To: Renee Orr, 5-Year Program Manager,
Minerals Management Service (MS-4010)
Room 3120, 381 Elden Street
Herndon, Virginia 20170

Re: Proposed Outer Continental Shelf Oil and Gas Leasing Program 2007-2012

August 2006

Dear Ms. Orr,

I am opposed to the proposed Outer Continental Shelf Oil and Gas Leasing Program 2007-2012 which plans to open up 34 million acres located in the Chukchi Sea, off the coast of Alaska, to oil and gas exploration. The affected coastline of the Chukchi Sea is home to several species of marine mammals including the Pacific walrus. As evidenced in the attached paper, the Pacific walrus is especially vulnerable to extinction and more research is necessary before oil companies can be allowed to begin their activities.

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Effects of Oil and Gas Activities in the Chukchi Sea on the Pacific Walrus (*Odobenus rosmarus divergens*)

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August, 2006

As fuel supplies begin to decline, and gas prices continue to rise, the United States government has begun to focus its attention more and more on the prospect of oil in the American arctic. Despite comprehensive studies documenting the detrimental effects of oil development and exploration on the arctic environment and the endemic species that inhabit it (National Research Council, 2003), the U.S. government seems determined to move forward. In February 2006 the U.S. Minerals Management Service drafted a proposal for a new five-year lease program, including the leasing of 34 million acres located in the Chukchi Sea, off the coast of Alaska, at a distance from shore ranging from 8 nautical miles to 200 nautical miles (MMS, 2006c). The affected coastline of Chukchi Sea is home to several species of marine mammals including the Pacific walrus.

Heavy harvesting of walruses in the late 19th and early 20th century seriously depleted populations until their protection began in the 1940s. While the current size of the Pacific walrus population is unknown (FWS, 2002), it is believed that their population numbers fall above sustainable levels, and have remained consistent for the past few decades. Unfortunately, due to current rapid climate changes and increasing petroleum exploration and development in the arctic the walrus is once again in danger. As McKinney (1997) noted in his study on extinction vulnerability, across taxa there are several life history indicators of extinction vulnerability in species. The behavioral ecology of the Walrus includes several of these indicators, including "slow" life histories, high trophic level, and complex social behavior (McKinney 1997). Considering this, the potential consequences of the accumulating effects of climate change and oil and gas activities in the arctic could be devastating to the Pacific walrus. This paper aims to discuss and evaluate the behavioral ecology of the Pacific walrus in terms of the possible effects of oil development in the Chukchi Sea, and hopes to highlight the importance of additional research on the subject.

The Pacific Walrus (*Odobenus rosmarus divergens*) and the Atlantic Walrus (*Odobenus rosmarus rosmarus*) are the last remaining members of the family Odobenidae, a line of marine carnivores from the late Miocene and early Pliocene periods (FWS 2004). The Pacific walrus is represented by one single stock of animals that inhabit the continental shelf waters of the Bering and Chukchi Sea (FWS 2004). The distribution of this stock varies significantly with the seasons, as the population follows the development and recession of the arctic pack ice (MMS 2006a). In winter, a majority of the population is found in Bering Sea pack ice. During the breeding season (January-March) Pacific walruses are found southwest of St. Lawrence Island, or in outer Bristol and Kuskokwim bays (Fay 1982). In the spring and early summer a portion of the population, primarily adult males, remain in the Bering Sea, however as the weather warms most of the walrus population follow the pack ice north into the Chukchi Sea. (Fay 1982). Those who migrate northward are found in the Chukchi pack ice west of Point Barrow, along the northern coastline of Chukotka and around Wrangel Island (FWS, 2006).

The behavioral reasons for why some walrus migrate north while others stay in the Bering Sea are uncertain, however one explanation may be the result of walrus' gregarious nature. Female walruses use the pack ice for birthing, feeding their young, resting and molting. In general, they conduct these activities in large groups. As Simpkins et al. found in their study of habitat selection by ice-associated pinnipeds, walruses chose large ice floe habitats, such as that of the pack ice, which can support the combined weight of hundreds of these large bodied mammals (Simpkins et al. 2001). While in centuries past the behavior of hauling out and raising calves in large groups may have helped walruses to keep warm through brutal winters, and to keep them alert to possible polar bear attacks, it may be this very behavior which makes them vulnerable to extinction. Early this spring orphaned walrus pups were found starving to death in the middle of the arctic sea. It was believed they lost their mothers while trying to swim towards solid ice. (Appel, 2006).

