries to look at effects over the life of its projects, which may be 20-40 years. With climate changes predicted, there is not much available information, and so the agency is very much interested in ongoing research.

Larry Hartig – Department of Environmental Conservation

In September 2007, the Governor created the Alaska Climate Change Subcabinet, which is a smaller group of the Governor's cabinet, and which Mr Hartig is chairing. Members include DEC, the Department of Transportation, DNR, the Department of Commerce, Communities, and Economic Development, a liaison from the University of Alaska, and John Katz from the Governor's Washington, DC office. There are also informal participants, such as the Emergency Response Division of the Department of Military and Veterans Affairs. Their purpose is to come up with adaptation, mitigation, and research needs, and their first priority is to address the needs of the most "at risk" communities.

A workgroup was set up to designate which communities are "at risk", It is chaired by Trish O'Pheen (COE), and someone from the State Department, and includes a representative from the Denali Commission, and emergency response people. They started working from the GAO list. The workgroup has been meeting every 2 weeks, and has brought in people from vulnerable communities. In the next 60 days, they will be producing a report of the most vulnerable communities, and the most vulnerable services in those communities. Impetus on this issue has come from Senator Stevens, who has highlighted the need to move along more quickly to help these communities.

At the next Subcabinet meeting, Mr Hartig will roll out a plan for various workgroups to work on particular aspects of adaptation and mitigation. This will also be presented at the Alaska Forum for the Environment, including what the workgroup process will achieve. The process to take about a year, then will be used to formulate a proposed strategy to the Governor. The research workgroup is chaired by Bob Sharp, and Ken Taylor (ADFG). As the mitigation and adaption workgroups go ahead, they will identify research needs that will then be passed to the research workgroup. The research group plans to come up with a strategy document for research, rather than detailing all examples of needs.

The next Subcabinet meeting is Feb 13th 1-5pm, and they are anticipating having Bob Karouse speak to provide an update on the Arctic climate assessment, as well as one of the key people who worked on the Stern report (on economic impacts), who is coming over from Britain. The meeting will be in Anchorage, at the Egan Center, and it should be on the Alaska Forum for the Environment schedule. Contact Larry if there are any questions.

On a different issue, DEC put out their updated report on greenhouse emissions sources (manmade, not natural) in the State. A reason for putting out this report is to show how Alaska is different from other states, and has different issues. The biggest issue emitter is the oil and gas industry, followed by air transportation. The transportation figure attributes to Alaska, for example, the total amount fuel that is taken aboard by commercial jets in Alaska, and assumes that all that fuel was burned in the state. This is different from other states, for example, that have for example car fuel emissions as their number one source. Alaska's emissions sources are not under our control in the same way. Someone from EPA is likely to be detailed to work specifically on these issues with the DEC.

One of DEC's activities for this winter is to look into the issue of mercury and persistent organic pollutants. DEC is looking for help from State and Federal agencies. There is currently fairly limited monitoring of fish in the state. The Governor had a press release this summer about health advisories for most at risk populations, particularly with regard to older flatfish. The State wants to be able to track this pollutants. At an upcoming meeting of the Oceans subcabinet, they will look at sources of funding for long-term fish monitoring. For the program to be successful, though, it really needs to address and answer long-term questions, including trends. DEC and the State are looking for partners and funding sources.

Mr Corin mentioned a study the USFWS did two or three years ago, looking at mercury and other pollutants in freshwater fish. The study took place out of the Fairbanks office.

Mr Hartig also noted that he is one of the six trustees for the Exxon Valdez Oil Spill (EVOS) Council. He thinks it is time to evaluate the direction in which the trust is going, given that it is twenty years since the spill, and lots of money has been spent on habitat restoration and research. There are two major issues left: some species haven't recovered (e.g. herring), and how does this affect communities; and lingering oil has been noticed in the last couple of years - how extensive is the problem, what are the opportunities for more proactive remediation. If we have done everything we can, is it more of a long-term monitoring issue? Over the next two years, the EVOS Council will be looking hard at future directions, and would like public input.

Eric Olson, Diana Evans – North Pacific Fishery Management Council (handout attached)

Mr Olson is the new Chair of the Council, having taken over for Ms Stephanie Madsen in October. The Council's Aleutian Islands Fishery Ecosystem Plan is now available, and pulls together information about physical, biological, and socioeconomic interactions in the Aleutian Islands ecosystem. The Council has published a brochure summarizing the FEP, which was distributed to the group and is available on the Council website (http://www.fakr.noaa.gov/npfmc/current_issues/ecosystem/AIFEPbrochure1207.pdf).

