



*healthy oceans ... healthy communities*

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**To:** Secretary Ken Salazar

April 2, 2009

**Cc:** Senator Mark Begich  
Senator Lisa Murkowski

**Re: Supplementary Information on Offshore Drilling in Alaska's Bristol Bay and Southeast Bering Sea (North Aleutian Basin) Related to 45-Day MMS/USGS Report**

Dear Secretary Salazar,

The Alaska Marine Conservation Council, a community-based organization representing people that depend directly on the health of Alaska's marine resources for their livelihoods, applauds your recent announcement to take a comprehensive approach to energy exploration and development in our nation's Outer Continental Shelf (OCS), including our wild fisheries stronghold in Bristol Bay and the southeast Bering Sea. The strategy you outlined for incorporating sound science, considering renewable energy potential, and engaging the public and stakeholders in a dialogue on this important topic is a welcome departure from the policy of the former administration.

While our organizations plan to submit detailed comments during the extended 180-day comment period on the new 5-Year OCS Leasing Program, there is vital information we would like to provide as a supplement to the 45-day Minerals Management Service (MMS) and US Geological Survey (USGS) report. In this communication, we aim to provide important information specific to Alaska's fish-rich Bristol Bay and southeast Bering Sea (North Aleutian Basin) that may not be included in the MMS/USGS documents. This information is related specifically to: 1.) The ecological richness of Bristol Bay and the southeast Bering Sea especially the region's fisheries resources, 2.) the documented lack of scientific information available to support leasing decisions in this planning area, and 3.) concerns regarding potential seismic surveys to obtain more detailed information on oil and gas resources.

We hope you will find that the astounding ecological, economic, and cultural importance of the living marine resources of Bristol Bay, which include the largest runs of wild salmon on the planet, merits an increased level of scrutiny when it comes to offshore leasing decisions.

Thank you for your time and consideration of these important issues. We look forward to working with you and others in the Department and invite you to visit our nation's fisheries stronghold in Bristol Bay during your trip to Alaska for the regional OCS meeting, or at a later date of convenience.

Sincerely,

Kelly Harrell, Friends of Bristol Bay Director,  
Alaska Marine Conservation Council

**Attachments:**

- Bristol Bay habitat maps

**Supplementary Information on Bristol Bay/Southeast Bering Sea  
Resources and Scientific Information Gaps**

**Background**

In your February 10, 2009 announcement, you directed the Minerals Management Service (MMS) and US Geological Service (USGS) to provide a report including information on oil and gas resources and impacts from OCS development within 45 days.

The Department of Interior news release on the announcement from that date stated:

*“Salazar directed the United States Geological Survey, the Minerals Management Service, and other departmental scientists to assemble all the information available about the offshore resources – conventional and renewable – along with information about potential impacts. The report is due in 45 days.*

*Based on that report, the Department will then determine what areas need more information and create a plan for gathering that information.”*

Our organization has concerns that the MMS/USGS report may leave out critical information related to Bristol Bay that should be considered as you develop a plan for gathering additional information for OCS decision making. Below and in attachments we provide information we you hope you will take into account alongside the MMS/USGS report.

As you are aware, North Aleutian Basin Lease Sale 214 is scheduled to occur in 2011 in the current (2007-2012) 5-year OCS leasing program and in the new (2010-2015) 5-year OCS leasing programs. An additional sale for 2014 is scheduled in the 2010-2015 5-year program. MMS is currently in the process of preparing a Draft Environmental Impact Statement (EIS) for Sale 214.

**1.) Overview of Bristol Bay and Southeast Bering Sea**

Bristol Bay, and the larger eastern Bering Sea in which it lies, represent one of the most ecologically rich aquatic ecosystems in our nation. The region is among the world's most productive, temperate subarctic ocean environments and is home to more than 450 species of fish and invertebrates.

