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Re: Comments on Armstrong Energy's Nanushuk Project Draft Environmental Impact Statement and Clean Water Act Section 404 and Rivers and Harbors Act Section 10 Permit

The Center for Biological Diversity, Northern Alaska Environmental Center, and Eyak Preservation Council submit these comments on Armstrong Energy's Nanushuk Project draft environmental impact statement (EIS) and application for a Clean Water Act section 404 permit and Rivers and Harbors Act section 10 permit. The project will result in significant damage to the waters and wetlands of the Arctic coastal plain, including harm to polar bears, caribou and the climate.

This major oil development project lies in the Colville River Delta. The Colville River is America's largest Arctic river, and its delta is the most productive in Northern Alaska. The delta provides important breeding and migration habitat for dozens of species of birds. The deep channels and lakes provide approximately 70% of the overwintering fish habitat on the North Slope. There are numerous endangered species in the project area — polar bears, bearded seals, Steller's eiders, spectacled eiders, and bowhead whales. Herds of caribou cross the project area to migrate to the delta, which is heavily used for subsistence.

The project will consist of three drilling pads, a processing facility, 37.4 miles of pipeline, 250 acres of gravel roads, and fill of more than 330 acres of waters and wetlands in the Arctic coastal plain. And the impacts to the fragile delta, its wetlands, tundra, and wildlife will extend far beyond the project's footprint. The project will degrade important habitat and harm wildlife, and the Corps concedes that it will have significant adverse effects on subsistence. Granting the permit would be inconsistent with the requirements of the Clean Water Act, and the draft EIS fails to comply with the National Environmental Policy Act (NEPA). For the reasons described here, we urge the Corps to deny Armstrong's permit.

I. GRANTING THE PERMIT WOULD BE INCONSISTENT WITH THE REQUIREMENTS OF THE CLEAN WATER ACT.

The Corps must deny the permit because the proposed discharge does not comply with the Clean Water Act's section 404(b)(1) guidelines. The Act limits the authority of the Corps to issue permits for the discharge of fill material into the waters of the United States.[1] Specifically, the Corps' regulations state that a permit will be denied if the proposed discharge would not comply with the guidelines.[2]

Under these guidelines, "degradation or destruction of special aquatic sites, such as filling operations in wetlands, is considered to be among the most severe environmental impacts."[3] Discharging fill material in wetlands often destroys habitat and vegetation, degrades water quality, and diminishes wetlands' capacity to store floodwater and shield upland areas from erosion.[4] "Fundamental to [g]uidelines is the precept that . . . fill material should not be discharged into the aquatic ecosystem, unless it can be demonstrated that such a discharge will not have an unacceptable adverse impact."[5]

Discharging fill material into waters of the United States violates the section 404(b)(1) guidelines when (1) there is a practicable alternative that would have less adverse effect on the aquatic ecosystem; (2) the proposed filling would significantly degrade the aquatic ecosystem; or (3) the proposed filling does not include all appropriate and practicable measures to minimize potential harm to the aquatic ecosystem.[6] If there remain unavoidable impacts, the Corps must require compensatory mitigation.[7]

In applying the above criteria, the Corps must make detailed factual determinations as to the potential environmental effects of the proposed discharges.[8] Crucially, these factual determinations depend on not only a project's direct effects on aquatic ecosystems, but also the cumulative effects of other discharges and secondary effects associated with the project.[9]

For the reasons discussed below, the analysis contained in the Nanushuk draft EIS and the information provided in Armstrong's permit application fail to demonstrate that the proposed filling would comply with the section 404(b)(1) guidelines.