Pacific walruses are well known for their large size and large tusks. Like other large mammals, walrus reproductive behavior includes low fecundity rates, and late sexual maturation. Females do not reach sexual maturity until around 6 years old, and

fecundity peaks at 9 to 10 years of age. Male walruses are able to breed around the same age, however they are usually unable to compete for access to females until about 15 years old (Fay 1982). Following fertilization, the blastocyst does not implant in the uterus until 3 or 4 months later, with gestation lasting an additional 11 or 12 months (Fay 1982)

Calves are born from late April to early June, as females migrate northward toward the Chukchi Sea, following the ice pack (Fay 1982). Once born, the calves are immediately dependent on constant contact with their mothers not only for feeding, but also for maintenance of body temperature (Fay and Ray, as cited in FWS 1994). The calf remains with its mother, dependent on her for food for additional two years.

Due to these time constraints, females cannot reproduce more than once every two years. As with other marine mammals, these low fecundity rates, and the late onset of puberty make the walrus particularly vulnerable to rapid population collapse from stochastic events (such as rapid global climate change) or human error (such as an oil spill), from which recovery may take decades (Musick, 1999).

While a catastrophic event, such as an oil spill or leak, could have a devastating effect on the Pacific walrus population, oil exploration poses additional threats. Walruses are found, for the most part, in shallow waters of less than 325 feet. They feed primarily on benthic invertebrates at these shallow depths. The proposed Chukchi Sea lease program includes oil activity at water depths ranging from 32 feet to 230 feet (MMS 2006c), which would have oil operations taking place directly within the walruses' primary feeding grounds. Buchanan et al. (2003) discussed the lethal and sublethal effects of offshore drilling on marine organisms, including the benthic food resources of the walruses. These effects can lead to the complete loss of benthic populations or contamination (Buchanan et al. 2003). Not only would such effects reduce the food resources of the walrus, but it could also lead to decreased population levels. As with many mammals, walruses have shown decreased reproduction rates due to changes in food resources. For example, up until 1975, female Pacific walruses were found to ovulate for the first time at 4 to 8 years (Fay 1982; FWS 1994). But by the late 1980s, however, the age of first ovulation had increased by about 2 years, presumable due to changes in the food supply (Fay et al. 1989).

As with other mammals in high trophies levels, the threat of even some contamination of the benthic food source of the walrus, can lead to lethal levels once concentrated in a 1500 lb. animal. Seagers and Garlich-Miller (2001) found high concentrations of Organochlorine compounds (known to cause damage to the immune system) and aliphatic carbons (can cause damage to the endocrine system) in Pacific walrus blubber. As oil activity in walrus feeding grounds increases, these concentrations will only increase.

Another primary concern regarding oil operations in the Chukchi Sea is the effect of increased anthropogenic noise on walrus behavior. The audiogram research of Kastelein et al. on walruses in captivity found that walruses have relatively acute underwater sensitivity to sounds, and can most likely hear most underwater anthropogenic noise (2002). Low frequency noise caused by offshore drilling, cargo ships and low-flying planes may influence the ecology of the walruses by keeping them from feeding, breeding and resting grounds (Born et al, as cited in MMS 2006a). Anthropogenic noise may also interfere with conspecific calls used in mating and rearing young (Kastelein et al., 2002).

While additional research is necessary, preliminary studies have found walrus response to anthropogenic disturbances variable. Females with young, as with the majority of the summer Chukchi Sea walrus population, show the most negative response to noise disturbance (Fay 1984, as cited in FWS 1994). This poses a significant danger to calves as disturbances can cause separation from their mothers on whom they are dependent. Early abandonment, especially during the first year of nursing, will most likely result in the starvation of the calf (FWS 1994). Even a brief separation of calf and cow, such as when disturbed by plane flying overhead, can prove deadly, as Polar bears prey upon calves, and will take advantage of even briefest moments of neglect by a mother walrus (Fay 1984a).