The coastal environment of the Bristol Bay region is characterized by extensive tidal flats, some of which are several miles wide. These occur at the mouths of the many rivers and tributaries that bring in nutrients to nourish the ecosystem. These near-pristine habitats support the world's largest wild sockeye (red) salmon runs, with a record 62 million salmon returning to spawn in the rivers and estuaries adjacent to the North Aleutian Basin (NAB) planning area. Beyond sockeye, all of the other species of Pacific salmon, which have been greatly diminished in other parts of the country, continue to run in massive numbers in Bristol Bay. These anadromous fish nourish the rich coastal and terrestrial ecosystems of the region. Spawning salmon become food for birds of prey such as the bald eagle and the peregrine falcon, as well as for the many brown and black bears of the Alaska Peninsula. After spawning, the decaying fish serve as a source of marine nutrients for the watersheds of the region.

As will be discussed in further detail below, Bristol Bay provides important habitat for red king crab, halibut, herring, and a wide variety of groundfish species. The region is also home to large and diverse populations of forage fish such as capelin and eulachon. Furthermore, the coastal wetlands, lagoons, and sheltered bays along the coastline serve as migratory hubs, staging areas, and wintering grounds for over 60 million shorebirds and waterfowl. Several species of birds that utilize these coastal habitats and the open waters of Bristol Bay are listed as threatened or endangered. These include the short-tailed albatross, Steller's eider, and the spectacled eider.

The Bristol Bay region also supports populations of approximately 25 species of marine mammals. Steller sea lions (also listed as endangered), walrus, harbor and fur seals utilize areas in Bristol Bay for haulouts and rookeries. Sea otter populations in the region have once again been in decline, and are now also listed under the Endangered Species Act. A number of whale species listed as endangered- including the blue whale, humpback whale, fin whale, and sperm whale- can be found within the NAB planning area. Designated critical habitat for the North Pacific right whale-considered the most endangered marine mammal in the world- directly overlaps the proposed lease sale area (see attached map).

As further testament to the importance and diversity of ecosystems surrounding the NAB planning area, the region is home to five different National Wildlife Refuges (NWRs): Alaska Peninsula NWR, Becharof NWR, Togiak NWR, Izembek NWR, and a portion of the Alaska Maritime NWR. Located within Izembek Refuge are some of the world's largest eelgrass beds, which serve as essential feeding and reproductive habitat for birds, fish, and crabs in the region. The Alaska Maritime Refuge contains some of the first conservation units to be established in the United States and is considered to be the most productive refuge in the nation. The Alaska Peninsula Refuge, where the proposed offshore development plan would place an oil and gas transportation pipeline, is home to moose, bear, wolverine, caribou populations, and over 200 species of seabirds. This refuge also contains more than 1,000 salmon producing streams. Biologists have estimated that the waters of Alaska Peninsula NWR and the adjacent Becharof NWR annually produce more than 30 million salmon.<sup>i</sup> There are also five state critical habitat areas in the Bristol Bay region along the Alaska Peninsula - Egegik, Pilot Point, Cinder River, Port Heiden, and Port Moller (see attached map).

- ***Commercial Fisheries Resources of Bristol Bay and the Southeast Bering Sea***

The North Aleutian Basin ecosystem supports the most important commercial fisheries in Alaska and in the larger United States in terms of total pounds landed and overall economic value. The Bering Sea accounts for 50% of total U.S. fish and shellfish landings.<sup>ii</sup> Dutch Harbor, a major seafood-processing center in the region, has ranked as the number one fishing port by volume in the nation for the last 19 years.<sup>iii</sup> The shallow continental shelf waters of Bristol Bay and the southeastern Bering Sea provide important fish habitat and/or fishing grounds for much of the Bering Sea's bounty – including salmon, pollock, Pacific cod, black cod, Pacific halibut, herring, and red king crab. The economic importance of Bristol Bay and southeastern Bering Sea fisheries extends beyond Alaska to the Pacific Northwest. Many vessel owners, permit holders, crew members and seafood processing workers that invest and/or participate in Alaska's fisheries are residents of Washington, Oregon, and California. Numerous supporting industries such as boat building and fishing gear are bolstered by the region's fisheries.