A. The project will cause significant degradation of the waters and wetlands.

Under the section 404(b)(1) guidelines, the Corps may not permit discharges of fill material that will "cause or contribute to significant degradation" of wetlands.[10] Examples of effects contributing to significant degradation include adverse effects on life stages of aquatic life and other wildlife dependent on aquatic ecosystems, as well as the loss of fish and wildlife habitat.[11] The extent and duration of the impacts, as well as the habitats' uniqueness, are relevant

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[1] 33 U.S.C. § 1344(a), (b), (d); *Id.* § 1362(7) (defining "navigable waters" as "waters of the United States"); 33 C.F.R. § 328.3(a)(1), (5), (6) (defining "waters of the United States" to include waters that may be used in interstate commerce, tributaries of such waters, and wetlands adjacent to those tributaries and waters).
[2] 33 C.F.R. § 323.6(a).
[3] 40 C.F.R. § 230.1(d).
[4] *Id.* § 230.41(b).
[5] *Id.* § 230.1(c).
[6] *See Id.* § 230.12(a)(3)(i)-(iii); *see also Id.* § 230.10(a), (c), (d).
[7] *Id.* § 230.93(a)(1).
[8] *See Id.* §§ 230.11, 230.12(b).
[9] *See Id.* § 230.11(g), (h).
[10] 40 C.F.R. § 230.10(c).
[11] *See Id.* § 230.10(c)(3).

considerations.[12] If the Corps finds that the project would significantly degrade wetlands, it may issue a permit conditioned on minimization of, or compensation for, impacts.[13] However, inadequacies in plans for minimization or compensation may invalidate the decision to allow discharge.[14]

The entire project is in waters and wetlands, including direct fill and permanent loss of 330.4 acres of wetlands and waterbodies to construct the oil development infrastructure.[15] The Corps' draft EIS admits probable, long-term effects to wetlands.[16] The permanent loss of wetlands from the fill accounts for only part of the project's impacts on wetlands. Thousands of additional acres will be damaged. Studies have shown that roads and pipelines rapidly expand flooding and thermokarst, which expanded at 9.2 hectares a year.[17] The concomitant effects to the wetlands from the construction and operation of the drilling project, including water withdrawals from lakes,[18] will also cause significant degradation to the waters. The project will increase sediment and turbidity,[19] decrease diversity and change the composition of the vegetation,[20] degrade quality of the habitat for wildlife, and increase permafrost melt and erosion.[21] Moreover, an oil spill, which is likely over the life of the project, would significantly degrade waters and wetlands.[22]

The Corps has not made a determination in the draft EIS about whether the project will result in significant degradation of the waters, and it must make such a finding and support it in the EIS to grant the permit. Further, the Corps must be able to identify the effects of the loss of wetland function and diversity to make this determination, yet the draft EIS states that the magnitudes cannot be described because they are unknown."[23] To the extent that the Corps considers impacts to wetlands to be minor, such findings are arbitrary and capricious because, among other things, the agency fails to consider the unique and important role of the wetlands in the Colville River Delta to wildlife.

B. <u>The preferred action is not the least environmentally damaging practicable alternative.</u>

The Clean Water Act's implementing regulations require that "no discharge of dredged or fill material shall be permitted if there is a practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem, so long as the alternative does not

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[12] *See Id.* § 230.10(c); *Bering Strait Citizens for Responsible Res. Dev. v. U.S. Army Corps of Eng'rs*, 524 F.3d 938, 949 (9th Cir. 2008).
[13] *See City of Olmstead Falls, Ohio v. EPA*, 435 F.3d 632, 637-38 (6th Cir. 2006); *Ohio Valley Envtl. Coal. v. U.S. Army Corps of Eng'rs*, 674 F. Supp. 2d 783, 790 (S.D. W. Va. 2009).
[14] *See All. to Save the Mattaponi v. U.S. Army Corps of Eng'rs*, 606 F. Supp. 2d 121, 134 (D.D.C. 2009).
[15] DEIS 3-268.
[16] DEIS 3-267.
[17] Raynolds et al. 2014. Cumulative geoecological effects of 62 years of infrastructure and climate change in ice-rich permafrost landscapes, Prudhoe Bay Oilfield, Alaska, *Global Change Biology* 20:1211-24.
[18] DEIS 3-208, 3-329.
[19] DEIS 3-221, 3-222.
[20] DEIS 3-274.
[21] DIES 3-57, 3-58.
[22] DEIS 3-280, 3-281.
[23] DEIS 3-272; 3-274.