The threat of noise disturbance in the Chukchi Sea, is especially worrying, as it is while summering in the Chukchi Sea that walruses (primarily females and calves) haul out in groups of up to several thousand (FWS 2004). When haul out numbers are this large, a significant disturbance, such as that of seismic exploration or icebreaking, can trigger stampeding into the water. Calves are especially vulnerable to disturbances at

these times, and many have been trampled to death during stampedes caused by both human and natural disturbances (Okanek & Snively, 2005).

As mentioned previously, walruses use the summer pack ice to rest, raise young, and to molt. Frequent disturbances which cause the animals to often enter the water, may also interfere with the walruses' annual molt. Walruses require elevated skin temperatures to complete their molt (Fay 1982), and frequent disturbance by anthropogenic activity from which they are often retreating into the icy water, may result in a prolonged molt period and increased metabolic costs (FWS, 1994). The effects of these metabolic costs on the population are unknown. The complex behavior of the walrus, and variation in response to noise disturbances highlight the need for additional research on the long term impacts these disturbances on walrus populations.

On May 8th, 2006 the Department of the Interior, Fish and Wildlife Service posted the requests of oil companies Shell, GXT Houston and ConocoPhillips Alaska, Inc. to authorize the take of marine mammals by harassment incidental to conducting open-water seismic operations in the Chukchi Sea. These companies have already begun a marine geophysical survey program in support of future oil and gas exploration within the area of the proposed Chukchi Sea Lease Sale. Although the request lists several potential impacts of the proposed operations, such as disturbance by icebreakers and seismic activity, it lists these as "negligible impact on species." As this paper shows, the impact of this activity, will certainly not be "negligible."

The Pacific walrus is an important member of the arctic ecosystem for both the native hunters who depend on them for food and clothing, as well as to the benthic ecosystems in which they feed (Levermann et al. 2003). Walrus behavioral ecology includes parameters, including their slow life history, high trophic level and complex behavior, that make the walrus vulnerable to extinction if their habitat or numbers become threatened. Although Pacific walrus population numbers are currently sustainable, the accumulating effects of climate change and oil and gas activities in the arctic can have a significant effect of these population numbers.

The harsh climate of the arctic makes research on the Pacific walrus difficult. However, as this paper demonstrates, additional research on the behavioral ecology of

the walrus is needed. Some of the areas in which research is needed:

- Determine the limits current population, and sustainable population for walruses. – Although a 2006 population survey is underway (USGS 2006).
- Investigate haulout choice in both summer and wintering haulout locations.
- Monitor the effects of industrial activities on walruses; during both summer and winter months. Including population changes or changes in health that may be related to oil and gas activities.
- Monitor behavioral reactions to industrial activities, and possible consequences of disturbances as varying levels of disturbance.

Commercial exploitation of the walrus in previous centuries left Pacific walrus populations depleted. However, as evidenced by the high population levels of the 1980s, walruses can return from low population levels if their habitat remains stable, and hunting is regulated. Unfortunately, as the ice continues to melt, and the quiet hum of arctic winds transforms into the constant drum of an offshore rig, the walrus' ability to maintain current population levels seems once again threatened. Attention needs to be paid to the walrus populations today; before their vulnerability to extinction is demonstrated; before we talk of the family Obodenidae of which no modern species survives.

References:

Appel, A. 2006, March 27. Baby Walruses Stranded by Melting arctic Ice, Experts Say. *National Geographic News*. [Online] Available: news.nationalgeographic.com. [Accessed: May 16 2006.]

Barlow, J., K.A. Forney, P.S. Hill, R.L. Brownell, Jr., J.V. Carretta, D.P. DeMaster, F. Julian, M. Lowry, T. Regan, and R.R. Reeves. 1997. U.S. Pacific Marine Mammal Stock Assessments: 1996. NMFSSWFSC-219. Seattle, WA: USDOC, NOAA, NMFS.

