Joint Review Panel Secretariat
Canadian Environmental Assessment Agency
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October 1, 2012

Re: The Shell Jackpine Mine Expansion exacerbates cumulative environmental impacts threatening woodland caribou and migratory bird species, including whooping cranes. Canada is obligated under national law and an international treaty to prevent or mitigate the impacts of tar sands extraction on these species.

Dear Joint Review Panel:

On behalf of Center for Biological Diversity, Council of Canadians, Environmental Defence, Forest Ethics, Friends of the Earth, National Wildlife Federation, Natural Resources Defense Council, and the Sierra Club, we provide this letter in opposition to the planned expansion of tar sands mining activity, including the Jackpine Mine Expansion by Shell Energy Canada (the "Project"). In this letter we provide detailed information about the cumulative impacts of tar sands mining on migratory birds, including whooping cranes, and woodland caribou. The Joint Review Panel for the Project must consider any cumulative environmental effects that are likely to result from the designated project in combination with other physical activities that have been or will be carried out. Given the cumulative impacts of tar sands mining and related activities on wildlife species in the region, the Project should not be considered to be in the public interest.

Our coalition is increasingly concerned that tar sand activities in Alberta, Canada are threatening woodland caribou and migratory birds, among many other species. On September 22 2011, we submitted a petition under U.S. law to the U.S. government ("Pelly petition"), asking the President to certify that the impacts of large-scale tar sands mining in Alberta violate Canada's obligations to prevent takings of caribou and migratory birds, including whooping cranes.[1] There has been no substantive response: the U.S. Fish and Wildlife Service claims it is waiting for a Canadian government response, but there has been none. Now we raise our concerns to the Canadian government directly.

As set out in the Pelly petition, extraction of oil from Alberta's tar sands directly kills migratory birds in tailings ponds and contaminated wetlands, and indirectly kills migratory birds by causing widespread damage to important migratory bird habitat. Mistaking tailings ponds for natural ponds, waterfowl and shorebirds land in the tailings pond and become oiled with waste bitumen and toxic elements. They then drown, die from hypothermia, or suffer from ingestion of

toxins. Endangered whooping cranes (*Grus americana*) are particularly vulnerable to the risk of landing in a tailings pond, as the entire global population of wild, migratory whooping cranes migrates through the tar sands region twice each year, including the area where the Project would be located. While whooping cranes do not nest in the Project area, they could land there for overnight stops during migration. This is made clear from the unpublished maps and data appended to this submission. Toxins from the tailings ponds and pollutants from other aspects of tar sands operations leak into wetlands and forests, contaminating important habitat for migratory birds. Strip-mining of over 4,790 square kilometers in Alberta's boreal forest would result in the loss of important breeding habitat for millions of birds. These impacts pose serious risk to 130 species of migratory bird protected under the Convention Between the United States and Great Britain [on behalf of Canada] for the Protection of Migratory Birds, Aug. 16, 1916, 39 Stat. 1702, T.S. No. 628 ("Migratory Bird Convention"). See Migratory Bird Convention, art. 1.

Tar sands development also destroys critical habitat for threatened[2] woodland caribou (*Rangifer tarandus caribou)* that live in local herds and do not migrate. Roughly one third of Alberta's woodland caribou lives in the tar sands region. All caribou herds in the tar sands area have declined more than 50 percent over their last three generations. Anthropogenic habitat disruption and fragmentation—including tar sands exploration, infrastructure development and industrial activities—are the driving forces of this population decline.[3] While woodland caribou do not currently live in the Project area, the Project will exacerbate the cumulative damage to their habitat, as described further below.

As a significant contributor to global warming, tar sands operations also indirectly impact migratory birds and caribou by increasing insects and wildfires in boreal forests, droughts in wetlands, and causing dramatic shifts in vegetation and predators in their habitats.

The Project would add to the congestion that already exists in the tar sands area, and which is causing the destruction of habitat and subsequent declines in species such as woodland caribou and migratory birds that are the subject of our petition. In fact, Shell Energy Canada published a report in September 2012 projecting severe habitat loss if all proposed tar sands mining expansion moves forward as planned in the region. Of the species Shell studied, habitat loss from planned tar sands development—including but not limited to the Project—would be severe for at least two internationally protected migratory bird species: horned grebes would lose 26 percent of their high quality habitat available before industrial development, while olive-sided flycatchers would lose 13 percent.[4] In addition, woodland caribou would lose a staggering 47 percent of their high quality habitat compared to pre-industrial levels.[5] In light of the impacts the Project will have on such wildlife, in combination with other existing and planned development, we urge the Joint Review Panel to conclude that the Project will have significant adverse effects and that approval of the Project be denied on the basis that it is not in the public interest.

A. Tar Sands Extraction Threatens Migratory Birds

Millions of waterfowl migrate through the tar sands area each year en route to and from their northern breeding grounds.[6] During migration, waterfowl are attracted to water bodies for foraging, roosting, nesting, and resting purposes. Unfortunately, the toxic tailings ponds created as a result of tar sands extraction also attract waterfowl. Shorebirds also mistake the tailings ponds' oily shorelines for mudflats. When the Athabasca River and other natural wetlands are

frozen in early spring, migrating birds are particularly vulnerable to landing on tailings ponds as stopover sites, as the ponds are the only unfrozen water source available due to the warm effluents. They are also the largest bodies of water in this part of the migratory flyway. Even when other open water sources are available, tailings ponds still attract large numbers of migratory waterfowl.[7]

When waterbirds and shorebirds land on tailings ponds, they can come into contact with bitumen wastes that weigh them down and cause them to become incapable of flight. Up to 80 to 90 percent of oiled birds drown, or die from hypothermia when their oiled feathers lose the ability to insulate.[8] Birds can also absorb tar sands toxins through inhalation, ingestion, and skin contact.[9] As an Alberta court explained in a case involving the death of approximately 1600 migratory ducks after they landed in an oil company's tailing pond in the Alberta tar sands:

> Birds that attempt to preen bitumen from their feathers and those that forage on the shores of the pond may ingest bitumen which is toxic to them. Even a light oiling can interfere with a bird's reproductive abilities. Relatively small amounts of some petroleum products may also result in high levels of mortality for bird embryos.[10]

As of 2010, 43 species of birds—mostly waterbirds protected by the Migratory Bird Convention— have died from exposure to tar sands tailings ponds.[11] Bird species in drastic population decline are at particular risk when flocks land on tailings ponds for stop-overs.[12] At least nine species found in the tar sands region and protected by the Migratory Bird Convention have lost over 50 percent of their population over the past 40 to 50 years, including horned grebe, lesser yellowlegs, short-billed dowitcher, boreal chickadee, olive-sided flycatcher, evening grosbeak, lesser scaup, greater scaup, and northern pintail.[13] The population of lesser scaup, for example, has declined as much as 70 percent in the past 30 years. [14] These waterfowl are a widely reported casualty of tailings ponds.[15]

In addition to the direct and immediate harm caused to waterfowl and shorebirds by tailings ponds, other sources of pollution from tar sands operations are also harmful to migratory birds. For example, when heavy metals such as mercury, lead, and cadmium accumulate in wetlands, they magnify in the food chain and build up in birds' tissues, causing problems with overall health, reproduction, and behavior. These effects increase risk of death for adult birds, as well as embryo malformations, reduced egg weights, and reduced chick survival.[16] Tar sands pollutants in wetlands also affect the food chain for fish-eating birds by killing fish or causing severe deformities, lesions and other health problems in fish.[17] Acid rain caused by emissions of air pollutants from tar sands operations is harmful to birds because it can increase birds' uptake of heavy metals.[18] It also depletes calcium in the soil, leaving less available in the food chain for successful egg production.[19] In addition, acid rain decimates populations of aquatic invertebrates, insects and fish, which are important food sources for waterbirds and insectivorous birds.[20]

Tar sands operations also destroy vast areas of breeding habitat for migratory birds. The boreal forest of northeast Alberta is a key breeding area for over 292 species of birds, at least 130 of which use the tar sands area and are protected by the Migratory Bird Convention.[21] Roughly 2.6 square kilometers of forest in the northeast Alberta can support as many as 500 breeding pairs of migratory birds, some of the highest densities anywhere within Canada's boreal forest.[22] Between 22 million and 170 million birds breed each year in the tar sands area.[23] A 2009 study

estimated that the impacts of tar sands operations on habitat have caused the loss of 58,000 to 402,000 birds.[24] Because the industrial footprint of the tar sands is likely to double in the next 15 years, habitat loss will continue to increase mortality rates of migratory birds.[25] The effects of tar sands mining and drilling on bird habitat are projected to reduce the forest-dependent bird population by between 10 to 50 percent.[26] Strip mining of the roughly 3,100 square kilometers currently allocated for mines will destroy habitat for an estimated 480,000 to 3.6 million adult birds.[27] Drilling infrastructure could eliminate or fragment another roughly 49,000 square kilometers of migratory bird habitat.[28] Tar sands operations will also reduce bird births, with one estimate ranging from 9.6 million to 72 million fewer birds being born over a 40-year period.[29]