have other significant adverse environmental consequences."[24] For projects that are not water dependent "practicable alternatives that do not involve special aquatic sites are presumed to be available, unless clearly demonstrated otherwise."[25] And alternatives that avoid discharge into a special aquatic site "are presumed to have less adverse impact on the aquatic ecosystem, unless clearly demonstrated otherwise."[26]

Here, the proposed project is not water dependent, and it affects special aquatic sites; therefore, there is a presumption of the availability of practicable alternatives with a less adverse impact. The Corps has failed to meet its burden to clearly demonstrate that the proposed action is the least environmentally damaging practicable alternative. The Corps assumes that the location of the Nanushuk and Alpine C reservoirs limit alternatives to the proposed project,[27] which is insufficient to meet the high burden without an examination of any meaningful alternatives.

The alternatives examined in the draft EIS are insufficient for the agency's "least damaging practicable alternative" analysis because each alternative has similar damaging effects on the wetlands and environment. Some of the alternatives that were eliminated from consideration are practicable and would result in less damage. For example, roadless access, moving facilities farther from the river, offsite processing, or phased development would all lessen damage. Notably, the Corps' determination that roadless access does not have less environmental impact is arbitrary and lacks rational or scientific support. The Corps' conclusory justifications for eliminating numerous less damaging alternatives fail to meet its burden to clearly demonstrate that there is no less damaging alternative and overcome the presumption. Additionally, other alternatives may have less damaging impacts including eliminating the potential gravel mine, narrowing and shortening the roads, co-locating facilities, using horizontal directional drilling, prohibiting hydraulic fracturing, prohibiting off-road travel, and mandating additional mitigation measures to protect the aquatic ecosystem.

C. <u>The proposal does not include all appropriate and practicable measures to minimize potential impacts to aquatic ecosystems.</u>

The guidelines prohibit the Corps from issuing a permit "unless appropriate and practicable steps have been taken which will minimize potential adverse impacts of the discharge on the aquatic ecosystem."[28] Subpart H of the guidelines provides examples of actions the Corps might take to minimize adverse effects,[29] which courts have viewed as the "correct factors" for the Corps to consider when making its determination.[30] These measures include: locating and confining the discharge to minimize smothering of organisms;[31] selecting the disposal site, the discharge point, and the method of discharge to minimize the extent of any plume;[32] timing the discharge to

[24] 40 C.F.R. § 230.10(a).
[25] 40 CFR § 230.10(a)(3).
[26] *Id.*
[27] DEIS 1-10, 1-11.
[28] *Id.* § 230.10(d).
[29] *See Id.*
[30] *Sierra Club v. U.S. Army Corps of Eng'rs*, No. Civ.A. 05-1724JAP, 2005 WL 2090028, at *17 (D.N.J. Aug. 29, 2005).
[31] 40 C.F.R. § 230.70(a).
[32] *Id.* § 230.70(e).

minimize impact;[33] selecting sites or managing discharges to confine and minimize the release of suspended particulates to give decreased turbidity levels and to maintain light penetration for organisms;[34] setting limitations on the amount of material to be discharged per unit of time;[35] and avoiding changes in water current and circulation patterns which would interfere with the movement of animals;[36] and avoiding sites having unique habitat or other value.[37]