Bristol Bay and Bering Sea fisheries are of tremendous importance to local economies of the region, to the state of Alaska, and to the larger U.S. economy. Exports of Alaska's fish products to countries such as Canada, Japan, and China also benefit the entire nation by helping to balance the national trade deficit.<sup>iv</sup> Fisheries are **renewable resources** that continue to provide viable and continuous sources of revenue. The Bristol Bay region is free from industrial development and human activity in the coastal zone that has degraded nearshore environments and marine waters throughout the lower 48 states- causing pollution and/or elimination of habitat for anadromous and marine fish and shellfish.

Described below are, four of the most valuable Alaskan fisheries that either take place directly within the NAB planning area and/or rely on the area's ecosystem to provide important habitat for harvested species:

### ➤ **Bering Sea/Aleutian Islands Groundfish**

The Alaska groundfish fishery is the largest and most lucrative fishery in the United States, accounting for 49% of domestic landings by weight in 2007.<sup>v</sup> More than 90% of this harvest comes from the Bering Sea/Aleutian Islands management area. Species harvest in the Bering Sea groundfish fishery includes walleye pollock, Pacific cod, yellowfin sole, rock sole, and arrowtooth flounder. Alaska pollock represents the highest abundance of species harvested in the fishery and is the largest single-species fishery in the world. Relatively short-lived and fast growing, pollock are also an important prey source for a variety of seabirds, marine mammals, and other commercial fish species such as salmon.<sup>vi</sup> Essential fish habitat for all life stages of pollock, which include eggs, larvae, juveniles, and adults, overlaps the targeted area for offshore oil and gas leasing.<sup>vii</sup>

### ➤ **Bristol Bay Red King Crab**

A valuable Bristol Bay red king crab commercial fishery thrives today. Bering Sea coastal villages also have a quota share in the fishery under the Community Development Quota (CDQ) program. Nearly 100% of the Bristol Bay red king crab catch comes from within the 5.6 million acre area targeted for oil and gas leasing.<sup>viii</sup> Crucial crab nursery and rearing habitat is located in the Port Moller area, which MMS considered in the past at highest risk for an oil spill because it is the proposed location for a transportation pipeline.<sup>ix</sup> Red king crab relies on southeastern Bering Sea habitats throughout all of its life stages (eggs, larvae, juvenile and adult). The area proposed for leasing falls within this vitally important habitat, designated as essential fish habitat (EFH). Two large areas that overlap and are adjacent to the proposed sale area have been closed to trawling by the North Pacific Fishery Management Council to protect this important habitat (see attached map).

### ➤ **Bristol Bay Sockeye Salmon**

The Bristol Bay region boasts the world's largest runs of wild sockeye (red) salmon. An estimated 40 million sockeye migrated through Bristol Bay in 2008 making it one of the largest runs on record—a sign that Bristol Bay salmon stocks remain healthy at a time when many salmon populations around the world are threatened or extinct.<sup>x</sup>

The area proposed for leasing overlaps several important habitats for Bristol Bay sockeye salmon. Bristol Bay's shallow, productive waters provide vital marine habitat for young sockeye before they continue their migration into the Gulf of Alaska or farther out in the Bering Sea. Migratory pathways in the southeastern Bering Sea serve as a feeding corridor during this decisive life stage—the same area proposed for oil and gas leasing. After two or three years at sea, adult sockeye once again swim through and nearby the area proposed for leasing, returning to freshwater streams to spawn and continue the cycle (see attached map).

In 2008, the ex vessel value – or value before processing – of the Bristol Bay salmon fishery was \$113 million.<sup>xi</sup> Salmon fishing in Bristol Bay is often a family affair, with many of today's vessel owners and captains heading up small businesses passed down by their parents and grandparents. In addition to harvesting, salmon processing creates jobs and adds economic value to the fishery. Regional efforts are underway to create new markets, raise quality and promote Bristol Bay salmon as its own brand. Fishermen formed the Bristol Bay Regional Seafood Development Association in 2006 and small, specialty processors have also been established in the region.