Bailey, 2006. April 30. Setting the stage for Arctic offshore exploration. *Petroleum News*. Vol. 11, No. 18. [Online] Available: petroleumnews.com. [Accessed 15 2006.]

Born E. W., I. Gjertz, R.R. Reeves. 1995. *Population assessment of the Atlantic walrus*. Meddelelser Norsk Polarinst., No. 138. Oslo: Norsk Polarinstitutt. 100pp.

Buchanan. R.A., J.A. Cook, A. Mathieu, A. 2003. Environmental effects monitoring for exploration drilling. Environmental Studies Research Funds. Calgary, Alberta, Canada.

ConocoPhillips Alaska, Inc. (CPAI), 2006, Jan. Application for incidental harassment authorization to NMFS for, open water seismic operations in the Chukchi Sea. [Online] Available: http://www.nmfs.noaa.gov/pr/pdfs/permits/ina_cpai.pdf. [Accessed: May 6, 2006].

Dulvy, N.K., Y. Sadovy, J.D. Reynolds. 2003. Extinction vulnerability in marine populations. *Fish and Fisheries*, Vol. 4, pp 25-62.

Fay, FH, and C. Ray. 1968. Influence of climate on the distribution of walruses, *Odobenus rosmarus* (Linnaeus). I. Evidence from thermoregulatory behavior. *Zoologica* 53:1-18.

Fay, F.H., B.P. Kelly, P.H. Gehnrich, J.L. Sease, and A.A. Hoover. 1984. Modern populations, migrations, demography, trophics and historical status of the Pacific walrus. U.S. Dept. Commer., NOAA, OCSEAP Final Rep. 37(1986):231-386.

Fay, F.H. 1982. Ecology and Biology of the Pacific Walrus, *Odobenus rosmarus divergens* Illiger. U.S. Fish. Wildlife Service. *North American Fauna*. No. 74, Washington D.C., 279 pp.

Fay, F.H., B. P. Kelly, and J.L. Sease. 1989. Managing the exploitation of Pacific walruses: a tragedy off delayed response and poor communication. *Marine Mammal Science* 5:1-16.

Frisk, G. et al. 2003. *Ocean Nose and Marine Mammals*. Ocean Studies Board. National Academies Press, Washington D.C.

FWS (U.S. Fish and Wildlife Service). 2004. Marine Mammals Management: Pacific Walrus. [Online] Available: http://alaska.fws.gov/fisheries/mmm/walrus/nhistory.htm. [Accessed: May 15, 2006].

FWS (U.S. Fish and Wildlife Service). 2006. Marine Mammals; Incidental Take During Specified Activities. Federal Register: Volume 71, Number 88. [Online] Available: http://www.fws.gov/policy/library/06-4284.html. [Accessed: May 15, 2006].

FWS (U.S. Fish and Wildlife Service). 1994. Conservation plan for the Pacific walrus in Alaska. Marine Mammals Management, FWS, Anchorage, AK, 79 pp. [Online] Available: http://www.r7.fws.gov/mmm/docs/wconpln.pdf [Accessed: May 5, 2006].

FWS (U.S. States Fish and Wildlife Service). 2002. Stock assessment for Pacific walrus (*Odobenus rosmarus divergens*): Alaska stock. Marine Mammal Protection Act Stock Assessment Report. 6 pp. Available online at: alaska.fws.gov/fisheries/mmm/stock/finalpwalrusalaska.pdf. [Accessed: May15, 2006].

Gray, Olsgard, 1995. A comprehensive analysis of the effects of offshore oil and gas exploration and production on the benthic communities of the Norwegian continental shelf. *Marine Ecology Progress Series*. Vol 122, pp. 277-306.

Grebmeir J.M., J.E. Overland, S.E. Moore, E.V. Farley, E.C. Carmack, L.W. Cooper, K.E. Frey, J.H. Helle, F.A. McLaughlin, S.L. McNutt. 2006, March 10. A major ecosystem shift in

the northern Bering Sea. *Science*. 2006 March 10;311(5766):1461-4.

CGER (Commission on Geosciences, Environment and Resources). 1994. *Environmental Information for Outer Continental Shelf Oil and Gas Decisions in Alaska*. National Academies Press, Washington D.C.