The Arctic FMP was already mentioned by Mr Kurland, but is under development by the Council, and public input is welcome. Salmon bycatch is an important topic for the Council at the moment, particularly Chinook bycatch, which is almost at and all-time bycatch high. At the February meeting, there will be an update about genetic work on bycatch, providing information about the stock of origin through the end of 2006. This should give a better understanding about which stocks are impacted. A particular concern is how much of the salmon bycatch originates in western Alaska streams. Other Council initiatives are addressed in the handout, however Mr Witherell advised the group about a national report that is being conducted out of headquarters on deep sea corals (<http://www.nmfs.noaa.gov/habitat/dce.html>).

Gary Reimer – Bureau of Land Management

BLM is moving forward with resource management planning in Alaska. A lot of controversy has resulted from the issues arising out the Pebble mine permitting, even though BLM is not responsible for that permit. The Ring of Fire environmental impact statement is in its final stages.

BLM's land transfers are starting to take hold. The State has been working closely with BLM, and they are starting to see land pattern changes. Many of BLM holdings now belong to State, village corporations. Mr Reimer would be willing to talk about it more if anyone is interested.

Update on Alaska/Aleutian Islands Research Plan (Brian Allee) (handouts attached)

The impetus for this project is out of the President's Ocean Action Plan, which talked about conducting regional research plans. National Sea Grant came up with funding on a competitive grant system, and based on the input received from the State of Alaska and the AMEF, the Alaska project focuses on the Aleutian Islands. The project pulls together existing research plans for the Aleutian Islands from many sources and agencies, and will put them in a document with links, so people can access the information. SeaGrant is trying to coordinate stakeholder input to the research plans, in order to prioritize, for example, the top ten research needs in each theme. The focus is on management-critical research areas. They have developed a research survey for stakeholder input, organized by six themes. SeaGrant would like to send AMEF a draft based on the results of the survey, and have agencies come together in a steering committee, using an analytical hierarchy technique, to prioritize research needs. The final report will come out at the end of 2008. Ultimately the report will have top priorities by theme, links to research plans, reporting on what exists at the present time. The document will be dynamic, and accessible on the website. There is also funding to update the document over the subsequent three years. SeaGrant hopes that some kind of implementation plan will follow from the priorities. Kurt Byers is coordinating this program for Alaska SeaGrant.

Mr Allee asked the AMEF to fill out the stakeholder forms, and provide input on who specifically should be on the steering committee. He would like to receive names by email in the next couple of weeks.

Update on the Aleutian Islands Risk Assessment (Leslie Pearson)

The Aleutian Islands Maritime Risk Assessment project has now begun. The National Academy of Sciences formed a committee of 8 people, from all different cross sections, to begin the scoping process for the Aleutian Maritime Risk Assessment. Their task is to come up with a methodology for conducting the risk assessment, not with the assessment itself. During the last week of October, the committee was in Alaska - 2 days in Anchorage dealing with stakeholders, interest groups, etc., and then out to Dutch Harbor. As none of the committee members had been out there before, it gave a good geographic reference point to the landscape. The Committee met many locals, and went out in a tugboat bringing in a huge container ship. The meetings all went well.

The Committee's second meeting was back in Washington, DC, in January. The primary focus was to look at data, and data gaps (casualty information, vessel traffic information). The committee brought in other experts who have been conducting marine traffic safety assessments elsewhere, as well as a panel of mariners who have done work in the Bering Sea, and piloted cargo ships. Most of the other marine traffic safety assessments have been very focused – the Aleutians is a much bigger project (in terms of geographic size). The third and final meeting will be in mid-March, and the committee intends to have a project design ready by the end of the May. Then DEC can start the actual risk assessment for the Aleutians. There is about \$3 million available for the Aleutian assessment. (As a comparison, a very

focused assessment in Puget Sound cost \$2.2 million, for the impacts of adding just one berth). The State also has some funding to begin a risk assessment for Cook Inlet, and will use an adjusted version of the project design for that too.

As a follow up from last time, the emergency towing systems in Unalaska are in place, and the deployments and testing were successful. Their object is to keep vessels off the rocks. There are two systems, one for 50,000 tons or less, and one for 50,000 tons or greater.

Update on oil and gas lease in the North Aleutian Basin (Dan Sharp)

Most of the information to report was covered earlier. The agency is in a state of flux about this lease sale, and does not yet have critical dates laid out. Until the dates are determined, the agency is trying to take advantage of appropriate forums to talk to stakeholders. Formal pre-scoping will likely take place this summer.