Tar sands extraction also reduces viable bird habitat by reducing water available to natural ecosystems, as very little of the water used in operations is returned to the natural cycle.[30] Most of the water used in tar sands mining operations comes from the Athabasca River.[31] Up to 15 percent of the river's weekly flow can be taken,[32] causing concerns that low-flow periods will increase mortality of fish and other aquatic organisms that are a source of food for birds.[33] Low flows may also increase concentrations of pollutants and eliminate the annual floods that are critical for nutrient deposition in the floodplain.[34] Mining also "dewaters" areas surrounding the mines by diverting streams from the mineable area, draining adjacent wetlands, and lowering the water table to keep water out of the open pit.[35] As mining operations change regional wetlands, rivers, and underground reservoirs, they threaten hundreds of thousands of migratory birds dependent on these wetlands.[36]

Fragmentation of forests from tar sands drilling and transportation infrastructure leaves fewer areas of closed forest canopy and more forest "edges," where forests meet clearings.[37] Fragmented forests have different microclimates than intact forests, as well as more frequent habitat disturbances, an increase in bird predators and parasites, and invasions of introduced plants and animals.[38] Forest fragmentation also leads to changes in bird social structure and mating success, which decrease survival and reproduction of breeding birds.[39] Isolated bird populations in forest patches are more vulnerable to catastrophic weather or human disturbances.[40]

Noise pollution from compressor stations also impacts bird breeding success. The 5,000 existing compressor stations may have reduced local bird populations in Alberta by 27,000 birds due to habitat loss, and an additional 85,000 birds from noise effects.[41] Expansion of drilling as planned could eliminate another 425,000 birds from the noise effects of compressor stations alone.[42]

Climate change that will be worsened by tar sands development threatens migratory birds as well. Temperatures in Canada's boreal forest have already risen up to four degrees Celsius in some areas over the past century. This causes dramatic changes in timing of ecosystem events including emerging of springtime insects and mating and nesting of birds.[43] Migratory birds may arrive too late to take advantage of the insect emergence, which is key to providing adequate food for nestlings.[44] Global warming is also shifting bird distributions and altering their migration behavior and habitat, diminishing their survival ability and threatening some species with extinction.[45] As ranges shift north, some species will be replaced by species from further south. All will face habitat loss as well as new competitors, prey, and predators.[46] Moreover, as water tables near mines are lowered during "landscape dewatering," surrounding wetlands become drier.[47] Such dewatering particularly impacts waterbirds, as drier wetlands will be more

strongly affected by the late summer droughts projected to become more common in the region due to global warming.[48] A species of particular concern and the subject of rigorous conservation efforts in the United States is the endangered whooping crane. As North America's tallest bird and one of its rarest, the whooping crane has long been a symbol of international conservation efforts. In 1941 the population had fallen as low as 16 adults due to hunting and habitat destruction. Today the whooping crane population is growing, but the species remains endangered and vulnerable to catastrophic natural and anthropogenic threats, including the threats posed by tar sands operations. In 2010, the global population of wild whooping cranes was just 383 birds, 270 of which migrate over the tar sands region twice each year from Alberta and the Northwest Territories to coastal Texas. These 270 cranes are the only migratory whooping cranes remaining. Pairs, family groups or small flocks fly up to 6000 feet, then glide downwards on thermal currents, covering up to 692 kilometers per day. They descend by nightfall, landing opportunistically at any available water body along their migration route. The cranes take flight again only when wind conditions are right. They may stay at stopover locations overnight, or up to one week in spring and two weeks in fall. Only four percent of crane stopovers are documented by human observers, but the majority of these occur within roughly 260 kilometers of the cranes' main migratory corridor. According to U.S. Fish and Wildlife Service Whooping Crane Coordinator Tom Stehn:

> Just having one known whooping crane stopover in a county in the data set roughly means that you can expect at least one whooping crane group to stop in that county in any given year. … Whooping cranes often do not use traditional roost sites, but stop wherever they happen to be late in the day when they find conditions no longer suitable for migration. Although some areas are used regularly by multiple cranes, the possibly more common situation is to have a few cranes stopping at a small wetland or farm pond for a night at a location that they may never use again in their life time. … This can make for a very unpredictable pattern of stopover use depending on daily weather conditions. … [Cranes] occasionally interrupt daytime migration flights to drink and/or forage in an agricultural field or wetland for a brief period.

In the 1980s, radio-telemetry studies documented that the migrating whooping cranes fly over the tar sands area and land on many different water bodies within their migratory corridor. (See Annex II.) In 1981, one group was grounded northeast of Fort McMurray for a week due to dense smoke from forest fires. A second group stayed on the ground in the Birch Mountains northwest of Fort McMurray for two days due to unfavorable weather and adverse winds. In 2006, a family group of possibly oil-stained whooping cranes were photographed during a fall migration stopover on the Platte River in Nebraska. (See Annex III, Figures 5 and 6 for photos.) A contaminants expert at the USGS Patuxent Wildlife Research Center commented on the incident at the time:

The durability of the staining and the uniform pattern on all three birds are compatible with some type of oil-based staining that occurred as the birds were wading through water. The dark brown (almost black) color would indicate exposure to either crude oil (oil field waste ponds), lubricating oils from waste water retention ponds (industrial or refining complexes), or one of the heavier fuel oils (Nos. 4-6). Gasoline and kerosene would have produced little visible stain and diesel fuel would have left a light brown stain.

United States Fish and Wildlife Service Whooping Crane Coordinator Tom Stehn also commented on the incident:

[E]xperts I consulted all indicated the material looked like oil. This "oiling" occurred somewhere between Wood Buffalo National Park in N.W.T., Canada and the Platte River, Nebraska. … Although there is no proof, it seems possible to me that the oiling may have occurred in the tar sand operations in Canada.

During the fall migration of 2010, whooping cranes fitted with Global Positioning Systems (GPS) transmitters were documented making stopovers in the tar sands region, in both the surface mineable area and the drillable area. (See Annex II.)

According to the Government of Alberta, whooping cranes face the greatest threat from habitat loss and degradation during migration:

> Conversion of wetlands for development (be it agricultural, urban, commercial, or recreational), oil exploration, or road construction is the most significant threat affecting the overall vulnerability of cranes. ... Wetland conversion reduces habitat suitability and availability.

According to the U.S. Fish and Wildlife Service, wetland mosaics provide the most suitable stopover habitat for whooping cranes and should be available every ten miles (26 kilometers)—at a minimum—throughout their migratory corridor. As described above, tar sands development seriously threatens intact wetland mosaics as stopover habitat. (See Annex II, Figure 4 for a map of anthropogenic disturbance in Alberta's whooping crane migratory corridor.)

In addition, whooping cranes are threatened by global warming, which causes changes in their breeding habitat (as discussed above for migratory birds in the boreal forest), as well as increases in the salinity of wetlands and viability of prey species in their wintering habitat due to sea level rise. Droughts exacerbated by climate change can dry up wetland breeding areas, reduce food supplies, and increase vulnerability of whooping crane chicks and nests to predation. According to the Government of Alberta, "the threat of global warming and the predicted outcome on the environment has the potential to seriously impact existing [whooping] crane habitats."

Thus, while we do not know of confirmed instances of whooping cranes landing in tar sands tailings ponds, it is clear that the cranes use the tar sands area for stopovers; some cranes have possibly been oiled somewhere along their northern migration corridor; and tar sands tailings ponds pose a threat to the entire global population of migratory whooping cranes. In addition, tar sands extraction is reducing suitable stopover habitat for whooping cranes in the tar sands region, and contributing to global warming that will alter their breeding, migration, and wintering habitats.

At least 130 bird species that breed in, or migrate through, habitat located in the tar sands area are protected by the Migratory Birds Convention Act of Canada and the Migratory Bird Treaty Act of the United States. In its preamble the Migratory Bird Convention calls for protection of endangered and threatened migratory bird species:

> Whereas, many of these species are … *in danger of extermination through lack of adequate protection* during the nesting season or while on their way to and from their breeding grounds;
>
> [The Parties], being desirous of saving from indiscriminate slaughter and of insuring the preservation of such migratory birds as are either useful to man or are harmless, have resolved to adopt some uniform system of protection which shall effectively accomplish such objects, and to the end of concluding a convention for this purpose.
>
> Migratory Bird Convention, pmbl. (emphasis added).