There are several ways that the project could minimize impacts on aquatic ecosystems. First, the Corps could minimize the footprint of the project thus reducing the amount of fill. Second, the project could be roadless -- avoiding filling of wetlands, dust dispersal, and permafrost melt that harm the ecosystem. Third, the roads and pads could be built to better prevent permafrost melt and thermokarst. Fourth, the Corps could prohibit hydraulic fracturing that increases water use, chemical use, and wastewater discharge, among other things. Fourth, the facilities could be positioned better to reduce dust and be further east of the Colville River. Fifth, the proposed gravel mine could be eliminated. Sixth, modeling of climate change impacts of erosion and flooding of the Arctic coastal plain to recommend design revisions could reduce aquatic impacts.[38] Finally, there could be several mitigation measures to reduce impacts to aquatic habitat. Examples include prohibiting off-road travel, requiring housekeeping to avoid stormwater discharges, building berms or swales to prevent oil or chemical spill dispersal, and mitigating climate change. Any permit approvals must be conditioned on additional mitigation to meet the criteria for a 404 permit.

D. The project is not in the public interest.

The Corps must deny the permits because Armstrong Energy's drilling project is not in the public interest. Pursuant to the applicable regulations, the "decision whether to issue a permit will be based upon an evaluation of the probable impacts, including cumulative impacts, of the proposed activity and its intended use on the public interest."[39] The Corps regulation requires a careful case-by-case balancing of the benefits and detriments, including the conditions placed on the proposal.[40]

The Corps' regulations include a non-exhaustive list of factors that may be relevant for each individual project. 33 C.F.R. § 320.4(a)(1) states in part:

> All factors which may be relevant to the proposal must be considered including the cumulative effects thereof: among those are conservation, economics, aesthetics, general environmental concerns, wetlands, historic properties, fish and wildlife values, flood hazards, floodplain values, land use, navigation, shore erosion and accretion, recreation, water supply and conservation, water quality,

[33] *Id.* § 230.72(d).
[34] *Id.* § 230.73(f).
[35] *Id.* § 230.73(g).
[36] *Id.* § 230.75(a).
[37] *Id.* § 230.73(g).
[38] Raynolds et al. 2014.
[39] 33 C.F.R. § 320.4(a)(1).
[40] *Id.*

> energy needs, safety, food and fiber production, mineral needs, considerations of property ownership and, in general, the needs and welfare of the people.

Consistent with the mandate that the Corps consider "all those factors that become relevant," this non-exhaustive list of factors includes issues beyond those directly related to the impacts of in-water work.[41] In other words, by requiring an analysis of "cumulative impacts" and by including a non-exhaustive, far-reaching list of factors, the Corps is clearly required to conduct a broad analysis of the public interest that captures all impacts associated with the project and not just those that result directly from the permitted activities.

1. The project is not in the public interest because it will exacerbate the effects of climate change.

The Corps' public interest determination must consider the project in the context of climate change. The Corps indicates that the project will produce 120,000 barrels of oil per day. This massive oil development will deepen the climate crisis and increase ocean acidification. At the very least, the Corps' public interest determination must consider "[t]he relative extent of the public and private need" for the project[42] in light of climate change and the urgent need to rapidly transition to clean, sustainable energy sources.

Climate change, driven primarily by the combustion of fossil fuels, poses a severe and immediate threat to the health, welfare, ecosystems, and economy of the United States and the world. In recognition of these threats, the Paris Agreement, adopted on December 12, 2015, codifies the international, scientific consensus that climate change is an "*urgent and potentially irreversible threat to human societies and the planet* and thus requires the widest possible cooperation by all countries."[43] Accordingly, the Paris Agreement commits all signatories to hold the long-term global average temperature "to well below 2°C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5°C above pre-industrial levels."[44] Immediate and aggressive greenhouse gas emissions reductions are necessary to keep warming below a 1.5º or 2°C rise above pre-industrial levels.[45] Despite the Trump administration's move to withdraw from the Paris Agreement, meeting the targets in the accord are nonetheless in the public interest.