Salmon has always been an essential food source for the Aleut, Yup'ik and Athabaskan peoples around Bristol Bay. Native and rural Alaskans still depend on wild salmon for sustenance, preserving their large catch by freezing, canning, and pickling, and through traditional methods, such as drying and smoking. Each year more than two million pounds of salmon are harvested for subsistence use.<sup>xii</sup> The Bristol Bay watershed also supports world-class sport fishing for salmon and trophy-sized rainbow trout in the region's pristine lakes

and rivers. According to a 2007 Trout Unlimited Report, tourists spend \$61 million annually on Bristol Bay fishing trips.<sup>xiii</sup>

➤ **Pacific Halibut**

Bristol Bay and the southeastern Bering Sea shelf provide critical nursery habitat crucial to the overall Pacific halibut population.<sup>xiv</sup> Young halibut spend two or three years growing in these nursery areas, after which they migrate to other parts of the Bering Sea, through the Aleutian passes, and into the North Pacific where they live out their adult lives.<sup>xv</sup> The importance of these nursery grounds has been recognized by fishery managers for decades: in 1967 the International Pacific Halibut Commission (IPHC) closed a significant area of the southeastern Bering Sea to halibut fishing in order to protect young fish at this sensitive life stage.<sup>xvi</sup> This closure area directly coincides with the proposed oil and gas leases (see attached map).

***Proposed Lease Sale Area Overlap with Fisheries***

The potential for conflict between important fisheries and offshore fossil fuel activities is extremely high. Commercially harvested species including salmon, pollock, Pacific cod, Pacific halibut, and red king crab all have scientifically recognized habitat as well as productive harvesting grounds that overlap the lease sale area. Please see the table below, as well as attached maps.

**Fishing Grounds and Fish Habitat Overlap with Proposed Offshore Oil and Gas Leasing Area**

<b>Fishery</b>	<b>Habitat overlap</b>	<b>Fishing grounds overlap</b>
<i>Bristol Bay sockeye salmon</i>	Smolt outmigration routes, juvenile feeding grounds, adult migration routes	
<i>Area M (Alaska Peninsula) sockeye salmon</i>	Migration routes, nursery grounds	Proposed pipeline route would pass through fishing grounds near Herendeen Bay/Port Moller
<i>Pacific halibut</i>	Nursery grounds for the entire North Pacific population	Lease Sale 92 area falls within region closed to halibut fishing since 1967 to protect important habitat (see map)
<i>Bristol Bay red king crab</i>	Essential fish habitat for eggs, larvae, juveniles, adults; Lease Sale 92 area overlaps with areas closed to trawling to protect sensitive crab habitat (see map)	Nearly 100% of species catch taken from Lease Sale 92 area
<i>Bering Sea/Aleutian Islands (BSAI) Pollock</i>	Essential fish habitat for eggs, larvae, juveniles, and adults	Percent of total BSAI harvest from Lease Sale 92 area: trawl 21%
<i>BSAI Pacific Cod</i>	Essential fish habitat for eggs, larvae, juveniles, and adults	Percent of total BSAI harvest from Lease Sale 92 area: trawl 40%, longline 11%, pot 28%
<i>BSAI Flatfish</i>	Essential fish habitat for yellowfin sole, flathead sole, and rock sole;	Percent of total BSAI harvest from Lease Sale 92 area: yellowfin sole trawl 7%, flathead sole trawl 55%, rock sole trawl 14%

Sources: NMFS. *Final Environmental Impact Statement for Essential Fish Habitat Identification and Conservation in Alaska*, "Appendix D" (April 2005) [http://www.fakr.noaa.gov/habitat/seis/final/Volume\\_II/Appendix\\_D.pdf](http://www.fakr.noaa.gov/habitat/seis/final/Volume_II/Appendix_D.pdf) .

Diana Evans, North Pacific Fisheries Management Council. "Federal Fisheries of the North Aleutian Basin" (PowerPoint presentation given at the North Aleutian Basin Information Status and Research Planning Meeting, Anchorage, AK, November 28-December 1, 2006).

