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**[EXTERNAL] J. Schoen scoping comments on Arctic Refuge Coastal Plain**

1 message

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**The Schoens** <schoenak@gci.net>  
To: blm\_ak\_coastalplain\_EIS@blm.gov

Sun, Jun 17, 2018 at 5:44 PM

**John W. Schoen**, Ph.D.

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Secretary Ryan Zinke

Department of Interior

BLM, Alaska State Office

Attn: Coastal Plain EIS

West 7<sup>th</sup> Ave, #13

Anchorage, AK 99513

**Comments: Notice of Intent to Prepare an EIS for the Coastal Plain Oil & Gas Leasing Program in Alaska**

June 15, 2018

Dear Secretary Zinke,

I am proving you with my scoping comments on the *Notice of Intent to Prepare an Environmental Impact Statement for the Coastal Plain Oil and Gas Leasing Program*. I have worked professionally as a wildlife ecologist in Alaska for over 40 years; 20 years as a wildlife research biologist and senior conservation biologist for the Alaska Department of Fish and Game, and 14 years as the senior scientist for Audubon Alaska. I have also served as an affiliate associate professor of wildlife biology at the University of Alaska and have published more than 60 scientific and popular publications and reports on wildlife issues in Alaska. During that time, I have had the opportunity to both work and recreate in the coastal plain of the Arctic National Wildlife Refuge (Arctic Refuge) as well as elsewhere across Alaska's North Slope.

The Arctic Refuge, at 19.6 million acres, is the largest and most northerly wildlife refuge in the nation and the only refuge that encompasses an intact arctic ecosystem from the Arctic Ocean to the boreal forest south of the Brooks Range. There is great national interest in the conservation of this national wildlife refuge and the US Fish and Wildlife Service has described this refuge as containing the greatest biodiversity of any conservation area in the circumpolar Arctic.

My letter focusses on the following five major issues that must be addressed and analyzed in the EIS for the coastal plain of the Arctic Refuge:

1. Refuge purposes,
2. Cumulative environmental effects of oil and gas development,
3. Major wildlife concerns,
4. The refuge as an intact ecosystem and scientific benchmark for climate change and anthropogenic impacts, and
5. The need for a comprehensive arctic conservation strategy.

## Refuge Purposes:

The original 'Arctic National Wildlife Range' was established in 1960 "For the purpose of preserving unique wildlife, wilderness and recreational values..."

In 1980, ANILCA re-designated the Range as part of the larger Arctic National Wildlife Refuge and designated the following purposes:

- to conserve fish and wildlife populations and habitats in their natural diversity;
- to fulfill the international fish and wildlife treaty obligations of the United States;
- to provide the opportunity for continued subsistence uses by local residents; and
- to ensure water quality and necessary water quantity within the refuge.

Last year, Congress, through the budget reconciliation process, included oil and gas development as a new purpose. It is my professional opinion that it would be very difficult, and likely impossible, to achieve the purposes for which the Arctic Refuge was established and also allow a major oil and gas development program within the coastal plain of the Arctic Refuge. This is also the assessment of many scientists that have experience on Alaska's North Slope, and similar concerns have been raised by The Wildlife Society as well as the National Research Council (NRC) during their 2003 study of the Cumulative Effects of Oil and Gas Activities on Alaska's North Slope.

**I recommend that the EIS process clearly analyze and explain how oil and gas activities in the coastal plain are compatible with the previous purposes of the refuge.**

## Cumulative environmental effects of oil and gas development:

The NRC in 2003 analyzed the cumulative effects of oil and gas development on the North Slope. In this analysis, they stated that "Northern Alaska's environment and culture have already been significantly affected by oil infrastructure and activities." The report determined that "...nearly all of the roads pads, pipelines and other infrastructure ever built are still in place. Roads, in particular, were identified as having far reaching effects on the North Slope.

One of the major concerns about the proposed oil and gas activities in the coastal plain of the Arctic refuge is the concept that development will be restricted to 2,000 acres. This is a highly misleading concept. The NRC described that the cumulative effects of oil infrastructure are not limited to the gravel footprint. The NRC determined that extent of development on the North Slope has affected 1,000 square miles but the gravel footprint only covers 10,000 acres. This discrepancy needs to be explicitly addressed in the EIS. For example, scientists have determined that caribou (particularly large groups of cows and calves) are displaced by pipelines in combination with roads in the Prudhoe Bay development area. Thus, the area of impact is far greater than the immediate infrastructure.

**I recommend that a detailed analysis of various development alternatives be undertaken so as to accurately assess and predict cumulative effects of development activities and infrastructure on wildlife (including birds, mammals and fish), vegetation communities, hydrology, and other ecosystem processes. The DOI must also address the faulty concept of the development footprint limited to 2,000 acres. This is not an accurate measure of the cumulative impacts of oil and gas development in the Arctic. The actual impacts of development infrastructure and activities significantly exceed the direct gravel footprint of infrastructure. The indirect influence of pads, airstrips, roads, pipelines, and aircraft and vehicular traffic have significant impacts on animal behavior, displacement, and stress. These stressors must be accounted for and a robust program of research and monitoring should be established so as to develop and adaptive management strategy to reduce impacts to the natural resources of the coastal plain.**

## Major wildlife concerns:

In contrast to the central Arctic oil fields where the coastal plain is much broader (greater than 100-150 miles from the arctic coast), the Arctic Refuge coastal plain is much narrower (15-40 miles). This compression of habitats concentrates the habitat use of many wildlife species including caribou, polar bears, grizzly bears, wolverine, wolves, muskoxen, fish, snow geese, and over 130 species of migratory birds. Overlaying an industrial infrastructure on this narrow coastal plain will have significant influence on the wildlife that use this important area.