This project will contribute to blowing past the carbon budget. A 2016 analysis found that carbon emissions from developed reserves in currently operating oil and gas fields and mines would lead to global temperature rise beyond 2°C.[46] Excluding coal, currently operating oil and gas fields

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[41] *Id.*
[42] 33 C.F.R. 320.4(a)(2).
[43] Paris Agreement, Decision, Art. 4(3); Recitals. Although President Trump has announced his intent to withdraw the United States from the Paris Agreement, that process will take four years and could be overridden in the next presidential election. Moreover, the Paris Agreement represents the international consensus to address greenhouse gas emissions, and therefore remains a relevant consideration in determining our nation's energy needs.
[44] *Id.*, Art. 2 (emphasis added).
[45] *See, e.g.*, EPA Endangerment Finding, 74 Fed. Reg. 66,496, (Dec. 15, 2009) (detailing the detrimental effects of climate change); Melillo, Jerry M., Terese (T.C.) Richmond, and Gary W. Yohe, Eds., 2014: Climate Change Impacts in the United States: The Third National Climate Assessment (U.S. Global Change Research Program). doi:10.7930/J0Z31WJ2 (same).
[46] Oil Change International, 2016. The Sky's Limit: Why the Paris Climate Goals Require A Managed Decline of Fossil Fuel Production.

alone would take the world beyond 1.5°C.[47] To stay well below 2°C, the study recommends that no new fossil fuel extraction or transportation infrastructure should be built, and governments should grant no new permits for new fossil fuel extraction and infrastructure.[48] And a 2015 study found that "all Arctic resources should be classified as unburnable," because "development of [fossil fuel] resources in the Arctic . . . [is] incommensurate with efforts to limit average global warming to 2 °C."[49]

More-recent studies corroborate these findings. For example, in 2017, the U.S. Global Change Research Program—comprised of the nation's top climate scientists—completed a report "designed to be an authoritative assessment of the science of climate change, with a focus on the United States, to serve as the foundation for efforts to assess climate-related risks and inform decision-making about responses."[50] The report confirms that the Arctic is warming "at a rate more than twice as fast as the global average;"[51] "Arctic-wide ice loss is expected to continue through the 21st century, *very likely* resulting in nearly sea ice-free late summers by the 2040s (*very high confidence*);"[52] and "multiple lines of evidence provide *very high confidence* of enhanced [A]rctic warming with potentially significant impacts on coastal communities and marine ecosystems."[31]

The report highlights the urgent need to act if we are to address climate change successfully. It finds that "[carbon dioxide] emissions must stay below about 800 GtC in order to provide a two-thirds likelihood of preventing 3.6 degrees Fahrenheit (2 degrees Celsius) of warming." [53] To reach that limit, "approximately 230 GtC more could be emitted globally."[54] Therefore, according to the report, "[s]tabilizing global mean temperature below 3.6 degrees Fahrenheit (2 degrees Celsius) or lower relative to preindustrial levels requires significant reductions in net global CO_2 emissions relative to present-day values before 2040 and likely requires net emissions to become zero or possibly negative later in the century."[55]

Increasing the odds of meeting these targets requires meeting even stricter carbon budgets.[56] Given that global emissions in 2014 alone totaled 36 GtC,[57] humanity is rapidly consuming the remaining burnable carbon budget needed to have even a 66% chance of meeting the 2.0°C, let alone the 1.5°C, temperature increase limit. Expanded Arctic oil development will seriously hinder our ability to avoid the worst effects of climate change, and is therefore not in the public interest.

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[47] *Id.*
[48] *Id.*
[49] *Id.*
[50] USGCRP, 2017. Climate Science Special Report: Fourth National Climate Assessment, Volume I [Wuebbles, D.J., D.W. Fahey, K.A. Hibbard, D.J. Dokken, B.C. Stewart, and T.K. Maycock (eds.)]. U.S. Global Change Research Program, Washington, DC, USA, 470 pp.
[51] *Id.*
[52] *Id.*
[53] *Id.*.
[54] *Id.*
[55] *Id.*
[56] *See* Meinshausen, M., N. Meinshausen, W. Hare, S. C. B. Raper, K. Frieler, R. Knutti, D. J. Frame, and M. R. Allen. 2009. Greenhouse-gas emission targets for limiting global warming to 2 degrees C. *Nature* 458:1158–62.; Carbon Tracker Initiative 2013, Unburnable Carbon.
[57] *See* Global Carbon Emissions, http://co2now.org/Current-CO2/CO2-Now/global-carbon-emissions.html.