Mr Allee noted that Sea Grant is holding a workshop on issues relating to the North Aleutian Basin lease sale, March 18-19 at the Marriott. The workshop is intended to be a fact-based non-advocacy workshop. SeaGrant is facilitating and coordinating the workshop in partnership with the Bodø University in Norway. It is a public meeting, and the agenda will be on the SeaGrant website soon. The funding is cooperative – many groups are sharing costs of workshop (commitment levels are currently at 50%). There will also be a mini-discussion item at Kodiak ComFish, March 23, and follow up meetings in Bristol Bay and Unalaska, and maybe at the Bodø University in Norway. The intent is to elicit the concerns from the community, for example about contaminants, research needs and priorities, and the implementation approach.

Alaska Monitoring and Assessment Program (AKMAP) Coastal Survey of the Aleutian Islands (Doug Dasher) (handouts attached)

The Alaska Monitoring and Assessment Program is related to the national Environmental Monitoring and Assessment Program (EMAP). EMAP was originally designed as a large scale monitoring program, to provide reports to Congress and the public, on status of nation's east coast. It was extended to the west coast some years later, and after some advocacy, to parts of Alaska. Alaska was divided into five regions, and the Southcentral region was the first project in Alaska.

In 1999, various areas in the lower 48 were designated as coastal index sites, and received more intensive monitoring. This has not yet happened in Alaska, but as a result of funding in 2001, a selection of estuaries around southcentral Alaska was chosen as the first site for the monitoring assessment process. 50 index sites were chosen for a range of monitoring of water quality, sediment quality, and fish and benthic organisms. The traditional studies had focused on soft sediments; the program is not evolved for rocky benthic sediments. As a first effort in 2002, the study did a triad analysis on sediment quality. Although the EPA developed standard parameters for these coastal surveys in the 1990s, the Alaska studies have added others (e.g., parameters monitored from the Exxon Valdez Oil Spill). The Southeast region was surveyed in 2004, and DEC has just now received the fish sample results back from the laboratory (progress was delayed as the samples were analyzed at the EPA's Gulf Breeze Laboratory, which was impacted with hurricanes and Gulf monitoring).

Field surveys in the Aleutians were completed in 2006-2007. The original plan was to sample soft sediments, but a much smaller percentage of those is available in the Aleutian Islands, where there are many rocky habitats. So the project focused on the nearshore in Aleutians, which seemed like a priority. A new method was developed for the Aleutians, using dive transects. The DEC worked closely with the University of Alaska Institute of Marine Science, and had NOAA folks involved. They developed

methods based on what they encountered. They have videos, and counts of organisms. They did not do trawl sampling, only longline sampling for contaminants in fish. The fieldwork included intertidal surveys at each site where it was possible, including a description of algae, etc. These aspects are also not a part of a standard EPA assessment, but are important to understanding climate change and acidification. Atka mackerel uses the intertidal area heavily, especially in Segum Pass, where it sets up territory and nests underneath the rocks. The survey detected a new species of kelp, and a new sea anemone was identified.

The study looked at DDT in fish tissue. DDT is still being manufactured in Asia (it is very effective against malaria). The study did see DDT in the Aleutians, but previous studies have not seen it in fish in southcentral or southeast Alaska. DEC is working on some samples in conjunction with the seafood program now, using dusky rockfish. These samples are able to look at a finer resolution.

DEC had the opportunity to partner with quite a lot of people, and it could not have been done without partnership. The Aleutian survey was funded with a \$1.4 million earmark. EPA was willing to come up with about \$300,000 for the survey, but the boat alone cost around \$500,000. NOAA supplied a person for 60 days field time (over the 2 year study); Reid Brewer (SeaGrant Marine Advisory Program) helped with connections; various contractors also helped out. The total cost of the survey does not include DEC salaries. DEC hopes to have a draft report on the Aleutian survey out this fall, and will report at the Marine Science Symposium and the Alaska Forum on the Environment next year.

Next on the agenda are the Chukchi and Beaufort coastal surveys. \$1.4 million is available for the surveys, which is probably enough for the Chukchi Sea but not for the Beaufort also. To bring a boat up from Seward for 60 days, costs about \$6-700,000, which doesn't include the fact that insurance rates go much higher when boats go north of the Bering Strait (because of fewer rescue facilities). Molly McCammon is working with DEC to set up a workshop for the Chukchi, Beaufort, and Cook Inlet surveys, to try to start some forward planning. It has not yet been scheduled, but will be sometime soon. Other groups have come forward for offering partnerships, for example, NOAA's national mussel watch program, and others (taxonomic collection of algae, sea urchin work).