## ***Sustainable Fisheries Resources of the North Aleutian Basin Planning Area Worth Upwards of \$2 Billion Annually***

The economic figures for the fisheries provided below are intended to give an approximate assessment of the value of the fisheries that could be affected by oil and gas development in the portion of the North Aleutian Basin Planning Area currently scheduled for leasing 2011 (Sale 214 area). These fisheries were determined to be potentially affected by the impacts of offshore oil and gas development based on two criteria: 1.) the fisheries take place within or surrounding the proposed lease sale area and/or 2.) the species that are fished utilize habitat within or surrounding the area proposed for leasing.

The impacts of oil and gas development would extend beyond the proposed 5.6 million acre lease sale area. Offshore seismic surveys, infrastructure construction and emplacement, vessel traffic, the discharge of drilling muds and cuttings, as well as chemical or oil spills could affect fisheries that occur inside and outside the lease sale area. Oil and gas activities have the potential to cause displacement from fishing grounds, degradation of fish habitat, as well as lethal and sublethal impacts to fish and their prey. Even the perception of a reduction in the quality of product harvested in the region could drive down prices on the world market.

Values after processing were only available for the federal groundfish fisheries. In all other fisheries the ex vessel values, or value before processing, are given below. Thus, the total value for these fisheries actually exceeds the numbers presented below, as value after processing is higher than the price paid to fishermen at the dock.

<u>Federally-Managed Bering Sea/Aleutian Islands (BSAI) Groundfish 2007 Value after Processing</u> (includes pollock, Pacific cod, and flatfish) <sup>xvii</sup> :	\$1.7 billion
<u>Pacific Halibut 2007 Ex vessel value</u> <sup>xviii</sup> :	\$217 million
<u>Salmon 2008 Ex vessel values</u> <sup>xix</sup> :	
• Alaska Peninsula/Aleutian Islands Salmon	\$29 million
• Bristol Bay Salmon (includes sockeye and other species)	\$113 million
• Kuskokwim Salmon	\$1.5 million
• Yukon Salmon	\$1.4 million
Total Salmon:	\$144.9 million
<u>Shellfish 2008 Ex Vessel Values</u> <sup>xx</sup> :	
• Red King Crab 2008 ex vessel value:	\$84 million
• Tanner Crab 2008 ex vessel value:	\$3.4 million
Total Shellfish:	\$87.4 million
<u>State-Managed Groundfish 2008 Ex Vessel Values</u> <sup>xxi</sup> :	
• Bering Sea/Aleutian Islands	\$6.8 million
• Alaska Peninsula	\$7.2 million
Total State-Managed Groundfish:	\$14 million
<u>Bristol Bay (Togiak) Herring Sac Roe 2008 Ex Vessel Values</u> <sup>xxii</sup> :	
• Seine	\$1.5 million
• Gillnet	\$654,000
Total Herring:	\$2.2 million

***Overall Total Value:                      more than \$2.1 billion***

## 2.) Lack of Science to Support Leasing Decisions

Scientists have expressed great concern over the ability to evaluate potential environmental impacts of offshore oil and gas operations in Bristol Bay and the southeast Bering Sea due to the tremendous information gaps that exist with regards to important species of fish, marine mammals, and waterbirds that inhabit the region. Despite these warnings by numerous experts, the federal Minerals Management Service (MMS) continues to move forward on a 2011 offshore oil and gas lease sale while only initiating a handful of studies to fill the data gaps. Successful mitigation of impacts and proper protection of the region's tremendous renewable fisheries resources and other species cannot occur in the face of such scientific uncertainty.

### ➤ ***National Marine Fisheries Service Comments on Leasing in Bristol Bay***

The National Marine Fisheries Service (NMFS) Alaska Region stated in their comments on the Draft Proposed 2007-2012 OCS Program that with regards to the North Aleutian Basin planning area (Bristol Bay and the southeast Bering Sea), the "proposed leasing schedule was **unrealistically ambitious** and would **not allow for necessary environmental research to support National Environmental Policy Act (NEPA) analysis or MMS' leasing process.**"<sup>xxiii</sup>

**NMFS recommended deletion of the North Aleutian Basin planning area from the 5-year leasing plan** and initiation of a comprehensive research program. Unfortunately, MMS did not heed these comments and included the planning area in the 2007-2012 leasing program.