In conclusion, the threats that tar sands operation pose to protected birds include: 1) bird deaths as a result of landing in tailings ponds during migration; 2) contamination of wetlands in the region and downstream; 3) damage to and reduction of suitable breeding habitat, due to, among other harms, forest fragmentation, noise, diversion of vast quantities of water and lowering of the water table, damage to food sources, wetlands eutrophication, and acid rain and deposition of other air pollutants; and 4) accelerating global warming and its negative impacts on migratory birds.

B. Tar Sands Extraction Threatens Woodland Caribou

Another species threatened by Canadian tar sands operations is the woodland caribou. Woodland caribou are medium-sized members of the deer family. Both males and females have antlers, long legs, and wide hooves adapted to harsh winters and deep snow. They have low reproductive potential and require large tracts of intact, low-productivity, mature to old conifer forests—both peatlands and uplands—that contain terrestrial lichens, their preferred winter food source.[49] They avoid younger and more productive forests that support other ungulates, thus avoiding predation by wolves. [50] Although they wander extensively throughout the year, woodland caribou are not migratory—their winter and summer ranges overlap.[51] Population densities are naturally very low, with just one caribou every 8 to 34 square kilometers.[52] Calving sites are also highly dispersed – roughly 16 square kilometers apart-- which minimizes population density and predation risk.[53]

Caribou survival rates and their rate of population growth are significantly lower in ranges with more anthropogenic and natural disturbance, or in close proximity to these disturbances.[54] With fragmentation, forest floor and light conditions change, favoring species other than lichens.[55] Abundance of younger forest increases populations of other ungulates, which spread parasites and attract wolves.[56]

Roughly one third of Alberta's woodland caribou (population 2,315 adults) lives in the tar sands region in fixed home ranges that are increasingly fragmented by tar sands extraction activities.[57] There are thirteen caribou herds in the tar sands region: Red Earth, Richardson, West Side Athabasca River, Nipisi, Chinchaga, Cold Lake, and East Side Athabasca River (further divided into Algar, Egg-Pony, Bohn, Christina, Wiau, Wandering, and Agnes). [58] All have anthropogenic disturbance in their home ranges. (See Annex IV, Figures 7 and 8 for maps of disturbance and caribou habitat in the tar sands region as a whole, and in the Lower Athabasca region.)

All of the herds are small in size and rarely mix with other herds, if at all.[59] Populations are so isolated that there are discrete genetic types of woodland caribou on either side of the Peace River.[60] Even small declines in survival of adult females can lead to large declines in populations, and all herds in the tar sands have suffered declines in numbers of adult females since 2002.[61]

Woodland caribou population declines in Alberta are a result of habitat disturbance and loss due to mines, well sites, pipelines, roads, seismic lines, transmission corridors, logging, and, in some cases, forest fires.[62] Tar sands oil development has led to high levels of caribou habitat disturbance, resulting in smaller, more isolated and less contiguous habitat patches and creating barriers to caribou movement. [63] By 2010, there were 34 current or approved tar sands operations in woodland caribou habitat, and 12 proposed operations.[64]

It is also important to note that there is a delay between habitat loss and local extinction: a population may persist for decades following habitat degradation before a herd disappears entirely.[65] Habitat alternation and loss also increases the number of caribou predators, namely wolves; not only does it make it easier for predators to move across the landscape and prey on caribou, it also creates conditions that attract alternative prey, thereby increasing the number of caribou predators.[66]

Woodland caribou also reduce their use of otherwise suitable habitat because of its proximity to human infrastructure or habitat disturbances, such as roads, well sites and seismic lines. In fact, the physical footprint that results from direct loss of habitat may be relatively small compared to the functional loss of habitat as a result of caribou avoidance. For example, woodland caribou avoid roads and well sites by approximately 250 meters and 975 meters, respectively.[67] This loss of functional habitat is thought to be the single most detrimental factor affecting woodland caribou.[68] For example, a study of the caribou population on the west side of the Athabasca River found that just one percent of habitat was directly lost—primarily due to seismic lines—but 48 percent was functionally lost as a result of reduced use behavior by caribou.[69] A 2011 study of habitat selection and wolf predation on the population on the east side of the Athabasca River found that physiological stresses resulting from intense, widespread levels of human activity may play a primary role in caribou population decline.[70] The study concluded that functional habitat loss may have more to do with human use than with industrial infrastructure (seismic lines, roads, and pipelines) alone: nutritional and physiological stress levels were highest when humans were more active in the landscape, and stress levels returned to normal when oil crews left the area.[71] The authors recommended clustering human activity on the landscape, both physically and temporally, and minimizing secondary roads.[72]

Global warming, accelerated by tar sands extraction, also threatens woodland caribou. Warming increases populations of mountain pine beetles in the boreal forest, resulting in the death of mature trees and decline of terrestrial lichens that caribou depend upon for winter forage.[73] As vegetation types shift northward with regional warming, lichen will be more quickly outcompeted by grasses and shrubs.[74] Extreme weather events, including unusually deep snow or ice crusts atop snow—caused by freezing rain or melting snows that refreeze—create difficult grazing conditions for caribou that may result in starvation and death.[75] Caribou herd population declines have also been linked to winters with heavy snow.[76] Regional warming is expected to cause warmer and longer summers and greater variety in snow conditions that will affect the growth and distribution of plants eaten by caribou.[77] Warming air temperatures also

cause changes in insect emergence, abundance and activity, causing caribou to spend more time running from mosquito and fly harassment and less time foraging, resulting in poor body conditions.[78] Warming also causes increases in the frequency and severity of forest fires; changes in abundance, type and quality of forage; changes in conditions for diseases and parasites; and increased caribou predation, as deer and moose expand northwards and are followed by wolves and other predators.[79]

The urgent need to protect woodland caribou from industrial development, in particular tar sands development, has been outlined in numerous reports and studies. A 2011 report concluded that:

> [T]he situation is critical and immediate action is required. None of the herds are currently self-sustaining and most will be functionally extirpated within three decades if current population trends continue. Population declines may even accelerate in the face of continued industrial expansion. … *It will not be possible to add any new industrial features to most caribou ranges for several decades without making matters worse for caribou.*[80]

The Athabasca Caribou Landscape Management Options report of 2009 concluded that "management action is needed NOW" as woodland caribou "will not persist for more than two to four decades without immediate and aggressive management intervention."[81] Further, "[t]ough choices need to be made between the management imperative to recover [woodland] caribou and plans for ongoing bitumen development and industrial land-use.[82] It also concluded that "the highest risk to caribou occurs in areas with thick bitumen deposits" and that the industrial footprint in caribou habitat should be reduced in size and duration.[83]

A 2011 panel of 23 woodland caribou experts recommended that the relatively more intact ranges of Chinchaga, Red Earth, West Side Athabasca River and East Side Athabasca River should be the focus of Alberta's land use planning to create an overarching caribou protection plan.[84] Among their findings:

> [T]o conserve woodland caribou means dispensing with business as usual, which has demonstrably and repeatedly failed to meet caribou conservation needs. … While it is tempting to regard predators as the culprits in the decline and demise of woodland caribou, the ultimate cause is human activities. … To proceed headlong with industrial exploitation in caribou range in the face of known uncertainties is to risk foreclosing on options. … Science suggests keeping caribou in the boreal forest is achievable. Society will need a new way of thinking—based on forethought and wisdom—to make it happen.[85]

Finally, a 2010 report determined that woodland caribou will be extirpated from most of the tar sands region in Alberta if industrial activity is allowed to continue unabated and without habitat restoration.[86] Even the Alberta government's Endangered Species Scientific Sub-committee recently recommended that Alberta's caribou be uplisted from "threatened" to "endangered."[87]

In conclusion, tar sands extraction in Alberta threatens woodland caribou through oil extraction activities that 1) directly destroy or degrade caribou habitat; 2) cause functional

habitat disturbance through human activities and sensory disturbance; 3) create forest conditions that attract caribou predators; and 4) accelerate global warming and its negative impacts on woodland caribou.

C. Conclusion

In sum, tar sands development in Alberta is occurring at break-neck pace without regard for the devastating impacts on migratory birds, woodland caribou, and the ecosystems on which they rely. It is also occurring contrary to the international commitment made under the Migratory Bird Convention. If approved, the Project will add to the impacts on such species, and as such we urge the Joint Review Panel to conclude that the Project will have significant adverse effects and that approval of the Project be denied on the basis that it is not in the public interest.

Sincerely,

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ANNEX I: SPECIES PROTECTED BY THE MIGRATORY BIRD CONVENTION THAT BREED OR MIGRATE THROUGH THE TAR SANDS REGION

The following list of migratory birds in the tar sands region were sourced from *Guideline for wetland establishment on reclaimed oil sands leases (2nd edition)* Alberta Environment (2008), http://environment.gov.ab.ca/info/library/8105.pdf at 318-322, Appendix E1, as well as J. Wells et al., *Danger in the Nursery, Impact on Birds of Tar Sands Oil Development in Canada's Boreal Forest* (2008), and compared with the 1995 Protocol Amending the Migratory Birds Convention, http://www.treaty-accord.gc.ca/text-texte.asp?id=101587.