The national EMAP program in the lower 48 conducts surveys annually, and rotates every 5 years through fieldwork in lakes, rivers, streams, coastal, wetlands. National funding is not available to support Alaska's repeat monitoring, which is what allows you to get to trends, and be valuable for the long-term. The program also needs to integrate various compartments – oceans, freshwater, watersheds, wetlands; and to integrate with modeling. There are lots of models for food webs and nutrient transport, but no comparable models for contaminants.

Arctic Marine Ecosystem Issues (Jon Kurland)

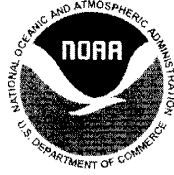
Led by Mr Kurland, the group discussed the focus of the AMEF, and considered whether it would be appropriate to shift its focus to Arctic marine ecosystem issues as all agencies seem to be devoting more attention to the Arctic. The group discussed whether to formally switch focus, but instead concluded that at the next meeting, we might have an Arctic theme for invited presentations and briefings. The group was not in favor of dropping focus on the Aleutians altogether, and supported the approach that agencies should brief the AMEF on any issues of relevance, Alaska-wide. The group determined that the Memorandum of Understanding (MOU) that created the AMEF gives the agencies the latitude to discuss any marine ecosystem issues that are relevant to Alaska, and that there is no need to amend the MOU at this time.

Next meeting

The group concurred that we should aim to hold AMEF meetings every six months. July 2008 was identified as the timeframe for the next meeting.

Issues identified for discussion at the next meeting include the following:

- Election of officers. Officers will remain the same for the July meeting, but will then change. The Memorandum of Understanding is structured so that the current Vice-Chair, Larry Hartig, will be the next Chair. The group will need to vote for a new vice-chair, however.
- Update on issues: SeaGrant Aleutian Island Research Plan, Aleutian Islands risk assessment
- New issues: focus on Arctic activities, concerns, resource management questions (e.g., how to make Arctic investigations more useful); request a presentation from a representative of the North Slope Science Initiative



NOAA / National Marine Fisheries Service
Overview of Issues Related to the Alaska Marine Ecosystem Forum
January 23, 2008

Background

NOAA Fisheries' mission is stewardship of living marine resources through science-based conservation and management and the promotion of healthy ecosystems.

NOAA Fisheries has three major resource management programs:

- Sustainable Fisheries (groundfish, crabs, scallops, halibut)
- Protected Resources (marine mammals and endangered species)
- Habitat Conservation (protection and restoration)

Issues

- **Proposed rule for Bering Sea habitat conservation measures** – We will soon publish a proposed rule to implement new habitat conservation measures recommended by the North Pacific Fishery Management Council. The regulations will limit bottom trawling to historically trawled areas of the Bering Sea; close nearshore areas to bottom trawling; and establish a Northern Bering Sea Research Area that would be closed to all fishing pending development of a research and management plan.
- **Arctic Fishery Management Plan** – We've been assisting North Pacific Council staff with development of a new Fishery Management Plan for the Chukchi and Beaufort Seas under the Magnuson-Stevens Fishery Conservation and Management Act. The plan would close the federal waters of the Arctic to all commercial fishing except for traditional fisheries. The Council will review a preliminary draft in February 2008.
- **NOAA Alaska Regional Collaboration Team (ARCTic)** – NOAA has formed a regional team to coordinate its programs in Alaska and provide more integrated services to the public. The team includes NOAA Fisheries, NOAA Weather Service, NOAA Ocean Service, NOAA Research, and NOAA Satellite and Information Service.
- **Endangered Species Act listing activities** – A final determination on whether to list Cook Inlet beluga whales is expected by April 2008. We're undertaking a status review for Lynn Canal herring and should make a finding as to whether to propose listing in April 2008. We recently received a petition to list ribbon seals and will make a finding as to whether a full status review may be warranted by March 20, 2008.
- **Arctic ecosystem research** – NOAA's Alaska Fisheries Science Center plans to conduct a Beaufort Sea marine fish survey in August 2008. A similar survey for the Chukchi Sea has been proposed for 2008 and depends on available vessel time. Same-year surveys would serve as a baseline to examine climate change effects as well as a comparison between three large marine ecosystems (Bering, Chukchi and Beaufort).



U.S. Fish & Wildlife Service

Restoring Alaska's Islands

Alaska Maritime National Wildlife Refuge's Invasive Species Program

50 Years of Righting the Wrongs

Storm tossed, mist shrouded islands of the Alaska Maritime National Wildlife Refuge are scattered along Alaska's coast and the 1000 mile long Aleutian chain, a vast archipelago reaching from mainland Alaska nearly to Russia. Forty million seabirds swirl around the cliffs and volcanic slopes of the 2500 refuge islands and islets. The Refuge was established to conserve these seabirds as well as marine mammals, other migratory birds and the marine resources on which they rely.