**Caribou:** The coastal plain of the Arctic Refuge provides important calving and insect relief habitat for the Porcupine Caribou Herd (PCH)—currently estimated at over 200,000 animals (ADF&G), it is the largest international migratory caribou herd in the world. The United States has an international agreement with Canada to conserve this herd. The Gwich'in Nation of Canada and the U.S. have depended on this herd for their subsistence use for centuries.

In the Central Arctic Herd (CAH, around Prudhoe Bay), where oil development has occurred on a portion of the calving grounds, cows in the late stage of pregnancy and with newborn calves avoided and shifted concentrated calving away from developed areas, including prime calving and foraging habitat (Whitten and Cameron 1983; Dau and Cameron 1986; Cameron et al. 1992; Nelleman and Cameron 1996, 1998; Murphy and Lawhead 2000; Wolfe 2000). Displacement from calving grounds can result in overcrowding and competition on suboptimal habitat. Decreased forage availability and lower nutrient intake can reduce reproductive rates (Cameron 1995, Nelleman and Cameron 1998). Caribou cows within oil fields gained less weight and exhibited lower calving and calf survival rates than cows outside oil fields (Cameron 1995). Displacement from prime calving grounds may also increase predation (Whitten et al. 1992, Nelleman and Cameron 1998, Griffith et al. 2002, Young et al. 2002).

Generally, some caribou appear to habituate to the presence of structures in oil fields but not to human presence and vehicular traffic (Nelleman and Cameron 1998). Caribou of the CAH avoided areas within 2.5 mi (4 km) of roads and pipelines, functionally increasing habitat loss from 2% (the immediate footprint of roads and gravel pads) to 29% (Wolfe 2000). The sensitivity of caribou to human activity and structures is greater during calving than during insect seasons, greater for maternal than nonmaternal caribou during the calving period, and greater during periods of intense insect harassment versus no insect harassment during summer. For example, Dau and Cameron (1986) clearly showed maternal caribou avoided roads during calving even when traffic levels were low, but nonmaternal caribou did not. During periods of intense insect harassment, some caribou have selected the elevated gravel of roads and shade from pipelines and buildings. At Prudhoe Bay, large groups of caribou often crossed roads with traffic and feeder pipelines during intense insect harassment but were reluctant to cross the same areas after insect harassment abated (Dau, personal communication 2002). Air traffic also has stressed parturient and postpartum cows and calves (Yokel 1997). Roads and pipelines and the snowdrifts they cause may impede caribou movements between foraging and insect-relief areas or disrupt normal movements, especially if perpendicular to routes (Gilliam and Lent 1982). Groups of greater than 100 caribou, common when under insect harassment and attempting to move to insect-relief areas at the coast, have greater difficulty crossing roads and pipelines than smaller groups (Smith and Cameron 1985). Measures to mitigate oil development impacts that appeared to work during exploration and onset of development may have become less effective as the cumulative effects of expanding development increased and the oil fields became operational (Whitten, personal communication 2002).

Demonstrable development related effects on the portion of the CAH occurring within the oil fields were observed during 1980-2000, despite masking effects of relatively low caribou densities and highly favorable weather on the calving grounds (Wolfe 2000, Griffith et al. 2002). Effects included shifting of concentrated calving from the Kuparuk oil field to the southwest of the field and delayed and deflected movement to and from coastal insect-relief areas (Whitten and Cameron 1983; Dau and Cameron 1986; Cameron et al. 1992; Nelleman and Cameron 1996, 1998; Murphy and Lawhead 2000; Wolfe 2000). Although the CAH increased from about 5,000 animals in 1978 to an estimated 27,000 in 2000, a population decline occurred from 1992 to 1995, followed by a rebound (Cameron et al. 2002). Comparing the higher growth rate of the Teshekpuk Caribou Herd (TCH) to the growth rate of the CAH, suggests that the CAH population may have been influenced by development infrastructure after approximately 1987. It appears that although oil field development has had a negative effect on the CAH, favorable environmental conditions, a low density of animals on the calving and post-calving grounds, and available calving area outside the oil fields on the broad coastal plain may have minimized the population-level impacts at this time. If displacement were to occur on a much larger herd like the PCH which migrate long distances, the population-level impacts could be much higher. Griffith et al. (2002), in fact, have predicted significant population-level impacts to the PCH from industrial development of the concentrated calving ground.