### ➤ ***North Aleutian Basin Science Meeting***

In November 2006, the Minerals Management Service (MMS) held the North Aleutian Basin Information Status and Research Planning Meeting in Anchorage to address study priorities for the region. At this meeting, experts identified a large number of information gaps for fish, marine mammal, and seabird species related to items such as abundance, habitat usage, and distribution in Bristol Bay and the southeastern Bering Sea. Based on these information gaps, these experts also concluded that the necessary biological and ecological data for species that occur in the Bristol Bay region **is not sufficient to adequately meet the requirements of the National Environmental Policy Act (NEPA) nor the Endangered Species Act (ESA).**<sup>xxiv</sup>

The experts present warned, "A full range of updated multidisciplinary scientific information will be needed to address oceanography, fate and effects of oil spills, marine ecosystems, fish, fisheries, birds, marine mammals, socioeconomics, and subsistence in the Basin." Participants assisted in developing 35 study profiles to fill "high priority information needs" in a variety of disciplines.

**Since that time, MMS has initiated only 3 studies that address those study needs and none of those studies address information gaps for the tremendously valuable fisheries in the region.** The studies in progress are related to the endangered North Pacific right whale, subsistence, and ocean circulation modeling. One additional study not identified as a priority by the experts at the meeting on ecosystem productivity and vulnerability to climate change is in progress through the University of Alaska-Fairbanks Coastal Marine Institute. Two other studies on the distribution of forage fish and salmon were intended to start in Fiscal Year (FY) 2008 but are not yet in progress.<sup>xxv</sup>

Proceeding with an oil and gas lease sale under these conditions of scientific uncertainty would violate key U.S. environmental conservation laws and preclude proper protection for the locally, nationally, and globally important fish, marine mammal, and seabird species that occur within the productive waters and along the coastline of Bristol Bay. The conclusions as

to information needed to support leasing were reached by a variety of experts at a meeting sponsored by MMS itself.

As the Draft Environmental Impact Statement for the North Aleutian Basin Lease Sale 214 is already being prepared, it is impractical to expect that any of the information from studies carried out from this point forward will be able to provide robust and valid information to support the leasing process. There will only be one summer field season (2009) available to conduct research before the Draft EIS becomes available if released in 2010 as planned. Essentially, this means the agency will have done very little to address the research needs which were identified as essential to supporting a defensible EIS and as necessary for ESA Section 7 consultations.

### **3.) Concerns about Seismic Surveys in Bristol Bay and the Southeast Bering Sea**

The MMS/USGS report is likely to reveal old, incomplete data with regards to the oil and gas resources in the North Aleutian Basin. Extensive seismic surveys were conducted in the 1980's and one COST well was drilled in the 80's also. We caution against gathering new seismic data here, as we have strong concerns about the impacts of seismic surveys on marine life in Bristol Bay and the southeast Bering Sea.

Unlike humans and other terrestrial animals, marine mammals rely on sound instead of sight as their primary sense. Dolphins, whales and seals utilize their sense of hearing to locate prey, avoid predators, choose migration routes, and to communicate across long distances. The noise associated with seismic surveys can affect the ability of these animals to detect natural underwater sounds, thereby disrupting these critical activities.

Numerous scientific studies have solidified what Eskimo subsistence hunters have known for years: that whales avoid expansive areas where seismic surveys are being conducted. One study showed that fall-migrating bowhead whales in the Beaufort Sea were displaced from an area within 12 miles of the seismic source and began to show avoidance behavior up to 21 miles away.<sup>xxvi</sup> Researchers have also observed signs of physical stress such as startle responses in humpback whales while seismic surveys were being conducted many miles away.<sup>xxvii</sup>

Scientists believe that pods of whales that include calves (such as the North Pacific right whale pods that have been spotted in the southeastern Bering Sea) are at serious risk from seismic activities due to their need to utilize important habitats for feeding and resting. If seismic surveys continually displace whales from these important areas, population-level consequences may result.<sup>xxviii</sup>

MMS stated in the Final EIS for the 2007-2012 OCS Leasing Program that impacts from seismic surveys can range from short-term (i.e. temporarily leaving a feeding area, avoiding the seismic vessel) or long-term for marine mammals (i.e. repeated disruption of important behaviors, avoidance of prime habitat, chronic increased stress)<sup>xxix</sup>. MMS also asserts that the potential exists for population-level impacts if effects such as abandonment of areas for young, repeated avoidance of traditional breeding grounds, or reduced reproductive potential of entire population occur.