One would think such far away, rugged islands would be pristine wilderness and indeed 2.7 million acres of the refuge are included in the National Wilderness Preservation System. But beginning in the 1700's, human accidents and actions changed the nature of many of these islands when non-native species were introduced to this seabird paradise. For over 50 years, the Refuge has been undoing this damage by removing the introduced animals, restoring the native ecosystems and bringing the birds back.

Accidents and Bad Ideas

Shipwrecks, stowaways, trappers, government agencies, and homesteaders all introduced non-native animals to the wild islands of the Refuge. The Refuge itself permitted and encouraged some introductions until the 1950's. Over the past two centuries, rats, foxes, ground squirrels, rabbits, mice, cattle, horses, sheep, reindeer, caribou and bison have been introduced to some islands within the Refuge. Plants, invertebrates and fish have also been introduced.



Steve Hillebrand/USFWS

Seabirds have flourished on Big Konuiji Island since foxes were eliminated.

Islands Are Different

Island ecosystems are limited to the species that can swim, fly or drift there. Birds flourish without mammal predators or competitors. Such was the case on Refuge islands before human intervention. But with the arrival of the introduced animals, many bird populations crashed. These island dwelling species had no adaptations to cope with newcomers. In addition, on the tree-less Alaskan islands, birds nest on the ground, on cliffs or in burrows, often accessible to predators.

Success with Foxes

Foxes were the most widespread invasive species on the Refuge. Russians and later the Americans brought foxes to hundreds of islands for the fur trade. Trappers dropped foxes on islands returning later to harvest the offspring. The fox fur trade flourished until World War II brought an end to the industry. Fox fur was no longer worth the cost of trapping.

Foxes decimated ground nesting birds and drove the Aleutian cackling goose nearly to extinction. The only way to undo the damage and restore the natural biodiversity was to remove the non-native foxes. Pioneering Refuge Manger Bob "Sea Otter" Jones began doing just that after World War II when he initiated fox removal on Amchitka Island. This program gained steam in the 1980's until foxes were removed from over 40 islands, restoring more than one million acres of habitat.



© Cornetius Nelo



Once rare, whiskered auklets have increased dramatically since Refuge islands were cleared of foxes.

"Making Birds"

Good news from our restoration work

■ The Aleutian cackling goose was brought back from the brink of extinction once foxes were removed from its former nesting habitat. A rare exception for an endangered species, this bird came off the Endangered Species List as fully recovered in 2001. This bird's population has gone from less than 1000 to over 115,000.

■ The Evermann's rock ptarmigan survived the fox farming era only on rugged Attu Island. Now with foxes removed, the ptarmigan has been successfully reintroduced and is nesting once again on nearby Agattu Island.

■ Puffins, whiskered auklets, and oystercatchers are among the 25 species that have flourished since fox removal. Bird populations have already increased by more than a quarter million birds.

Rats Are Next

Of the remaining introduced species on the refuge, rats are the most immediate threat to Aleutian biodiversity. Rats are voracious predators on birds, chicks and eggs. Worldwide, rats have caused about half of all recorded bird extinctions.

In the 1780's, a Japanese ship brought the first rats to Alaska when it wrecked on an island that would become known as Rat Island. Rats spread as ship traffic increased and harbors were established. World War II led to rat infestation of other Refuge islands as troop ships and landing craft moved throughout the Aleutians. Rats have become established on about ten large islands and several small islets in the Refuge greatly diminishing the native birds and altering the plant life and intertidal communities.

Evermann's rock ptarmigan, a unique Aleutian sub-species, is being re-established on fox free islands.

Rats Still Leave Sinking Ships

Nearly 3000 ships a year pass through the Refuge on the great circle shipping route between Asia and North America putting the Refuge at risk for "rat spills". With an average of two shipping mishaps a year, the Refuge has prepared by assembling ship wreck response kits and training rat spill responders. Although oil spills are bad for wildlife, oil degrades over time while rats multiply.

Partners to the Rescue

The Refuge is not alone in its work to turn the tide on rats. Others, including the Alaska Dept. of Fish and Game, Defenders of Wildlife, National Audubon, World Wildlife Fund, the Aleut Community of St. Paul Island, Kayumixtax, Alaska Sea Grant, and Marine Conservation Alliance, have banded together to halt the spread of rats in Alaska. The Nature Conservancy and Island Conservation have also partnered with the Refuge to restore seabird breeding habitat by removing rats.