1. American Avocet
2. American Bittern
3. Bobolink
4. Bufflehead
5. Canvasback
6. Boreal Chickadee
7. American Coot
8. Sandhill Crane
9. Whooping Crane
10. Short-billed Dowitcher
11. American Black Duck
12. Harlequin Duck
13. Ring-necked Duck
14. Ruddy Duck
15. Wood Duck
16. Great Egret
17. Alder Flycatcher
18. Great-crested Flycatcher
19. Least Flycatcher
20. Olive-sided Flycatcher
21. Yellow-bellied Flycatcher
22. Gadwall
23. Marbled Godwit
24. Barrow's Goldeneye
25. Common Goldeneye
26. American Goldfinch
27. Canada Goose
28. Ross' Goose
29. Snow Goose
30. Eared Grebe
31. Horned Grebe
32. Pied-Billed Grebe
33. Red-necked Grebe
34. Western Grebe
35. Evening Grosbeak
36. Bonaparte's Gull
37. California Gull
38. Franklin's Gull
39. Glaucous Gull
40. Herring Gull
41. Iceland Gull
42. Mew Gull

43. Ring-billed Gull
44. Great Blue Heron
45. Dark-eyed Junco
46. Killdeer
47. Eastern Kingbird
48. Ruby-crowned Kinglet
49. Arctic Loon
50. Common Loon
51. Red-throated Loon
52. Mallard
53. Common Merganser
54. Hooded Merganser
55. Red-breasted Merganser
56. Common Nighthawk
57. Red-breasted Nuthatch
58. Oldsquaw or Long-tailed Duck
59. Northern Oriole
60. Red Phalarope
61. Red-necked Phalarope
62. Wilson's Phalarope
63. Eastern Phoebe
64. Say's Phoebe
65. Northern Pintail
66. American Pipit
67. Redhead
68. Common Redpoll
69. American Robin
70. Buff-breasted Sandpiper
71. Least Sandpiper
72. Semipalmated Sandpiper
73. Solitary Sandpiper
74. Spotted Sandpiper
75. Upland Sandpiper
76. Greater Scaup
77. Lesser Scaup
78. Surf Scoter
79. White-winged Scoter
80. Northern Shoveler
81. Pine Siskin
82. Common Snipe
83. Sora
84. American Tree Sparrow
85. Chipping Sparrow
86. Clay-colored Sparrow
87. Fox Sparrow
88. LeConte's Sparrow
89. Lincoln's Sparrow
90. Savannah Sparrow
91. Sharp-tailed Sparrow
92. Song Sparrow
93. Swamp Sparrow
94. Vesper Sparrow
95. White-crowned Sparrow
96. White-throated Sparrow

97. Bank Swallow
98. Barn Swallow
99. Cliff Swallow
100. Tree Swallow
101. Trumpeter Swan
102. Tundra Swan
103. Western Tanager
104. Blue-winged Teal
105. Cinnamon Teal
106. Green-winged Teal
107. Arctic Tern
108. Black Tern
109. Caspian Tern
110. Common Tern
111. Hermit Thrush
112. Swainson's Thrush
113. Philadelphia Vireo
114. Red-eyed Vireo
115. Solitary Vireo
116. Warbling Vireo
117. Bohemian Waxwing
118. Cedar Waxwing
119. American Wigeon
120. Eurasian Wigeon
121. Willet
122. Black-backed Woodpecker
123. Pileated Woodpecker
124. Three-toed Woodpecker
125. Western Wood-Pewee
126. House Wren
127. Marsh Wren
128. Winter Wren
129. Greater Yellowlegs
130. Lesser Yellowlegs

ANNEX II: WHOOPING CRANE MIGRATION THROUGH ALBERTA'S TAR SANDS

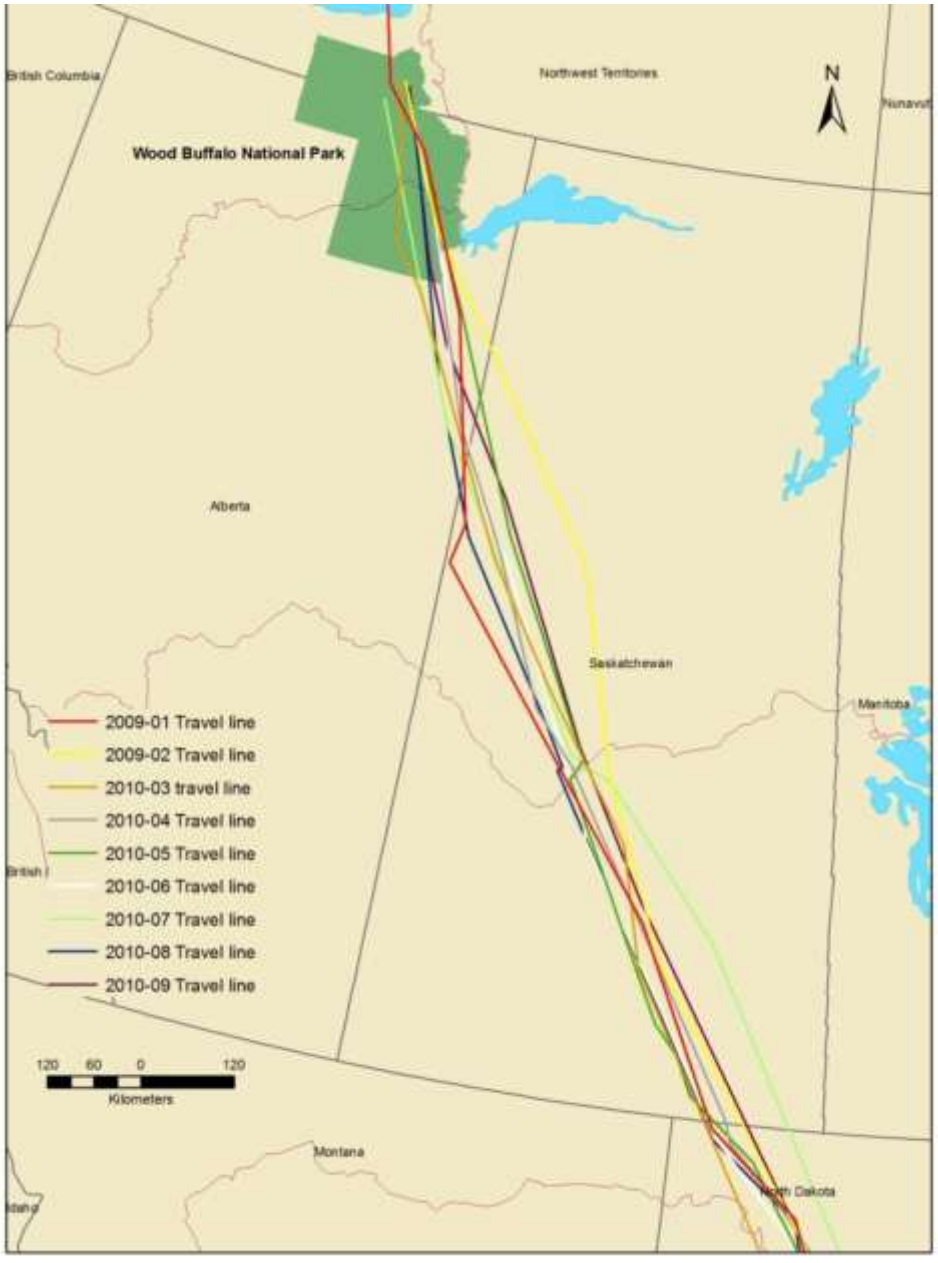

Figure 1. Migration Routes of GPS-tracked Whooping Cranes in Canada fall 2010, Source: Walter Wehtje, *Aransas Wood Buffalo Population Radio-Marked Whooping Crane Fall 2010 Migration Report*, The Crane Trust (unpublished report of April 2011) at 8.