The powerful sound waves generated by seismic surveys can also have a variety of harmful effects on fish. Within close range, seismic surveys have been found to kill adult fish as well as larvae and fish eggs.<sup>xxx</sup> Scientific studies have also shown that air gun blasts can cause a variety of sublethal impacts on fish such as damaging orientation systems and reducing their ability to find food. Researchers have noted disturbances in the migration routes of salmon and other anadromous species as a result of seismic operations. Seismic surveys can cause physical damage to fish ears and other tissues and organs such as swim bladders.<sup>xxxi</sup> Although such effects may not kill fish immediately, they may lead to reduced fitness, which increases their susceptibility to predation and decreases their ability to carry out important life processes.

Several studies from Norway's North Sea have shown that seismic operations have greatly reduced catches of fish around areas where air guns were being fired. These studies showed reduced catches (at times more than 50%) over 20 miles away from the source with catch reductions continuing five days after the testing was complete.<sup>xxxii</sup> Researchers believe these catch reductions are a result of altered fish behavior due to seismic operations which cause them to be less likely to take hooks and/or to move away from the seismic firing. Additionally, this past summer in 2008 increased seismic survey activities in Norway led to intense conflicts with the fishing industry there. Fishermen pointed to the surveys as causing a reduction in fish catch rates and at times pushed them out of their fishing grounds, leading many to demand compensation for economic losses. Given the economic importance of commercial fisheries in the southeastern Bering Sea and the fact that fishing takes place here year-round, the potential catch reduction from seismic surveys is a serious concern.

To date, little research has been conducted to examine potential impacts of seismic surveys on invertebrates, including commercially valuable crab species. One study- the only of its kind- by the Canadian Department of Fisheries and Oceans gives cause for concern and further research is strongly needed to determine if seismic testing would affect important populations of red king crab that congregate in the proposed lease sale area. The Canadian study examined the effects of seismic testing on *opilio* (snow) crabs and showed short-term and long-term effects to crabs exposed to airgun noise including loss of limbs due to stress, higher mortality rates, slower development of eggs and larvae, damage to livers, and hemorrhaging of the ovaries of female crabs.<sup>xxxiii</sup>

To our knowledge, no studies have examined the effects of seismic airgun blasts on molting red king crab, crab larvae, gravid female crab, nor a whole host of other sensitive life stages of commercially valuable fish species that occur in the area including juvenile halibut, salmon, pollock, and cod. A precautionary approach to seismic in the area must be taken due to the severity of potential impacts and high concentrations of sensitive and commercially valuable fish species in the region.

#### Reductions in fish catch rates as a result of seismic survey activity

Species	Gear type	Noise level of seismic testing	Catch reduction	Source
Atlantic cod ( <i>Gadus morhua</i> )	Trawl	250 decibels (dB)	46-69% lasting at least 5 days	Engas et al. 1993
Atlantic cod ( <i>Gadus morhua</i> )	Longline	250 dB	17-45% lasting at least 5 days	Engas et al. 1993
Atlantic cod ( <i>Gadus morhua</i> )	Longline	Undetermined, 9.32 miles from source	55-79 % lasting at least 24 hours	Lokkeborg and Soldal, 1993
Haddock ( <i>Melanogrammus aeglefinus</i> )	Trawl	250 dB	70-72% lasting at least 5 days	Engas et al. 1993
Haddock ( <i>Melanogrammus aeglefinus</i> )	Longline	250 dB	49-73% lasting at least 5 days	Engas et al. 1993
Rockfish ( <i>Sebastes</i> spp.)	Longline	223 dB	52%- effect period not determined	Skalski et al., 1992