Hope For the Future

Rodents have been successfully removed from over 300 islands worldwide, resulting in the explosive recovery of bird populations. Anacapa Island in the Channel Islands off California, Langara Island in New Zealand are a few examples. The Refuge and its partners, The Nature Conservancy and Island Conservation, are committed to applying the lessons learned from these successes to restore Refuge islands. The first step in this partnership is the restoration of Rat Island (see box).

The goal of the island restoration program is to protect and restore the natural diversity of Refuge islands. The results have been dramatic over the last 50 years. By preventing new introductions of invasive species and removing existing infestations, the Refuge will maintain its trust responsibility of protecting native wildlife and plants for generations to come.

Restoring Rat Island



Art Soons/USFWS



Rat Island Facts

- Rats arrived in 1780's. Alaska's first rats
- Located in the Aleutian Islands, 1300 miles west of Anchorage
- Became part of the Refuge in 1913; designated Wilderness in 1980
- 6,861 acres of cliffs, mountains, and tundra
- Virtually no remaining seabirds; few land birds
- No native land mammals

Rat Eradication

- Environmental Assessment. map, photos and Q & As available on-line at <http://alaskamaritime.fws.gov/news.html> or call (907) 235-6546
- Assessment analyzes impacts on refuge resources of no action or rat eradication
- Public comment period open through January 11, 2008
- Comments can be e-mailed to rat_island@fws.gov or mailed to address below



Brad Bentler/USFWS

Alaska Maritime National Wildlife Refuge
95 Sterling Highway, Suite #1
Homer, Alaska 99603
907/235-6546 (phone)
<http://alaskamaritime.fws.gov/>
alaskamaritime@fws.gov
www.StopRats.org

December 2007



Briefing for the Alaska Marine Ecosystem Forum

January 23, 2008

Principal Marine Ecosystem Issues facing the Council

Updates since July 2007

General ecosystem approach issues

Aleutian Islands Fishery Ecosystem Plan

The Council approved the Fishery Ecosystem Plan (FEP) for the western Aleutian Islands ecosystem area (west of 170° W. longitude) in June, and has now published a brochure summarizing the FEP. The FEP is an educational tool and resource for the Council, looking holistically at the AI ecosystem, at the relationships between the different fisheries, physical and biological characteristics of the ecosystem, human communities, and other socio-economic activities ongoing in the area.

The Council's Ecosystem Committee is now considering ways to move forward, building on the content of the FEP.

Arctic Fishery Management Plan

The Council is continuing its development of a Fishery Management Plan for commercial fishing in the Beaufort and Chukchi Seas. Currently, there is no Federal fishery management in the Arctic; with changing climate conditions, there is some indication that commercial stocks may extend their range northwards. Little information is currently available, however, about Arctic stocks or the Arctic ecosystem. The purpose of the FMP is to prohibit commercial fishing in these areas, until such time as sufficient information is available to assess the environmental impacts of such fishing. A preliminary FMP will be reviewed by the Council in February 2008, and the Council's final decision is scheduled for June 2008.

The Council is inviting all interested stakeholders and other agencies to provide input into the development of the plan. Options to be analyzed are: 1) status quo, 2) prohibit commercial fishing in the Arctic, and 3) prohibit commercial fishing in the Arctic but allow fishing for red king crab to continue in the southern Chukchi Sea.

National Study on the State of Ecosystem Science

The reauthorized Magnuson-Stevens Act (2006) requires the NOAA, in consultation with the Councils, to complete "a study on the state of the science for advancing the concepts and integration of ecosystem considerations in regional fishery management." The study should include the following elements:

- Data, information, technology requirements for understanding ecosystem processes
- Integrating ecosystem information from a variety of sources (Federal, State, regional)
- Incorporating broad stakeholder participation
- Accounting for environmental variation
- Council efforts to implement ecosystem approaches

A workshop was held in January 2008, and the study will be written in the coming months.



Fishery Interactions with Non-Target Species

Salmon bycatch in the Bering Sea pollock fisheries

The rates of salmon bycatch in the pollock fisheries have been steadily increasing in recent years. The Council has already made changes to its bycatch area closure management system, through a cooperative agreement with industry. However, the Council is now considering readjusting area closures, and instituting Chinook and chum bycatch caps on the pollock fishery, either at the fleet, sector, or cooperative level. The Council has been monitoring the available genetic information to determine what percentage of the salmon bycatch originates from western Alaska streams.