**I recommend that a comprehensive and detailed analysis of the cumulative effects of oil development on the Porcupine Caribou Herd be conducted and peer-reviewed by an independent scientific body. It will also be important to evaluate the potential effects on caribou in terms of subsistence users of this herd living in both Canada and Alaska.**

**Polar bears:** The Beaufort Sea population of polar bears in Alaska is estimated to be around 2000 bears IUCN (2003). Based on the analysis of over 30 years of data, scientists found that a bit less than half of the polar bear maternity dens were located on the coastal mainland or on ice attached to the mainland (Amstrup 2000). Retreating sea ice has resulted in increased polar bear denning on land (Amstrup and Garner 1994, Amstrup 1997). Along Alaska's Arctic coast, the highest density of polar bear land dens occurs within the coastal plain of the Arctic Refuge and the Fish and Wildlife Service has described it as the most consistently used polar bear land denning area in Alaska.

Each winter the pregnant females come ashore and dig dens into the snow, giving birth to one to three cubs in December-early January. Winter oil exploration and development activity coincides with the period when females are within their maternity dens. Should disturbances cause the female to flee the den, newborn cubs will die. Individual polar bear dens are extremely difficult to locate and therefore also difficult to avoid disturbing. It is the cumulative effect of numerous developments and disturbances that may distress the population most. Like other species of bears, polar bears exist in relatively small populations and have low reproductive rates. Consequently, even small population declines can have significant adverse impacts on the population, emphasizing a need for careful management of polar bears.

Concerns with the impact of oil activities on polar bear populations are best described by the IUCN/Species Survival Commission - Polar Bear Specialist Group. In the section Population and Habitat Threats, the following are listed as primary threats: hunting, petroleum exploration, toxic chemicals, nuclear waste, global warming and trade in polar bear parts. Under petroleum exploration, this group of polar bear experts identified the following potential problems: 1) death, injury, or harassment resulting from interactions with humans; 2) damage or destruction of essential habitat; 3) contact with and ingestion of oil; 4) contact with or ingestion of other contaminants; 5) attraction to or disturbance by industrial noise; 6) harassment (disturbance) by aircraft, ships, or other vehicles; 7) increased hunting pressure; 8) indirect food chain effects due to the impacts of oil and gas related activities on the food web upon which polar bears depend and are a part; 9) mortality, injury and stress resulting from scientific research to determine possible effects of oil and gas activities on polar bears and other species. Additionally, polar bears (like the other arctic carnivores - brown bear, wolves, arctic foxes, and wolverines) may also be attracted to human development because of food, curiosity over novel smells and activities, etc. often leading to an increase in human-caused deaths. How will development and production activities affect polar bears and particularly maternal denning of polar bears? These questions must be answered. Various development scenarios must be evaluated and long-term cumulative effects of oil and gas activities assessed before any lease sales of exploration and development begins.

**It will be necessary to assess the potential impacts of oil-field development on polar bears using the coastal plain and also analyze those impacts in terms of climate change and the likelihood of increasing use of the coastal plain for denning by polar bears. A cumulative effects analysis should be conducted and peer reviewed.**

**Grizzly bears:** Industrial development in the coastal plain of the Arctic Refuge would substantially increase bear-human interactions. Defense of life and property (DLP) mortality of grizzlies rises with increases in human residence and anthropogenic food availability. ADF&G found 21% of oil field grizzlies supplementing natural forage with anthropogenic foods. When access to garbage and human food was suddenly eliminated, food-conditioned bears suffered DLP mortalities greater than sustainable rates. In the Prudhoe Bay oil fields, the mortality rates of all adults and subadults that fed on anthropogenic foods was significantly higher than for bears that fed on natural foods (ADF&G). DLP kills are an example of the risks facing grizzly bears following industrial development in wilderness habitat. Arctic Refuge grizzly populations occur at low densities and are highly vulnerable to increasing harvest rates. Seismic exploration, particularly new 3-dimensional techniques, may also disrupt denning.

**A cumulative effects analysis of the impacts of exploration and development must be conducted for grizzly bears using the coastal plain. Other terrestrial mammals that need to be evaluated include wolverines, wolves, arctic fox, musk oxen, and some key indicators of small mammals.**

**Birds:** The Arctic Refuge provides important habitat for birds. Over 200 species of birds have been documented using the Refuge and about 70 species are known to breed on the coastal plain. Audubon WatchList species (with declining or vulnerable populations) that use the coastal plain include: red-throated and yellow-billed loon, common and king eider, long-tailed duck, black scoter, golden eagle, peregrine falcon, wandering tattler, whimbrel, bar-tailed godwit, and buff-breasted sandpiper.

Oil-field exploration and development would reduce bird populations through the loss and fragmentation of habitat. Disturbance associated with oil-field activity would also affect birds by increasing stress levels during nesting and molting. In addition, oil fields attract predators like foxes and ravens and these predators have had a significant impact on nesting birds in the Prudhoe Bay oil fields. Oil exploration and development will also have an impact on freshwater resources on the coastal plain. Compared to Prudhoe Bay and NPRS, freshwater is much more limited the refuge coastal plain and any reduction will have an impact on water birds that use the refuge. Finally, any oil spills that may reach wetlands or coastal lagoons would have substantial negative impacts on loons, waterfowl, and shorebirds using the coastal plain.