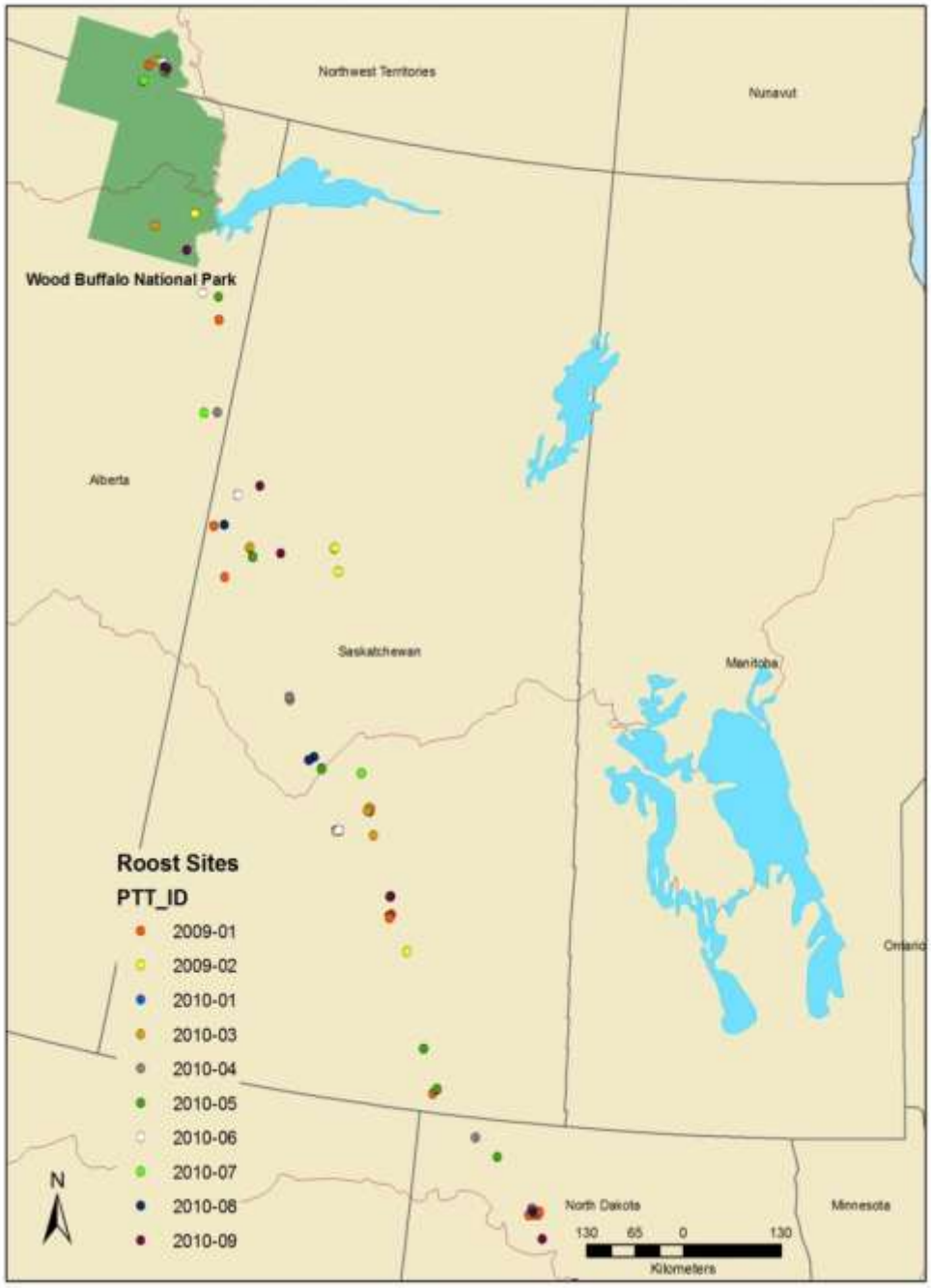

Figure 2. Migration roost sites of GPS-tracked whooping cranes in Canada during fall 2010 (Note: 2010-01 travel route not shown as there were too few data points to provide an accurate representation of its travel route). Source: Walter Wehtje, *Aransas Wood Buffalo Population Radio-Marked Fall 2010 Migration Report*, The Crane Trust (unpublished report of April 2011) at 8.

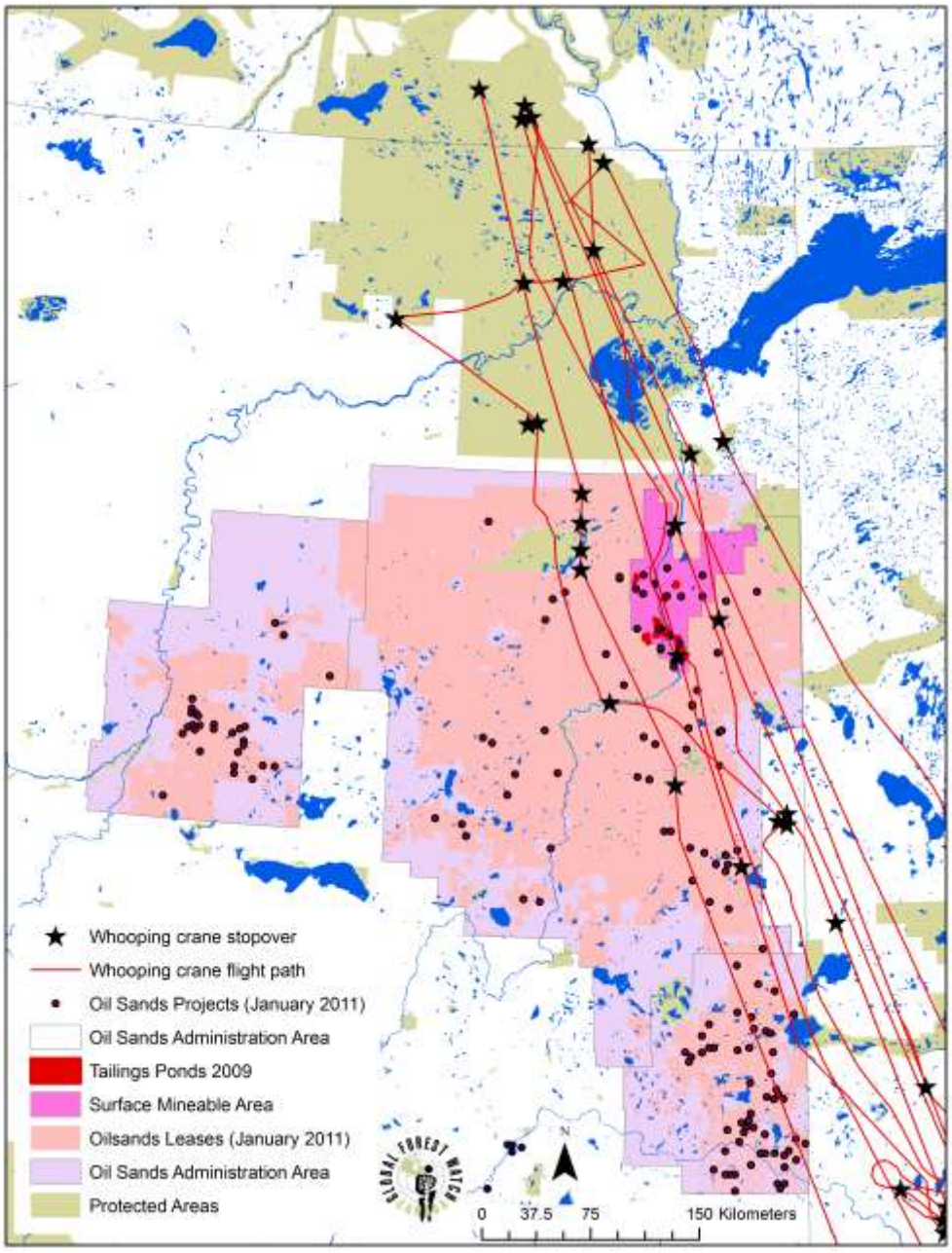

Figure 3. Whooping crane stopover spots and flight paths in Alberta Oil Sands Region (1981, 1982, 1983). Source: P. Lee, *Whooping Cranes (*Grus Americana*) in Alberta's Oil Sands Region***,** Global Forest Watch Canada International Year of Forests Publication #9 (2011), available at: www.globalforestwatch.ca, using stopover data from E. Kuyt, *Aerial Radio-tracking of Whooping Cranes Migrating Between Wood Buffalo National Park and Aransas National Wildlife Refuge, 1981-84*, Environment Canada, Canadian Wildlife Service Occasional Paper No. 74 (1992).