The public is harmed by climate change. For example, extreme weather events are striking with increasing frequency, most notably heat waves and precipitation extremes such as droughts and floods.[58] In the United States in 2011 alone, a record 14 weather and climate disasters occurred, including droughts, heat waves, and floods, that cost at least $U.S. 1 billion each in damages and loss of human lives.[59] Sea-level rise will be exacerbated by increasing storm intensity and storm surge.[60] In 2017, a record-breaking three category 4 hurricanes – Harvey, Irma, and Maria – made landfall in the U.S., killing dozens of people and resulting in billions of dollars of damage.[61] The frequency of high-severity hurricanes is increasing in the Atlantic,[62] as is the frequency of hurricane-generated large surge events — the offshore rise in water created and pushed ashore by storm winds.[63] The risk of extreme Katrina-magnitude storm-surge events has already doubled, and scientists estimate a twofold to sevenfold increase in the frequency of extreme surge events for each 1ºC rise in global temperature.[64] Summertime heat extremes[65] which covered much less than 1% of Earth's surface during 1951-1980 now cover about 10% of the Earth's land area, and extreme heat anomalies such as the record heat waves that hit Texas and Oklahoma in 2011 can be attributed with a high degree of confidence to global warming.[66]

Around the world as many as 50 to 200 million people are at risk of being displaced because of climate change.[67] Arctic communities are being displaced by climate change. Native villages in the Arctic are making difficult decisions about whether to leave their traditional livelihoods of hunting whales and caribou as prey moves and the icy habitat melts. Shishmaref and Kivalina

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[58] Coumou, D., and S. Rahmstorf. 2012. A decade of weather extremes. *Nature Climate Change* 2:491–496; IPCC. 2012. Managing the risks of extreme events and disasters to advance climate change adaptation, Special Report of the Intergovernmental Panel on Climate Change; Melillo et al. 2014.

[59] NOAA. 2012. NOAA : Extreme Weather 2011, available at http://www.noaa.gov/extreme2011/; WMO. 2012. World's 10th warmest year, warmest year with La Niña on record, second-lowest Arctic sea ice extent.

[60] Meehl, G., T. Stocker, W. D. Collins, and P. Friedlingstein. 2007. Global Climate Projections. Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Susan Solomon et al., eds., Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

[61] NOAA. 2017. Billion-Dollar Weather and Climate Disasters: Table of Events https://www.ncdc.noaa.gov/billions/events/US/1980-2017.

[62] Elsner, J. B., J. P. Kossin, and T. H. Jagger. 2008. The increasing intensity of the strongest tropical cyclones. *Nature* 455:92–5; Trenberth, K. E., P. D. Jones, P. Ambenje, and R. Bojariu. 2007. Observations: Surface and Atmospheric Climate. Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Susan Solomon et al. eds., Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA; aunders, M. A. and A. S. Lea. 2008. Large contribution of sea surface warming to recent increase in Atlantic hurricane activity. *Nature* 451:557-561; Bender, M. A., et al. 2010. Modeled impact of anthropogenic warming on the frequency of intense Atlantic hurricanes. *Science* 327:454–8; Kishtawal, C. M., N. Jaiswal, R. Singh, and D. Niyogi. 2012. Tropical Cyclone Intensification Trends during Satellite Era (1986-2010). *Geophysical Research Letter* 39: L10810.

[63] Grinsted, A., J. C. Moore, and S. Jevrejeva. 2012. Homogeneous record of Atlantic hurricane surge threat since 1923. *PNAS* 109:19601-19605.