**The DEIS should include a cumulative effects analysis of the impacts of petroleum exploration and development on a sample of loons, waterfowl, shorebirds, and song birds using the coastal plain of the refuge. Specific attention should be given to WatchList species.**

**Fish:** Freshwater is much more limited on the Arctic Refuge coastal plain than areas west of the refuge. Damage to wetlands and reduction in surface water will have significant impacts on fish including dolly varden, arctic grayling, and arctic cisco. **The impacts to fish and the hydrology of the coastal plain from water withdrawals for ice roads and pads and other uses must be carefully evaluated and cumulative impacts assessed.**

**The refuge as an intact ecosystem and scientific benchmark for climate change and anthropogenic impacts:**

Alaska is the only state in the nation that encompasses an arctic ecosystem. Terrestrial and marine arctic ecosystems and the fish and wildlife associated with them represent an important part of our nation's biodiversity. The scientific consensus is clear that human-caused climate change is rapidly occurring and that the Arctic is warming much faster than temperate or tropical regions of the Earth. Over the last four decades, there has been unprecedented industrial

development in Alaska's arctic. How are these changes being monitored so that we can respond with intelligent and responsible resource management and appropriate mitigation? To be responsive to this rapid change and meet our resource stewardship and socio-economic responsibilities, we need a clear plan of action based on a foundation of science. How can we evaluate change in populations of caribou, polar bears, birds, fish, or tundra plants unless we have a scientific baseline from which to monitor change and identify cause and effect relationships? The Arctic Refuge is the only intact region of the coastal plain that can adequately serve as a scientific baseline for long-term monitoring and research.

Petroleum development within the coastal plain of the Arctic Refuge will undoubtedly change this national wildlife refuge significantly. Exploration and development will impact natural ecological processes and also impact many populations of fish and wildlife and the people who depend on those resources. In 2003, the National Research Council (NRC) of the National Academies published their report on the cumulative effects of oil and gas activities on Alaska's North Slope. This comprehensive report documented many accumulated effects to date.

Excerpts from this report of key environmental effects follows.

- Nearly all the roads, pads, pipelines and other infrastructure ever built are still in place. The environmental effects of this infrastructure not only include the actual physical footprint but also impact at varying distances from the structures.
- Roads have had far-reaching and complex effects on the North Slope including direct effect on tundra and indirect effects caused by dust, roadside flooding, thawing of permafrost, and roadside snow accumulation. Roads and activity on them alter animal habitat and behavior and wildland values and increase human access.
- Surface erosion, water flow and tundra vegetation have been altered by extensive off-road travel. Some of that damage has persisted for decades.
- Cumulative impacts of oil and gas activities have had an influence on animal populations on the North Slope. Garbage and food have resulted in higher densities of predators, including foxes, ravens, and glaucous gulls. These predators prey on the eggs, nestlings, and fledglings of birds increasing mortality on some species such as black brant, snow geese, eiders, and shorebirds.
- The combined effects of industrial activity and infrastructure and the stress imposed by insects in some summers reduced calf production in the Central Arctic caribou herd and may have contributed to the reduction of herd size from 1992 through 1995...the spread of industrial activity into other areas caribou use for calving and insect relief, especially to the east where the coastal plain is narrower, would likely affect reproductive success...
- If recent warming trends in climate continue, as many projections indicate, the effects will accumulate over the next century to alter the extent and timing of sea ice, affect the distribution and abundance of marine and terrestrial plants and animals, and affect permafrost as well as the usefulness of current oil-field technologies and how they affect the environment.
- The Gwich'in Indians of northeast Alaska and northwest Canada have a centuries-old nutritional and cultural relationship with the Porcupine Caribou Herd. Most Gwich'in oppose any oil development that would threaten the herd, especially on the calving ground, which they consider sacred, and thereby threaten their cultural survival.
- Many activities associated with oil development have compromised wildland and scenic values over large areas.

**The DEIS must do a comprehensive literature review of scientific studies on the North Slope as well as evaluate research dealing with petroleum development in arctic regions elsewhere across the globe. It will be imperative that a plan for long-term research and monitoring of fish and wildlife and their habitats be developed, funded, and implemented in the Arctic Refuge coastal plain. The issue of a scientific baseline for comparative studies must be addressed.**

#### **The need for a comprehensive cumulative effects analysis and whole arctic conservation strategy:**

The 2003 NRC report on cumulative effects of oil and gas activities on Alaska's North Slope states that: "To date, decisions have generally been made without a comprehensive slope-wide plan and regulatory strategy that identify the scope, intensity, direction and consequences of industrial activities judged acceptable." This is a major concern. The coastal plain of the Arctic Refuge represents only 5 percent of the North Slope coastal plain. Nearly 90 percent of the Arctic coastal plain in Alaska is not permanently protected and remains available for development. Not only does the Arctic Refuge coastal plain provide an important scientific control area for long-term research and monitoring, it is the only such area available in our nation's only arctic ecosystem. Managing the Arctic Refuge for its wildlife and ecosystem values and as a baseline for monitoring climate change will be important for increasing our scientific understanding of Arctic ecology and achieving balance between conservation and development across America's Arctic.