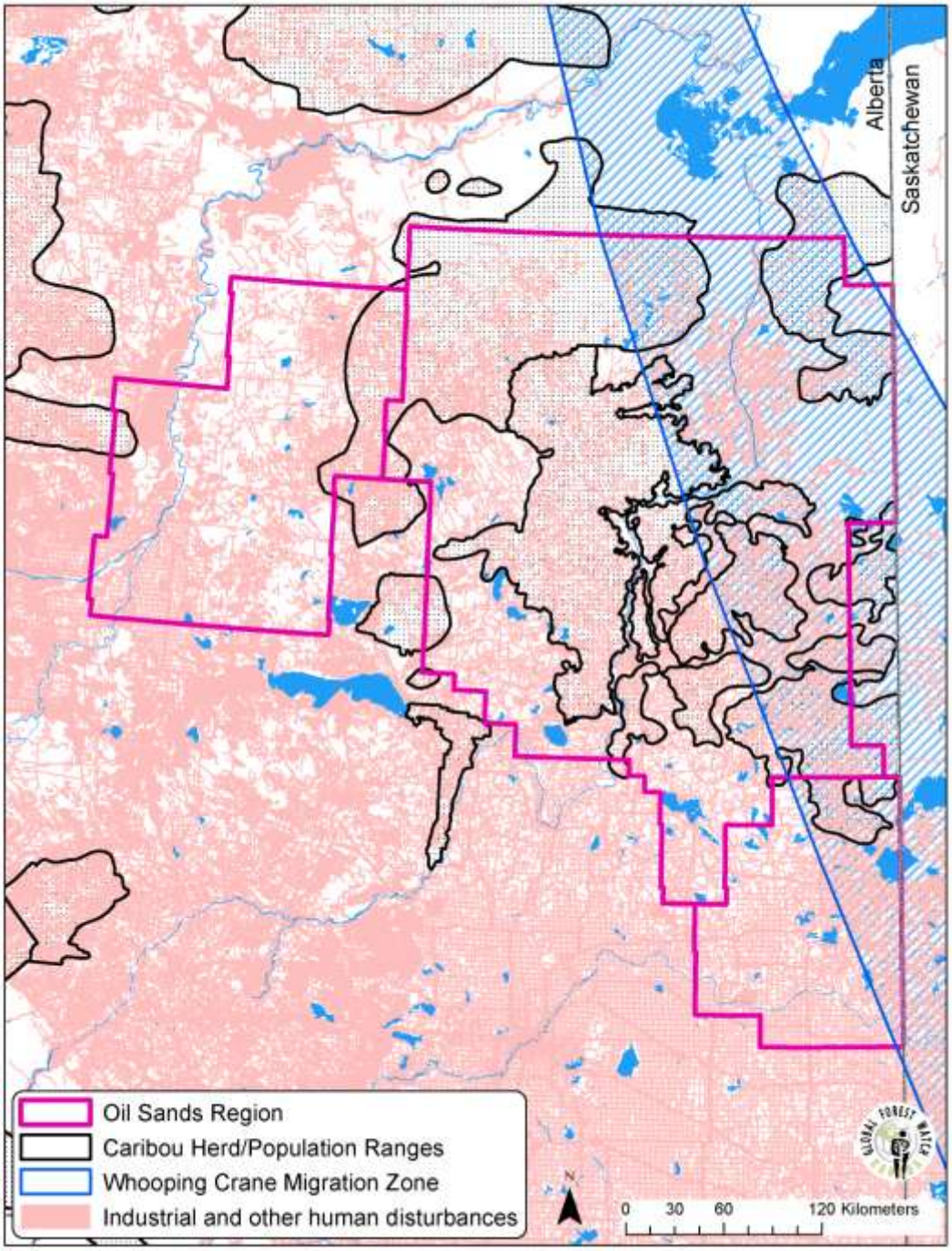

Figure 4. Anthropogenic disturbance in the whooping crane migratory corridor of Alberta. Source: Global Forest Watch Canada (August 2011), www.globalforestwatch.ca

ANNEX III: PHOTOGRAPHS OF POSSIBLY OIL-STAINED WHOOPING CRANES AT THE PLATTE RIVER, NEBRASKA, FALL 2006.

Figure 5. Stained Whooping Cranes on the Platte River, Nebraska, 2006. (The bellies of whooping cranes are normally pure white.) According to the U.S. Fish and Wildlife Service Whooping Crane Coordinator, it is possible that the cranes were oiled at an Alberta tar sands tailings pond. Credit: Michael Forsberg.

Figure 6. Possibly oiled Whooping Cranes in flight at the Platte River, Nebraska, Fall 2006. The underbellies of Whooping Cranes are normally white. Credit: Whooping Crane Journey North, *Tom Stehn's Report: Migration Dangers* (March 16, 2007) http://www.learner.org/jnorth/crane/spring2007/Update031607_Stehn.html.

ANNEX IV: CARIBOU HABITAT DISTURBANCE IN THE TAR SANDS REGION

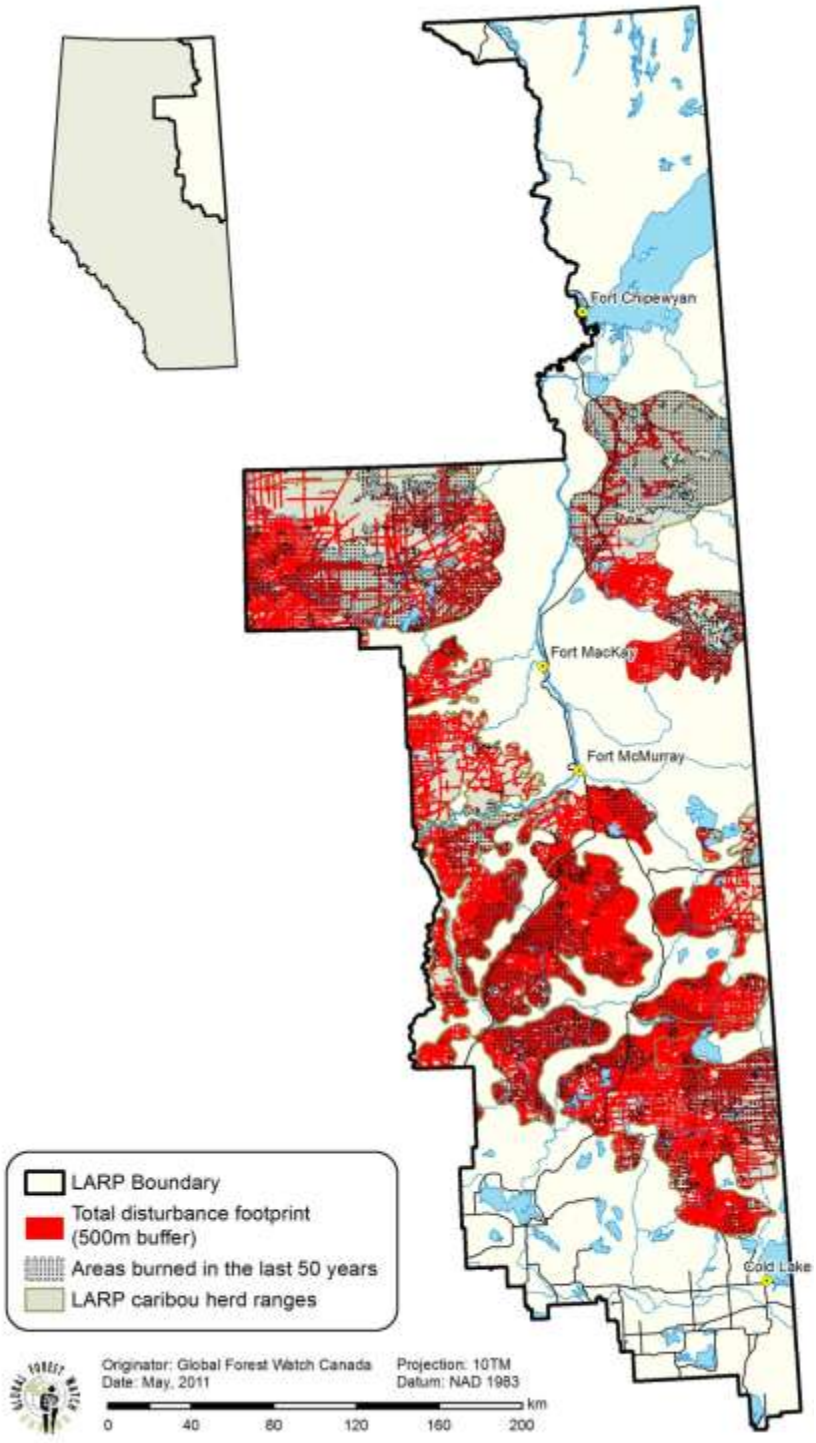

Figure 7. Anthropogenic footprint and fire disturbance in woodland caribou herd ranges in the Lower Athabasca Regional Plan of Alberta. Source: P. Lee et al., *Anthropogenic and Fire Disturbances in Woodland Caribou Herd Ranges in the Lower Athabasca Regional Plan Area, Alberta,* Global Forest Watch Canada International Year of Forests Publication #8. (2011).