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- <sup>i</sup> U.S. Fish and Wildlife Service (2002) Alaska Peninsula Wildlife Refuge Fact Sheet.
- <sup>ii</sup> Bering Sea Ecosystem Study (BEST) Science Plan (Fairbanks, AK: Arctic Research Consortium of the U.S., 2004).
- <sup>iii</sup> National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Agency (NOAA). Fisheries of the United States 2007 (Silver Spring, MD: NOAA, 2008).
- <sup>iv</sup> Alaska Fisheries Science Center, National Marine Fisheries Service "Alaska Fisheries and Global Trade" Accessed June 21, 2007 at: <http://www.afsc.noaa.gov/REFM/Socioeconomics/Projects/AFGT.php>.
- <sup>v</sup> North Pacific Fisheries Management Council (2008) Stock Assessment and Fishery Evaluation (SAFE) Report for the Groundfish Fisheries of the Gulf of Alaska and Bering Sea/Aleutian Islands Area: Economic Status of the Groundfish Fisheries Off Alaska, 2007.
- <sup>vi</sup> *Ibid.*
- <sup>vii</sup> NMFS. Final Environmental Impact Statement for Essential Fish Habitat Identification and Conservation in Alaska, "Appendix D" (April 2005) [http://www.fakr.noaa.gov/habitat/seis/final/Volume\\_II/Appendix\\_D.pdf](http://www.fakr.noaa.gov/habitat/seis/final/Volume_II/Appendix_D.pdf).
- <sup>viii</sup> Diana Evans, North Pacific Fisheries Management Council. "Federal Fisheries of the North Aleutian Basin" (PowerPoint presentation given at the North Aleutian Basin Information Status and Research Planning Meeting, Anchorage, AK, November 28-December 1, 2006).
- <sup>ix</sup> Minerals Management Service. Final Environmental Impact Statement, North Aleutian Basin Lease Sale 92. p. IV-B-50 (September 1985), [http://www.mms.gov/alaska/ref/EIS%20EA/FEIS%20N%20Aleutian%20Basin/85\\_0052Vol1\\_1.pdf](http://www.mms.gov/alaska/ref/EIS%20EA/FEIS%20N%20Aleutian%20Basin/85_0052Vol1_1.pdf)
- <sup>x</sup> Alaska Department of Fish and Game Division of Commercial Fisheries News Release, 2008 Bristol Bay Salmon Season Summary.
- <sup>xi</sup> *Ibid.*
- <sup>xii</sup> Duffield, Patterson, Neher, and Goldsmith. Economics of Wild Salmon Watersheds: Bristol Bay, Alaska Report for Trout Unlimited Alaska (July 2006).
- <sup>xiii</sup> *Ibid.*
- <sup>xiv</sup> Tim Loher, research scientist, International Pacific Halibut Commission (IPHC). Personal communication, July 24, 2007.
- <sup>xv</sup> International Pacific Halibut Commission. "The Pacific Halibut: Biology, Fishery, and Management" (1998, Technical Report No. 40).
- <sup>xvi</sup> Robert Trumble. "Evaluation of Maintaining the IPHC Closed Area in the Bering Sea" IPHC Report of Assessment and Research Activities (1998).
- <sup>xvii</sup> North Pacific Fisheries Management Council (2008) Stock Assessment and Fishery Evaluation (SAFE) Report for the Groundfish Fisheries of the Gulf of Alaska and Bering Sea/Aleutian Islands Area: Economic Status of the Groundfish Fisheries Off Alaska, 2007.
- <sup>xviii</sup> *Ibid.*
- <sup>xix</sup> Alaska Department of Fish and Game, 2008 Alaska Commercial Salmon Harvest and Ex Vessel Values.
- <sup>xx</sup> Alaska Department of Fish and Game, 2008 Preliminary Alaska Commercial Shellfish Catches and Ex Vessel Values.
- <sup>xxi</sup> Alaska Department of Fish and Game, 2008 Alaska Commercial Groundfish Harvests and Value (State-Managed).
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