**Before any lease sales or development occurs on the coastal plain of the Arctic Refuge, I strongly urge the Department of Interior to follow the 2003 NRC recommendations for filling the following knowledge gaps. Those recommendations include:**

- **Ecosystem-level research in addition to local ecological studies.**

- **Studies to understand the types of effects that exist at varying distances beyond the footprint of industrial structures.**
- **Studies of air pollutions that provide a quantitative baseline of spatial and temporal trends in air quality over long periods across the North Slope.**
- **Studies of effect of seismic exploration and other off-road use on the tundra.**
- **Research on habitat requirements of caribou, their reproductive physiology and movements, and how natural and anthropogenic disturbance affects them.**
- **Studies of the effects of taking water from lakes on the North Slope for ice roads, pads, and other purposes.**
- **Studies of the effects of oil and gas activities on human health...**

**In addition, The Department of Interior should develop a comprehensive conservation strategy for the entire arctic coastal plain, including the Arctic Refuge, Central Arctic, and NPR-A. Finally, the increased carbon emissions resulting from exploration, development, and extraction of oil from the ground should be calculated and their effects evaluated in terms of their contribution to climate change.**

Based on my experience and understanding of the cumulative effects of oil and gas exploration and development on Alaska's North Slope, I do not believe these impacts have been adequately considered for the Arctic Refuge. Without and adequate scientific understanding of the cumulative effects of development, it is unlikely that mitigation of impacts to this complex ecosystem will be effective. Conserving the Arctic Refuge is not simply an issue of attempting to mitigate impacts to caribou. Safeguarding the ecological integrity of the refuge is far more complex. Despite improved drilling technology, there is the significant probability that industrial development would change the coastal plain of the refuge from a wild, naturally functioning ecosystem to a human-dominated, industrial complex. The consequences of such an action are clearly not compatible with the purposes for which the refuge was established.

Thank you for considering my comments, concerns, and recommendations regarding DOL's intent to prepare and EIS for the coastal plain oil and gas leasing program in the Arctic National Wildlife Refuge.

Sincerely,

John W. Schoen, Ph.D.

Wildlife Ecologist, retired

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Secretary Ryan Zinke  
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**I recommend that the EIS process clearly analyze and explain how oil and gas activities in the coastal plain are compatible with the previous purposes of the refuge.**

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**I recommend that a detailed analysis of various development alternatives be undertaken so as to accurately assess and predict cumulative effects of development activities and infrastructure on wildlife (including birds, mammals and fish), vegetation communities, hydrology, and other ecosystem processes. The DOI must also address the faulty concept of the development footprint limited to 2,000 acres. This is not an accurate measure of the cumulative impacts of oil and gas development in the Arctic. The actual impacts of development infrastructure and activities significantly exceed the direct gravel footprint of infrastructure. The indirect influence of pads, airstrips, roads, pipelines, and aircraft and vehicular traffic have significant impacts on animal behavior, displacement, and stress. These stressors must be accounted for and a robust program of research and monitoring should be established so as to develop and adaptive management strategy to reduce impacts to the natural resources of the coastal plain.**

#### **Major wildlife concerns:**

In contrast to the central Arctic oil fields where the coastal plain is much broader (greater than 100-150 miles from the arctic coast), the Arctic Refuge coastal plain is much narrower (15-40 miles). This compression of habitats concentrates the habitat use of many wildlife species including caribou, polar bears, grizzly bears, wolverine, wolves, muskoxen, fish, snow geese, and over 130 species of migratory birds. Overlaying an industrial infrastructure on this narrow coastal plain will have significant influence on the wildlife that use this important area.

**Caribou:** The coastal plain of the Arctic Refuge provides important calving and insect relief habitat for the Porcupine Caribou Herd (PCH)—currently estimated at over 200,000 animals (ADF&G), it is the largest international migratory caribou herd in the world. The United States has an international agreement with Canada to conserve this herd. The Gwich'in Nation of Canada and the U.S. have depended on this herd for their subsistence use for centuries.

In the Central Arctic Herd (CAH, around Prudhoe Bay), where oil development has occurred on a portion of the calving grounds, cows in the late stage of pregnancy and with newborn calves avoided and shifted concentrated calving away from developed areas, including prime calving and foraging habitat (Whitten and Cameron 1983; Dau and Cameron 1986; Cameron et al. 1992; Nellemann and Cameron 1996, 1998; Murphy and Lawhead 2000; Wolfe 2000). Displacement from calving grounds can result in overcrowding and competition on suboptimal habitat. Decreased forage availability and lower nutrient intake can reduce reproductive rates (Cameron 1995, Nellemann and Cameron 1998). Caribou cows within oil fields gained less weight and exhibited lower calving and calf survival rates than cows outside oil fields (Cameron 1995). Displacement from prime calving grounds may also increase predation (Whitten et al. 1992, Nellemann and Cameron 1998, Griffith et al. 2002, Young et al. 2002).