Management of non-target species (squid, octopus, sharks, sculpins, skates)

These species are managed under the groundfish fishery management plans, but are primarily not the subject of target fisheries. Little information is available about their life history, but they serve important ecological functions in the ecosystem, and they are often poorly surveyed in groundfish surveys. The Council is considering alternative ways to manage these species, to reduce the risk of overharvest a vulnerable stock.

Fishery Interactions with Habitat

The Bering Sea habitat protection measures, approved in June 2007 and reported on at the last meeting, are in the process of being implemented. These 'freeze the footprint' of fishing in the northern Bering Sea, to prevent habitat impacts that might be associated with the changing distribution of commercial stocks due to global climate change.

Fishery Interactions with Seabirds and Marine Mammals

The Council continues to be active in considering fishery interactions with Steller sea lions. The Council and NMFS have requested a re-consultation on groundfish fishery interactions with Steller sea lions, under Section 7 of the ESA. The consultation will culminate in a new Biological Opinion, and depending on its findings, the Council will request adjustments to the economically restrictive Steller sea lion protection measures. NMFS anticipates publishing a draft Biological Opinion in April or May 2008.

Seabird interactions with fisheries have been very effectively addressed through gear modifications, to date primarily on longline fishing vessels. The Council is continuing to monitor and adjust its seabird gear modification requirements.

Humans as part of the Ecosystem

The Council is developing a formal approach for addressing stakeholder participation and community consultation in fishery management issues. A discussion paper will be presented to the Council in February 2008, which sets out a methodology for different ways to approach and document stakeholder participation and consultation.



Aleutian Islands Ecosystem Research and Information Plan: Alaska stakeholders asked to help set research priorities

During 2007 and 2008, Alaska Sea Grant will develop an *Aleutian Islands Ecosystem Research and Information Plan*. Key to this plan will be a set of research priorities aimed at addressing gaps in current research and improving scientific understanding of the Aleutian Islands ecosystem. This plan and its research priorities will help local, state, and national marine and fisheries research and management agencies focus their activities more effectively.

Central to this planning effort will be input from Aleutian Islanders and other stakeholders. The opinions, concerns, and needs of the region's residents; commercial, subsistence and sport fishermen; fishery managers; scientists; community leaders; and Natives will serve as the basis for this plan. This will not be a plan written by Washington policymakers. Instead, Aleutian stakeholders themselves will develop the plan and set its priorities.

This plan will focus on the roughly 1,500-mile Aleutian Islands archipelago that lies west of False Pass. The *Aleutian Islands Ecosystem Research and Information Plan* will address the interdisciplinary (ecology, oceanography, fisheries, social, economic) needs for this region of vital importance to Alaska and the nation. It is anticipated that an Aleutian Islands planning effort will serve as a model for the future development and implementation of other Alaska-region plans, and ultimately a comprehensive statewide marine research and information plan.

In the coming weeks and months, you will hear more about this effort. Many of you could be selected for in-person interviews to be conducted by Reid Brewer, the Marine Advisory Program agent based in Unalaska. As the planning effort proceeds, your opinions and counsel will be sought through paper surveys and an online survey on our Web site. Your feedback will be appreciated and used.

To learn more about the *Aleutian Islands Ecosystem Research and Information Plan*, please visit the Alaska Sea Grant Web site.

<http://seagrant.uaf.edu/research/projects/initiatives>

Project Schedule

Task	Completion date
Post stakeholder survey online	February 15, 2008
Gather stakeholder data from online survey, at meetings, one-on-one, etc.	March 31, 2008
Organize and sort data	May 16, 2008
Use steering members and Analytical Hierarchy technique to prioritize research needs	July 31, 2008
Complete report and distribute to reviewers	October 1, 2008
Get feedback from reviewers	October 17, 2008
Make final revisions and submit report	October 31, 2008



AKMAP

ALASKA MONITORING AND ASSESSMENT PROGRAM

Freshwater Coastal



www.dec.state.ak.us/water/akmap

AKMAP is about understanding the overall condition of Alaska's water quality...on a very large scale. Our interest is two fold:

- Reporting the overall condition of all Alaskan waters is DEC's responsibility through the Clean Water Act.
- DEC uses this information to make good decisions about our laws and regulations that protect the Nation's most pristine water sources.

US Environmental Protection Agency only provides partial funding for AKMAP implementation. Partnerships with the University of Alaska, NOAA and other entities are a vital part of these explorations. They lend expertise and add to the holistic picture of water quality in Alaska.

GETTING THE BIG PICTURE OF ALASKA'S WATER QUALITY...