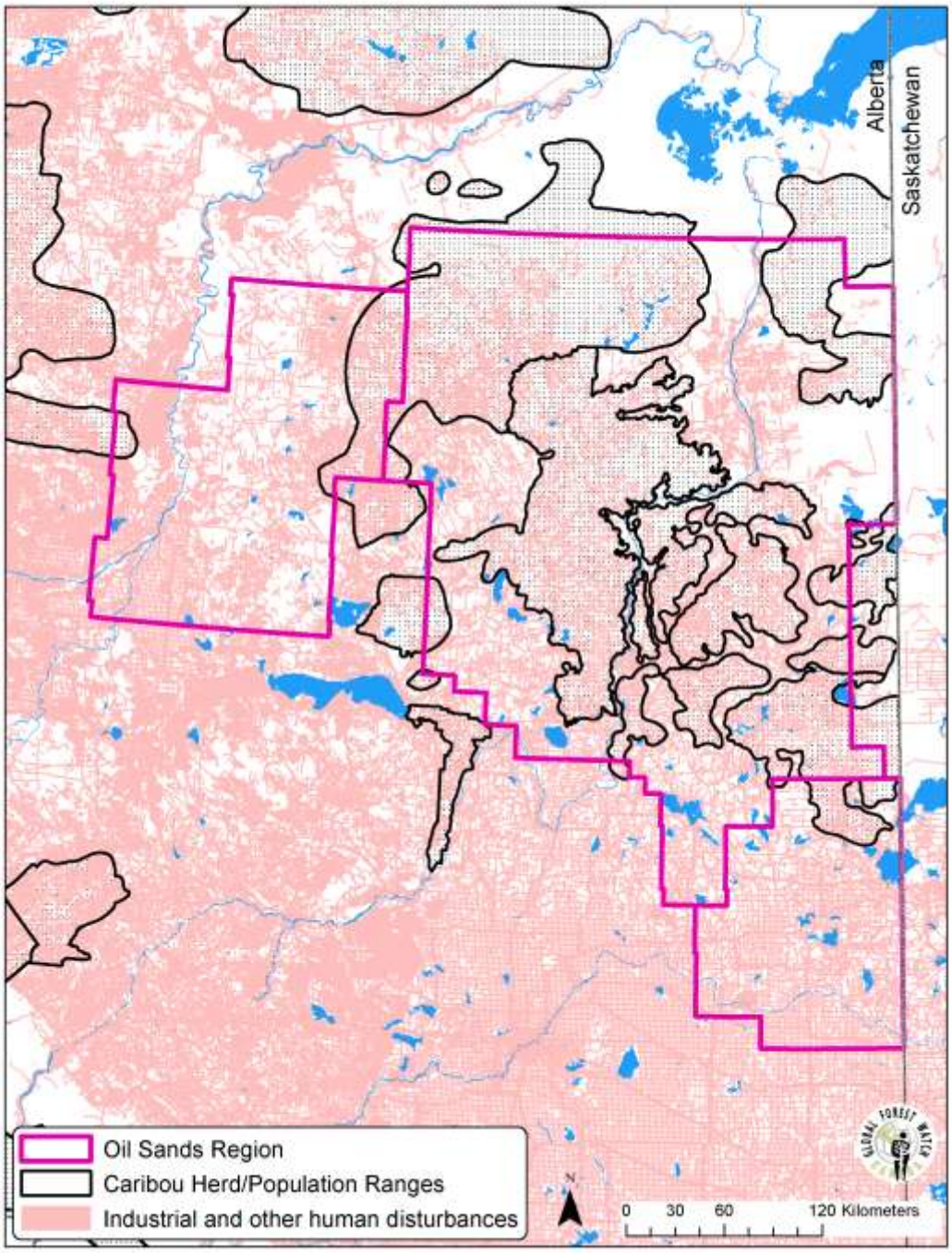

Figure 8. Anthropogenic disturbance in woodland caribou herd ranges in the tar sands region. Source: Global Forest Watch Canada (2011). This dataset, *Canada Access*, was selected by Environment Canada for their Canada-wide analysis and report: "Environment Canada, *Scientific Review for the Identification of Critical Habitat for Woodland Caribou (*Rangifer tarandus caribou*), Boreal Population, in Canada* (2008).

[1] On September 22, 2011, pursuant to the United States Pelly Amendment to the Fisherman's Protective Act of 1967 ("Pelly Amendment"), 22 U.S.C. § 1978, we called for the certification of Canada by the President of the United States regarding Canada's failure to prevent takings of woodland caribou and migratory birds, including whooping cranes, that result from large-scale tar sands development in Alberta, Canada.

[2] Woodland caribou are considered endangered in the United States and threatened in Alberta and Canada. The endangered woodland caribou of the United States live in the Selkirk mountains of Idaho and Washington. Harms to woodland caribou in the tar sands region do not directly affect U.S. woodland caribou, but local extinctions of Alberta caribou could diminish options for caribou conservation measures in the United States, including possibilities for captive breeding, relocation or reintroduction.

[3] D. Cichowski, *Status of the Woodland Caribou (*Rangifer tarandus caribou*) in Alberta*: *Update 2010*, Alberta Sustainable Resource Development, Alberta Wildlife Status Report No. 30 (2010), http://www.srd.alberta.ca/FishWildlife/SpeciesAtRisk/DetailedStatus/Mammals/documents/Status-WoodlandCaribou-inAlberta-Jul-2010.pdf, (hereinafter Cichowski 2010) at 55.

[4] These species are protected under the Migratory Bird Convention, to which Canada is a party.

[5] Shell Energy Canada, Project No. 10-1346-0001, Appendix A. Wildlife Modelling, Table 1.3-1 (September 2012).

[6] K. Timoney and R. Ronconi , *Annual Bird Mortality in the Bitumen Tailings Ponds in Northeastern Alberta, Canada*, 122 The Wilson Journal of Ornithology 3, 569, 570 (2010), http://www.bioone.org/doi/full/10.1676/09-181.1; E. Butterworth et al., *Peace-Athabasca Delta Waterbird Inventory Program: 1998-2001 Final Report*, Ducks Unlimited Canada (2002), http://www.ducks.ca/conserve/programs/boreal/pdf/pad2001.pdf ; *see also* Wells et al. 2008; *and* Timoney and Lee 2009. Millions of waterfowl, shorebirds and insectivorous birds protected by the Migratory Bird Convention winter in the United States and migrate north to breed in in Artic river deltas, Arctic islands, the Mackenzie River lowlands, Wood Buffalo National Park, and the Peace-Athabasca Delta of Alberta. All four of North America's major flyways converge on the Peace-Athabasca Delta alone, which is the largest inland boreal delta in the world and the most important waterbird staging area in Canada. Over one million protected birds converge on the Delta in the fall, and over 130,000 waterfowl breed there in spring, including over 15,000 lesser scaup, up to 20,000 mallards, nearly 10,000 canvasbacks, 7,000 common goldeneye, and 5,000 bufflehead. One study noted 18,000 geese over a tar sands lease area; other studies have noted as many as 2,700 ducks or 5,600 waterbirds at lakes in the tar sands during a single day.

[7] R. Ronconi and C. St. Clair, (2006); *R. v. Syncrude Canada Ltd.*, 2010 ABPC 229 (2010), ¶ 15.5, http://www.canlii.org/en/ab/abpc/doc/2010/2010abpc229/2010abpc229.pdf. In one study, up to 45 percent of waterfowl flying over a tailings pond landed in it, with ducks and shorebirds making over 50 percent of the landings.

[8] Ronconi and St. Clair 2006; *see also R. v. Syncrude Canada Ltd.*, 2010 ¶ 12 ("Bitumen mat on the surface of the tailings pond can trap the waterfowl that land on it and the birds will eventually sink with the bitumen. As bitumen contamination increases, birds lose buoyancy and the insulating effect of feathers. There is a loss of the feathers' waterproofing, leading to hypothermia or drowning. Birds will lose their ability to fly. A heavily oiled bird will almost certainly die."); id. ¶ 13 ("The mat was described as being several inches thick, viscous and cohesive with the consistency of a frothy roofing tar. It moves within the pond and eventually sinks, taking birds with it in this case. The mat found on April 28, 2008 covered a significant part of the pond."

[9] Wells et al. 2008 at 15.

[10] *R. v. Syncrude Canada Ltd.*, 2010 ¶ 13.

[11] Timoney and Ronconi 2010 at 569. Species killed by tailings ponds are primarily mallard, common goldeneye, northern shoveler, lesser scaup, American coot, grebes, mergansers, geese, and shorebirds, including semipalmated sandpiper, pectoral sandpiper, stilt sandpiper, lesser yellowlegs and greater yellowlegs.

[12] Timoney and Ronconi 2010 "Open pit bitumen extraction may exert population-level impacts upon migratory and resident birds, and is capable of causing mass mortality events."

[13] Wells et al. 2008 at 3, 17; Migratory Bird Convention, Protocol updating Article I at http://www.treaty-accord.gc.ca/text-texte.asp?id=101587.