Generally, some caribou appear to habituate to the presence of structures in oil fields but not to human presence and vehicular traffic (Nellemann and Cameron 1998). Caribou of the CAH avoided areas within 2.5 mi (4 km) of roads and pipelines, functionally increasing habitat loss from 2% (the immediate footprint of roads and gravel pads) to 29% (Wolfe 2000). The sensitivity of caribou to human activity

and structures is greater during calving than during insect seasons, greater for maternal than nonmaternal caribou during the calving period, and greater during periods of intense insect harassment versus no insect harassment during summer. For example, Dau and Cameron (1986) clearly showed maternal caribou avoided roads during calving even when traffic levels were low, but nonmaternal caribou did not. During periods of intense insect harassment, some caribou have selected the elevated gravel of roads and shade from pipelines and buildings. At Prudhoe Bay, large groups of caribou often crossed roads with traffic and feeder pipelines during intense insect harassment but were reluctant to cross the same areas after insect harassment abated (Dau, personal communication 2002). Air traffic also has stressed parturient and postpartum cows and calves (Yokel 1997). Roads and pipelines and the snowdrifts they cause may impede caribou movements between foraging and insect-relief areas or disrupt normal movements, especially if perpendicular to routes (Gilliam and Lent 1982). Groups of greater than 100 caribou, common when under insect harassment and attempting to move to insect-relief areas at the coast, have greater difficulty crossing roads and pipelines than smaller groups (Smith and Cameron 1985). Measures to mitigate oil development impacts that appeared to work during exploration and onset of development may have become less effective as the cumulative effects of expanding development increased and the oil fields became operational (Whitten, personal communication 2002).

Demonstrable development related effects on the portion of the CAH occurring within the oil fields were observed during 1980-2000, despite masking effects of relatively low caribou densities and highly favorable weather on the calving grounds (Wolfe 2000, Griffith et al. 2002). Effects included shifting of concentrated calving from the Kuparuk oil field to the southwest of the field and delayed and deflected movement to and from coastal insect-relief areas (Whitten and Cameron 1983; Dau and Cameron 1986; Cameron et al. 1992; Nelleman and Cameron 1996, 1998; Murphy and Lawhead 2000; Wolfe 2000). Although the CAH increased from about 5,000 animals in 1978 to an estimated 27,000 in 2000, a population decline occurred from 1992 to 1995, followed by a rebound (Cameron et al. 2002). Comparing the higher growth rate of the Teshekpuk Caribou Herd (TCH) to the growth rate of the CAH, suggests that the CAH population may have been influenced by development infrastructure after approximately 1987. It appears that although oil field development has had a negative effect on the CAH, favorable environmental conditions, a low density of animals on the calving and post-calving grounds, and available calving area outside the oil fields on the broad coastal plain may have minimized the population-level impacts at this time. If displacement were to occur on a much larger herd like the PCH which migrate long distances, the population-level impacts could be much higher. Griffith et. al. (2002), in fact, have predicted significant population-level impacts to the PCH from industrial development of the concentrated calving ground.

**I recommend that a comprehensive and detailed analysis of the cumulative effects of oil development on the Porcupine Caribou Herd be conducted and peer-reviewed by an independent scientific body. It will also be important to evaluate the potential effects on caribou in terms of subsistence users of this herd living in both Canada and Alaska.**

**Polar bears:** The Beaufort Sea population of polar bears in Alaska is estimated to be around 2000 bears IUCN (2003). Based on the analysis of over 30 years of data, scientists found that a bit less than half of

the polar bear maternity dens were located on the coastal mainland or on ice attached to the mainland (Amstrup 2000). Retreating sea ice has resulted in increased polar bear denning on land (Amstrup and Garner 1994, Amstrup 1997). Along Alaska's Arctic coast, the highest density of polar bear land dens occurs within the coastal plain of the Arctic Refuge and the Fish and Wildlife Service has described it as the most consistently used polar bear land denning area in Alaska.

Each winter the pregnant females come ashore and dig dens into the snow, giving birth to one to three cubs in December-early January. Winter oil exploration and development activity coincides with the period when females are within their maternity dens. Should disturbances cause the female to flee the den, newborn cubs will die. Individual polar bear dens are extremely difficult to locate and therefore also difficult to avoid disturbing. It is the cumulative effect of numerous developments and disturbances that may distress the population most. Like other species of bears, polar bears exist in relatively small populations and have low reproductive rates. Consequently, even small population declines can have significant adverse impacts on the population, emphasizing a need for careful management of polar bears.

Concerns with the impact of oil activities on polar bear populations are best described by the IUCN/Species Survival Commission - Polar Bear Specialist Group. In the section Population and Habitat Threats, the following are listed as primary threats: hunting, petroleum exploration, toxic chemicals, nuclear waste, global warming and trade in polar bear parts. Under petroleum exploration, this group of polar bear experts identified the following potential problems: 1) death, injury, or harassment resulting from interactions with humans; 2) damage or destruction of essential habitat; 3) contact with and ingestion of oil; 4) contact with or ingestion of other contaminants; 5) attraction to or disturbance by industrial noise; 6) harassment (disturbance) by aircraft, ships, or other vehicles; 7) increased hunting pressure; 8) indirect food chain effects due to the impacts of oil and gas related activities on the food web upon which polar bears depend and are a part; 9) mortality, injury and stress resulting from scientific research to determine possible effects of oil and gas activities on polar bears and other species. Additionally, polar bears (like the other arctic carnivores - brown bear, wolves, arctic foxes, and wolverines) may also be attracted to human development because of food, curiosity over novel smells and activities, etc. often leading to an increase in human-caused deaths. How will development and production activities affect polar bears and particularly maternal denning of polar bears? These questions must be answered. Various development scenarios must be evaluated and long-term cumulative effects of oil and gas activities assessed before any lease sales of exploration and development begins.