The Alaska Monitoring and Assessment Programs uses a probabilistic sampling design developed by the Environmental Protection Agency. We randomly select sites to sample across a large region to obtain a general picture of the water's health. AKMAP is a cost-effective means of obtaining baseline information for Alaska's 47,000 miles of coastal waters and huge freshwater resources. As Alaska's population grows and development continues, DEC will use this baseline to better manage and protect Alaska's waters. Repeat AKMAP sampling in the future can help determine when and what changes are occurring in the environmental condition of Alaska's waters.



DEC staff Doug Dasher, Jim Gendron and Terri Lomax retrieve a water sample from the icy Aleutian waters, R/V Norseman in the background. Photo by Paul Tate

THE 2006-2007 ALEUTIAN SURVEY

The Aleutian Islands are home to a plethora of wildlife and activity. A major international shipping route crosses through the Aleutian Islands. Only 35 years ago the largest US underground nuclear test was conducted in the Aleutians and 60 years ago major World War II battles occurred in the region. Localized contaminants remain from these major events. Global atmospheric and oceanic pathways transport pollutants, such as pesticides and mercury into this region which bi-sects the North Pacific Ocean and the Bering Sea. The Aleutian Islands and the nearby oceans contain one of the most productive halibut, cod and crab fisheries in the world. Aleuts and other Alaska Natives depend on the rich biology, including Steller Sea Lions, seals and migratory birds, to sustain their culture. The Aleutians offer much for Alaskans in resources and resource management challenges. *(Continued on Page 2)*



Photo by Reid Brewer

WHAT WERE WE LOOKING FOR?

In the summer of 2006, the first AKMAP coastal Aleutian assessment began to provide a better understanding of the nearshore environmental conditions around the islands from Unimak to Attu Island. The work contributes to the EPA National Coastal Assessment Program. The field work was broken into two parts, with the Eastern Half of the Aleutians surveyed in 2006 and the Western half in 2007. As we conduct this work there are a few questions we used to focus the study:

- Are the waters meeting the Alaska Water Quality Standards?
- Do contaminants found in fish reflect exposure to local or global wide sources?
- How does the biodiversity vary throughout the region?



Photo by Roger Clark

HOW WERE THE WATERS TESTED?

Divers from the UAF School of Fisheries and Ocean Sciences joined DEC marine chemists, algae scientists and other researchers on the R/V Norseman exploring the Aleutian Islands' near shore environment. The group traveled hundreds of miles from the western half of Unimak to Attu Island. These environments included rocky and sedimentary habitat, including the extensive kelp beds. Team members collected biological samples; conducted dive transects and gathered physical and chemical water quality data at 23 sites in 2006 and 27 sites in 2007. This collection will be analyzed by scientists for contaminants, physical and chemical water quality and to evaluate biodiversity. Biological specimens, as well as underwater photographs and videos, will be cataloged to document the diversity of the near shore environments.

WHAT TESTS WERE DONE?

- Water chemistry: dissolved oxygen, salinity, pH, temperature, light penetration, turbidity, total suspended solids, nitrogen/phosphorus content, and dissolved carbon.
- Sediments: (when encountered) grain size, total organic carbon, and silt/clay percent.
- Living resources: Chlorophyll *a*, benthic/epifauna community composition and abundance, and observed fish pathologies or parasites.
- Habitat: type, occurrence of macroalgae.
- Contaminants: fish and algae for metals and organics, sediments for metals/organics content and sediment toxicity.

WHAT'S NEXT?

Sample analysis, data entry and interpretation is ongoing. All sample must undergo a quality assurance/quality control review before findings can be released. Findings from this work will be reported in forums such as the Alaska Forum on the Environment, the Aleutian community meetings, by reports and publications and including EPA National Coastal Assessment reports. The 2007 voyage ended the Aleutians expedition, but it marks the continuation of the DEC efforts to complete the first baseline water quality survey of all of Alaska's five coastal eco-regions. The Chuckchi Sea and Arctic Ocean will be the focus of future AKMAP coastal assessment efforts.

To learn more about AKMAP and previous sampling, along with freshwater sampling efforts log onto our website at: www.dec.state.ak.us/water/akmap

RESEARCH is an ORGANIZED & SYSTEMATIC WAY of FINDING ANSWERS to QUESTIONS.



ALASKA MONITORING AND ASSESSMENT PROGRAM IS ADMINISTERED BY
THE ALASKA DEPARTMENT OF ENVIRONMENTAL CONSERVATION
QUESTIONS? CALL DOUG DASHER 907-451-2172
WWW.DEC.STATE.AK.US/WATER/AKMAP