Jay, C. V., Tamara, Olson, L., Garner, Gerald W. and Ballachey, Brenda E. 1998. Response of Pacific Walruses to Disturbances from capture ad handling activities at haul-out in Bristol Bay, Alaska. *Marine Mammal Science:* Vol. 14, No. 4, pp. 819–828.

Kastelein, R. A., P. Mosterd, B. van Santen, and M. Hagedoorn. 2002. Underwater audiogram of a Pacific walrus (*Odobenus rosmarus divergens*) measured with narrow-band frequency-modulated signals. *Journal of the Acoustical Society of America*. Vol. 112, Issue 5, pp 2173-2182.

Levermann, N., A. Galatius, G. Ehlme, S. Rysgaard, and E. W. Born. 2003. Feeding behavior of free-ranging walruses with notes on apparent dextrality of flipper use. *Bio Med Central: Ecology*. Vol 3. No. 9.

MMS (U.S. Minerals Management Service). 2006a. Arctic Ocean Outer Continental Shelf Seismic Surveys. OCS EIS/EA MMS 2006-019. Anchorage, AK: USDOI, MMS, Alaska OCS Region. [Online] Available: http://www.mms.gov/alaska. [Accessed: May 15, 2006].

MMS (U.S. Minerals Management Service). 2006b. Marine Mammals; Incidental Take During Specified Activities. *Federal Register*. Vol. 71, No. 88. [Online] Available: http://www.mms.gov/alaska. [Accessed: May 16, 2006].

MMS (U.S. Minerals Management Service). 2006c. Draft Proposed Program Outer Continental Shelf Oil and Gas Leasing Program 2007-2012. [Online] Available: http://www.mms.gov/alaska. [Accessed: May 12, 2006].

McKinney, M. L. (1997) "Extinction vulnerability and selectivity: Combining Ecological and Paleontological Views." *Annual Review of Ecology and Systematics:* Vol. 28, pp 495-516.

Molofsky, J. and J. Ferdy. (2005) "Extinction dynamics in experimental metapopulations." *Proceedings of the National Academy of Sciences of the United States of America.* Vol 102. No. 10. 3726-3731.

Musick. "Ecology and Conservation of Long-Lived Marine Animals." *American Fisheries Society Symposium.* 23:1–10. 1999.

Okenek, D.C. and M. Snively. 2005. Walrus Islands State Game Sanctuary, Annual Report. Alaska Department of Fish and Game, Division of Wildlife Conservation. Anchorage, AK. [Online] Available: http://www.wildlife.alaska.gov/index.cfm?adfg=refuge.rnd_is. [Accessed: May 13, 2006].

Orenstein, S., L. Langstaff. 2005. Advisory Committee on Acoustic Impacts of Marine Mammals. Report to the Marine Mammal Commission. November 2005. [Online] Available: http://www.mmc.gov/sound/welcome.html. [Accessed May 12, 2006].

Purvis, A., J.L. Gittleman, G. Cowlishaw and G.M. Mace. 2000. Predicting extinction risk in declining species. *Proceedings of the Royal Society B: Biological Sciences.* Vol. 267, No. 1456.

Simpkins M.A., L.M. Haruki-Raring, G. Sheffield, J.M. Grebmeier, J.L. Bengtson. 2003. Habitat selection by ice-associated pinnipeds near St. Lawrence Island, Alaska in March 2001. *Polar Biology.* Vol. 26, pp 577-586.

Seagers, D.J. and J. Garlich-Miller. 2001. Organochlorine compounds and aliphatic hydrocarbons in Pacific walrus blubber. *Marine Pollution Bulletin.* 43 (1-6):122-31.

USGS (U.S. Geological Survey). 2006. Walrus Abundance Survey Program. Alaska Science Center. [Online] Available: alaska.usgs.gov/science/biology/walrus/population.html. [Accessed: May17, 2006].

Webb, J.K., B.W. Brook, & R. Shine. 2002. What makes a species vulnerable to extinction?

Comparative life-history traits of two sympatric snakes. *Ecological Research* 17, 59–67.