**It will be necessary to assess the potential impacts of oil-field development on polar bears using the coastal plain and also analyze those impacts in terms of climate change and the likelihood of increasing use of the coastal plain for denning by polar bears. A cumulative effects analysis should be conducted and peer reviewed.**

**Grizzly bears:** Industrial development in the coastal plain of the Arctic Refuge would substantially increase bear-human interactions. Defense of life and property (DLP) mortality of grizzlies rises with increases in human residence and anthropogenic food availability. ADF&G found 21% of oil field

grizzlies supplementing natural forage with anthropogenic foods. When access to garbage and human food was suddenly eliminated, food-conditioned bears suffered DLP mortalities greater than sustainable rates. In the Prudhoe Bay oil fields, the mortality rates of all adults and subadults that fed on anthropogenic foods was significantly higher than for bears that fed on natural foods (ADF&G). DLP kills are an example of the risks facing grizzly bears following industrial development in wilderness habitat. Arctic Refuge grizzly populations occur at low densities and are highly vulnerable to increasing harvest rates. Seismic exploration, particularly new 3-dimensional techniques, may also disrupt denning.

**A cumulative effects analysis of the impacts of exploration and development must be conducted for grizzly bears using the coastal plain. Other terrestrial mammals that need to be evaluated include wolverines, wolves, arctic fox, musk oxen, and some key indicators of small mammals.**

**Birds:** The Arctic Refuge provides important habitat for birds. Over 200 species of birds have been documented using the Refuge and about 70 species are known to breed on the coastal plain. Audubon WatchList species (with declining or vulnerable populations) that use the coastal plain include: red-throated and yellow-billed loon, common and king eider, long-tailed duck, black scoter, golden eagle, peregrine falcon, wandering tattler, whimbrel, bar-tailed godwit, and buff-breasted sandpiper.

Oil-field exploration and development would reduce bird populations through the loss and fragmentation of habitat. Disturbance associated with oil-field activity would also affect birds by increasing stress levels during nesting and molting. In addition, oil fields attract predators like foxes and ravens and these predators have had a significant impact on nesting birds in the Prudhoe Bay oil fields. Oil exploration and development will also have an impact on freshwater resources on the coastal plain. Compared to Prudhoe Bay and NPRS, freshwater is much more limited the refuge coastal plain and any reduction will have an impact on water birds that use the refuge. Finally, any oil spills that may reach wetlands or coastal lagoons would have substantial negative impacts on loons, waterfowl, and shorebirds using the coastal plain.

**The DEIS should include a cumulative effects analysis of the impacts of petroleum exploration and development on a sample of loons, waterfowl, shorebirds, and song birds using the coastal plain of the refuge. Specific attention should be given to WatchList species.**

**Fish:** Freshwater is much more limited on the Arctic Refuge coastal plain than areas west of the refuge. Damage to wetlands and reduction in surface water will have significant impacts on fish including dolly varden, arctic grayling, and arctic cisco. **The impacts to fish and the hydrology of the coastal plain from water withdrawals for ice roads and pads and other uses must be carefully evaluated and cumulative impacts assessed.**

**The refuge as an intact ecosystem and scientific benchmark for climate change and anthropogenic impacts:**

Alaska is the only state in the nation that encompasses an arctic ecosystem. Terrestrial and marine arctic ecosystems and the fish and wildlife associated with them represent an important part of our nation's biodiversity. The scientific consensus is clear that human-caused climate change is rapidly occurring and that the Arctic is warming much faster than temperate or tropical regions of the Earth. Over the last four decades, there has been unprecedented industrial development in Alaska's arctic. How are these changes being monitored so that we can respond with intelligent and responsible resource management and appropriate mitigation? To be responsive to this rapid change and meet our resource stewardship and socio-economic responsibilities, we need a clear plan of action based on a foundation of science. How can we evaluate change in populations of caribou, polar bears, birds, fish, or tundra plants unless we have a scientific baseline from which to monitor change and identify cause and effect relationships? The Arctic Refuge is the only intact region of the coastal plain that can adequately serve as a scientific baseline for long-term monitoring and research.

Petroleum development within the coastal plain of the Arctic Refuge will undoubtedly change this national wildlife refuge significantly. Exploration and development will impact natural ecological processes and also impact many populations of fish and wildlife and the people who depend on those resources. In 2003, the National Research Council (NRC) of the National Academies published their report on the cumulative effects of oil and gas activities on Alaska's North Slope. This comprehensive report documented many accumulated effects to date.

Excerpts from this report of key environmental effects follows.