[64] Grinsted, A. et al. 2013. Projected hurricane surge threat from rising temperatures. *PNAS* doi:10.1073/pnas.1209980110.

[65] Summertime heat extremes are defined as more than three standard deviations (3σ) warmer than the climatology of the 1951–1980 base period.

[66] Hansen, J. M., M. Sato, and R. Ruedy. 2012. Perception of climate change. *PNAS*. 37:E2415–E2423.

[67] Davenport, Coral & Robertson. 2016. Resettling the first American climate refugees. *New York Times*. https://www.nytimes.com/2016/05/03/us/resettling-the-first-american-climate-refugees.html?_r=0.

have already voted to relocate their villages because climate change is making them uninhabitable.[68] Additional Arctic villages are struggling with similar decisions about what to do. Moreover, ocean acidification poses a significant threat to subsistence food sources, including salmon that prey on pteropods – a plankton that is highly sensitive to acidification.

Climate change poses an increasing threat to human health, through increases in heat waves and other extreme weather events, aliments caused or exacerbated by air pollution and airborne allergens, and the increased occurrence of climate-sensitive infectious diseases.[69] Certain groups such as children, the elderly, the poor, and minorities are particularly vulnerable to climate-related health effects.[70] Millions of people suffer health problems annually due to climate change.[71] The World Health Organization estimates that by 2030 there will be 250,000 more deaths per year because of climate change.[72] Economic losses from climate change events in 2016 totaled $129 billion.[73]

For these reasons, a project in the Arctic that encourages additional fossil fuel development and deepens the climate crisis is not in the public interest.

2. The project will cause severe degradation of habitat and wildlife, and will harm subsistence use of the Colville River Delta.

The public interest criterion here is not achieved by the proposed project that will destroy hundreds of acres of productive wetlands, harm and kill birds, displace caribou, harm endangered polar bears, and impede use of the most important subsistence area for Nuiqsut villagers.

First, proposed project will severely degrade wetland habitat in the biologically important Colville River Delta, Arctic river deltas are among the most fragile wetlands ecosystems. Hundreds of acres of wetlands would be permanently lost in one of the most productive habitats on the North Slope. This includes the loss of wetland function and diversity.[74] Additional acreage will be impacted from dust and thermokarsting that will change the hydrology, kill vegetation, and destroy tundra.[75] The Corps acknowledges that the project could cause major problems with channel stability and erosion of tundra and streambanks.[76] A similar oil project noted streambank erosion near its pipeline of up to 17.4 feet in one year.[77] Armstrong's project will cause

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[68] Goode, E. 2016. A Wrenching Choice for Alaska Towns in the Path of Climate Change, *New York Times*. https://www.nytimes.com/interactive/2016/11/29/science/alaska-global-warming.html
[69] Karl, T. R. et al. 2009. Global Climate Change Impacts in the United States. U.S. Global Change Research Program. Thomas R. Karl, Jerry M. Melillo, and Thomas C. Peterson, (eds.). Cambridge University Press, 2009.
[70] *Id.*
[71] Watts, Nick et al. 2017. The Lancet Countdown on health and climate change: from 25 years of inaction to a global transformation for public health. *The Lancet*.
[72] WHO. 2017. Climate change and health. http://www.who.int/mediacentre/factsheets/fs266/en/
[73] *Id.*
[74] DEIS 3-267.
[75] DEIS 3-275.
[76] DEIS 3-156, 3-157.
[77] DIES 3-146.

deposition of sediment into wetlands,[78] and thermokarsting that "could not be easily rehabilitated…[and] would last indefinitely."[79]