[14] Wells et al. 2008 at 9

[15] Wells et al. 2008 at 9;

[16] Wells et al. 2008 at 15-16. *citing* N. Fimreite, *Accumulation and Effects of Mercury on Birds* in *The Biogeochemistry of Mercury in the Environment*, Elsevier Press (1979) at 601-627; R. Eisler, *Mercury Hazards to Fish, Wildlife, and Invertebrates: A Synoptic Review*. U.S. Fish and Wildlife Service: Biological Report 85 (#1.1)

(1987); D. Thompson, *Mercury in birds and terrestrial mammals* in *Environmental Contaminants in Wildlife: Interpreting Tissue Concentrations*, W.N. Beyer et al., eds., (1996) at 341-356; D. Evers, and T. Clair, eds., *Biogeographical Patterns of Environmental Mercury in Northeastern North America*, 14 Ecotoxicology (2005). Mercury is known to cause embryo malformations, reduced egg weights and reduced growth in chicks, reduced chick survival, behavioral abnormalities and sterility. Lead is known to cause impaired locomotion and other neurological effects. Cadmium is carcinogenic and causes kidney toxicity, eggshell thinning, damage to testes, and behavioral changes. When first released into the tailings ponds, polycyclic aromatic hydrocarbons (PAHs) and naphthenic acids can be acutely toxic to birds, or have carcinogenic and mutagenic effects. Effects of PAHs include increased mortality of bird embryos, developmental abnormalities, reduced egg production, increased clutch abandonment, reduced growth, and increased organ weight.

[17] Schindler 2010.

[18] Wells et al. 2008 at 16.

[19] Wells et al. 2008 at 16.

[20] Wells et al. 2008 at 17.

[21] Wells et al. 2008 at 2, 4-5; Migratory Bird Treaty Act List, http://www.fws.gov/migratorybirds/regulationspolicies/mbta/mbtandx.html; Migratory Bird Convention, Protocol updating Article I at http://www.treaty-accord.gc.ca/text-texte.asp?id=101587.

[22] Wells et al. 2008 at iv, 2.

[23] Wells et al. 2008 at iv.

[24] Timoney and Lee 2009 at 71.

[25] Timoney and Ronconi 2010 at 574.

[26] Wells et al. 2008 at 13.

[27] Wells et al. 2008 at iv.

[28] Wells et al. 2008 at 12.

[29] Wells et al. 2008 at 8.

[30] M. Griffiths et al., *Troubled Waters, Troubling Trends: Technology and Policy Options to Reduce Water Use in Oil and Oilsands Development in Alberta*, The Pembina Institute, (2006) at 85.

[31] Government of Alberta, *Facts About Water in Alberta* (2010) http://environment.gov.ab.ca/info/library/6364.pdf at 42 (hereinafter Government of Alberta 2010 Water).

[32] Government of Alberta 2010 Water at 42.

[33] Wells et al. 2008 at 14.

[34] Wells et al. 2008 at 14.

[35] Shlumberger Ltd. 2011.

[36] Wells et al. 2008 at vi.

[37] Wells et al. 2008 at 12.

[38] Wells et al. 2008 at 12.

[39] Wells et al. 2008 at 12-13, citing 16 studies between 1995 and 2008.

[40] *See, e.g.*, E. Bayne et al., *Modeling and field-testing of Ovenbird (Seiurus aurocapillus) responses to boreal forest dissection by energy sector development at multiple spatial scales*, 20 Landscape Ecology 2, 203 (2005).

[41] E. Bayne et al, *Impacts of Chronic Anthropogenic Noise from Energy-Sector Activity on Abundance of Songbirds in the Boreal Forest*, 22 Conservation Biology 5, 1186 (2008) at 1192.

[42] Wells et al. 2008 at 13.

[43] Wells et al. 2008 at 21-22.

[44] Wells et al. 2008 at 21-22.

[45] Intergovernmental Panel on Climate Change, AR4 Working Group II, (2007), *Freshwater wetlands, lakes and rivers*, http://www.ipcc.ch/publications_and_data/ar4/wg2/en/ch4s4-4-8.html ("The seasonal migration patterns and routes of many wetland species will need to change and some may be threatened with extinction.").

[46] *See, e.g.*, C. Parmesan, *Ecological and Evolutionary Responses to Recent Climate Change*, 37 Annual Review of Ecology, Evolution and Systematics 637 (2006); *see also* T. Dawson et al., *Beyond Predictions: Biodiversity Conservation in a Changing Climate*, 332 Science 6025, 53 (April 1, 2011).

[47] M. Griffiths et al., *Troubled Waters, Troubling Trends: Technology and Policy Options to Reduce Water Use in Oil Sands Development in Alberta*, the Pembina Institute (2006) at 71.

[48] Wells et al. 2008 at 14 and 23.

[49] Cichowski 2010 at 14 and 20.

[50] Cichowski 2010 at iv, 14.

[51] Cichowski 2010 at 15-16.
[52] Cichowski 2010 at 16.
[53] Cichowski 2010 at 15, Badiou et al. 2011 at 4.
[54] Cichowski 2010 at 20.
[55] Cichowski 2010 at 57.
[56] Cichowski 2010 at 57.
[57] Cichowski 2010 at 55. These population estimates are challenged by Wasser et al. 2011 (see Bibliography), who estimated the East Athabasca River Population at 330 individuals rather than 150. However, even if populations are double the Government of Alberta estimates, woodland caribou in Alberta nevertheless remain threatened by existing and planned tar sands development. Furthermore, according to Jeff Wells (co-author of Badiou et al. 2011), Wasser's estimates are controversial due to possible methodological problems. A group of prominent caribou biologists and others have submitted a paper on this to 'Frontiers in Ecology and the Environment'. (J. Wells, Pers. Comm., August 2011).
[58] P. Lee et al., *Anthropogenic and Fire Disturbances in Woodland Caribou Herd Ranges in the Lower Athabasca Regional Plan Area, Alberta,* Global Forest Watch Canada International Year of Forests Publication #8. (2011), www.globalforestwatch.ca.
[59] Cichowski 2010 at v.
[60] Cichowski 2010 at 13.
[61] Cichowski 2010 at 21.
[62] Cichowski 2010 at iv; P.Badiou et al., *Keeping woodland caribou in the boreal forest: Big challenge, immense opportunity*, International Boreal Conservation Science Panel (2011), http://borealcanada.org/pr/documents/2011-07-11IBCSPCaribouScienceandPolicyBrief_FINAL.pdf (hereinafter Badiou et al . 2011) at 2, 4 and 7.
[63] Cichowski 2010 at 57.
[64] Ecojustice, *Protecting Alberta's Caribou,* (2011), http://www.ecojustice.ca/media-centre/caribou-backgrounder-june-2011/at_download/file (hereinafter Ecojustice 2011) at 1.
[65] Badiou et al. 2011 at 5.
[66] Cichowski 2010 at 58.
[67] Alberta Woodland Caribou Recovery Plan, *Alberta Species at Risk Recovery Plan No. 4* (July. 2005) at 7; S. Dyer et al., *Avoidance of Industrial Development by Woodland Caribou*, Journal of Wildlife Management 65(3) (2001) at 531.
[68] Cichowski 2010 at 60; S. Wasser et al., *The influences of wolf predation, habitat loss and human activity on caribou and moose in the Alberta oil sands*, Frontiers in Ecology and the Environment (2011).
[69] Cichowski 2010 at 62.
[70] Wasser et al. 2011 at 5.
[71] Wasser et al. 2011 at 3.
[72] Wasser et al. 2011 at 6.
[73] Cichowski 2010 at 59.
[74] K. Joly et al., *Changes in vegetative cover on Western Arctic Herd winter range from 1981 to 2005: potential effects of grazing and climate change*, 27 Rangifer (2007).
[75] T. Heggberget et al., *Reindeer (*Rangifer tarandus*) and climate change: Importance of winter forage*, 22 Rangifer (2002) http://www.ub.uit.no/baser/septentrio/index.php/rangifer/article/viewFile/388/377 at 24; L. S. Vors and M. S. Boyce, *Global declines of caribou and reindeer*, 15 Global Change Biology 2626 (2009).
[76] Heggberget et al. 2002 at 24.
[77] M. Nutall et al., *Hunting, Herding, Fishing, and Gathering: Indigenous Peoples and Renewable Resource Use in the Arctic*, Arctic Climate Impact Assessment (2004) at 12.2.4.1.
[78] Vors and Boyce 2009 at 2628-2629.
[79] Cichowski 2010 at 63.
[80] Schneider et al 2010 at 1609 (emphasis added).
[81] ACLMOR 2009 at i and 68.
[82] ACLMOR 2009 at i.
[83] ACLMOR 2009 at ii, 66 and 69.
[84] Badiou et al. 2011 at 11.
[85] Badiou et al. 2011 at 2,3,6,7, 8.

[86] S. Boutin, *Expert report on woodland caribou in the traditional territory of the Beaver Lake Cree Nation*,(July. 2010) , http://www.woodwardandcompany.com/media/pdfs/BLCTT__-_Stan_Boutin_Report_-_5_July_2010_final.pdf , at 19.
[87] Ecojustice 2011 at 3.