- Nearly all the roads, pads, pipelines and other infrastructure ever built are still in place. The environmental effects of this infrastructure not only include the actual physical footprint but also impact at varying distances from the structures.
- Roads have had far-reaching and complex effects on the North Slope including direct effect on tundra and indirect effects caused by dust, roadside flooding, thawing of permafrost, and roadside snow accumulation. Roads and activity on them alter animal habitat and behavior and wildland values and increase human access.
- Surface erosion, water flow and tundra vegetation have been altered by extensive off-road travel. Some of that damage has persisted for decades.
- Cumulative impacts of oil and gas activities have had an influence on animal populations on the North Slope. Garbage and food have resulted in higher densities of predators, including foxes, ravens, and glaucous gulls. These predators prey on the eggs, nestlings, and fledglings of birds increasing mortality on some species such as black brant, snow geese, eiders, and shorebirds.
- The combined effects of industrial activity and infrastructure and the stress imposed by insects in some summers reduced calf production in the Central Arctic caribou herd and may have contributed to the reduction of herd size from 1992 through 1995...the spread of industrial activity into other areas caribou use for calving and insect relief, especially to the east where the coastal plain is narrower, would likely affect reproductive success...
- If recent warming trends in climate continue, as many projections indicate, the effects will accumulate over the next century to alter the extent and timing of sea ice, affect the

distribution and abundance of marine and terrestrial plants and animals, and affect permafrost as well as the usefulness of current oil-field technologies and how they affect the environment.

- The Gwich'in Indians of northeast Alaska and northwest Canada have a centuries-old nutritional and cultural relationship with the Porcupine Caribou Herd. Most Gwich'in oppose any oil development that would threaten the herd, especially the calving ground, which they consider sacred, and thereby threaten their cultural survival.
- Many activities associated with oil development have compromised wildland and scenic values over large areas.

**The DEIS must do a comprehensive literature review of scientific studies on the North Slope as well as evaluate research dealing with petroleum development in arctic regions elsewhere across the globe. It will be imperative that a plan for long-term research and monitoring of fish and wildlife and their habitats be developed, funded, and implemented in the Arctic Refuge coastal plain. The issue of a scientific baseline for comparative studies must be addressed.**

**The need for a comprehensive cumulative effects analysis and whole arctic conservation strategy:**

The 2003 NRC report on cumulative effects of oil and gas activities on Alaska's North Slope states that: "To date, decisions have generally been made without a comprehensive slope-wide plan and regulatory strategy that identify the scope, intensity, direction and consequences of industrial activities judged acceptable." This is a major concern. The coastal plain of the Arctic Refuge represents only 5 percent of the North Slope coastal plain. Nearly 90 percent of the Arctic coastal plain in Alaska is not permanently protected and remains available for development. Not only does the Arctic Refuge coastal plain provide an important scientific control area for long-term research and monitoring, it is the only such area available in our nation's only arctic ecosystem. Managing the Arctic Refuge for its wildlife and ecosystem values and as a baseline for monitoring climate change will be important for increasing our scientific understanding of Arctic ecology and achieving balance between conservation and development across America's Arctic.

**Before any lease sales or development occurs on the coastal plain of the Arctic Refuge, I strongly urge the Department of Interior to follow the 2003 NRC recommendations for filling the following knowledge gaps. Those recommendations include:**

- Ecosystem-level research in addition to local ecological studies.
- Studies to understand the types of effects that exist at varying distances beyond the footprint of industrial structures.
- Studies of air pollutions that provide a quantitative baseline of spatial and temporal trends in air quality over long periods across the North Slope.
- Studies of effect of seismic exploration and other off-road use on the tundra.
- Research on habitat requirements of caribou, their reproductive physiology and movements, and how natural and anthropogenic disturbance affects them.



- **Studies of the effects of taking water from lakes on the North Slope for ice roads, pads, and other purposes.**
- **Studies of the effects of oil and gas activities on human health...**

**In addition, The Department of Interior should develop a comprehensive conservation strategy for the entire arctic coastal plain, including the Arctic Refuge, Central Arctic, and NPR-A. Finally, the increased carbon emissions resulting from exploration, development, and extraction of oil from the ground should be calculated and their effects evaluated in terms of their contribution to climate change.**

Based on my experience and understanding of the cumulative effects of oil and gas exploration and development on Alaska's North Slope, I do not believe these impacts have been adequately considered for the Arctic Refuge. Without and adequate scientific understanding of the cumulative effects of development, it is unlikely that mitigation of impacts to this complex ecosystem will be effective. Conserving the Arctic Refuge is not simply an issue of attempting to mitigate impacts to caribou. Safeguarding the ecological integrity of the refuge is far more complex. Despite improved drilling technology, there is the significant probability that industrial development would change the coastal plain of the refuge from a wild, naturally functioning ecosystem to a human-dominated, industrial complex. The consequences of such an action are clearly not compatible with the purposes for which the refuge was established.

Thank you for considering my comments, concerns, and recommendations regarding DOI's intent to prepare and EIS for the coastal plain oil and gas leasing program in the Arctic National Wildlife Refuge.

Sincerely,

John W. Schoen, Ph.D.  
Wildlife Ecologist, retired

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