Second, the project will result in permanent habitat loss of 324.6 acres and degradation of more than 2,000 acres for birdlife.[80] Activities will disturb, displace, and cause mortality of birds.[81] The draft EIS vastly underestimates the impact of damage to birds. The Colville River Delta is a remarkable habitat for birds with 68 species of birds that breed there and hundreds that migrate to the delta. The delta is considered a globally significant important bird area.[82] This region provides habitat for substantial numbers of birds, including many species of concern including yellow-billed loon, golden eagle, short-eared owl, red knot, red-throated loon, peregrine falcon, whimbrel, bartailed godwit, dunlin, buff-breasted sandpiper, and Arctic tern.[83] Endangered spectacled and Steller's eiders breed in the project area.[84] Although spectacled eiders in the northeastern portion of the delta declined by 90% between 1987 and the mid-1990s, the delta still represents a significant portion of their breeding range in North America.[85] The delta is also home to the largest breeding colony of brant on the Arctic Coastal Plain.[86] The area also provides significant breeding habitat for yellow-billed loons, supporting about 10% of the Coastal Plain population and more than 2% of the estimated global population.[87] The project will destroy some of the few suitable lakes for breeding of yellow-billed loons, and yellow-billed loons "would be unlikely to find alternate nesting lakes."[88] The Corps acknowledges that the water withdrawals will cause fish mortality and low water levels, thus destroying the suitability for breeding.

Third, the project will destroy and damage caribou habitat and impede caribou use of the habitat. The project area is incredibly important for caribou, and it is in the migration corridor for the central Arctic herd. The project will displace maternal caribou within 2.5 miles during and after calving.[89] Caribou will avoid crossing the roads because of the large gravel embankments; they will also be blocked by the pipelines;[90] and they will be corralled between the two roads. There will be long-term displacement of caribou from the project area and the herds will suffer an energetic cost from avoidance and disturbance from the development.[91]

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[78] *Id.*
[79] DEIS 160-61.
[80] DEIS 3-330.
[81] DEIS 3-325.
[82] Audubon, Important Bird Areas: Colville River Delta, available at http://www.audubon.org/important-bird-areas/colville-river-delta; Audubon, et al.. 2016. A Synthesis of Important Areas in the U.S. Chukchi and Beaufort Seas: Best Available Data to Inform Management Decisions. http://www.pewtrusts.org/~/media/assets/2016/05/synthesis_of_important_areas_us_chukchi_beaufort_seas.pdf.
[83] DEIS 3-293.
[84] *Id.*
[85] Audubon, Important Bird Areas: Colville River Delta, http://www.audubon.org/important-bird-areas/colville-river-delta.
[86] *Id.*
[87] *Id.*
[88] DEIS 3-329.
[89] *Id.*
[90] DEIS 3-387.
[91] *Id.*

Fourth, the project will significantly degrade polar bear habitat. The population estimate of Southern Beaufort Sea polar bears is only 900 individuals, and notably the population has declined 40% since 2004.[92] Polar bears are classified as a threatened species, and they are extremely vulnerable to climate change. The coast of the Beaufort Sea is an important denning habitat for polar bears.[93] Experience with captive female polar bears suggests that they may be particularly sensitive to noise and disturbance during maternity denning.[94] If a female bear with cubs is forced to prematurely abandon a den, the survival of the cubs is likely to be low, and therefore disturbance of dens can result in reproductive failure.[95] Polar bears may be more likely to abandon dens in the fall, when they have less to lose reproductively than in the spring.[96] Activities such as dumping, dredging, and drilling and construction of platforms, pipelines, support facilities, and storage facilities may damage or destroy feeding areas, and cause polar bears to abandon prime habitat to use marginal habitat or to concentrate in undisturbed areas.[97] The Corps acknowledges that the project will result in loss and alteration of denning habitat for polar bears.[98] This will result in displacement of bears, loss of productivity, and increased harassment and hazing of polar bears.[99] Moreover, "expansion of oil and gas development along the Arctic coast on both land and sea may reach a level at which such effects become problematic for polar bears in the future."[100]

Finally, not only will the project harm habitat and wildlife, it will significantly degrade the use of the area for subsistence use. There will be significant harm to caribou, fish, and birds that are harvested for subsistence.[101] Additionally, access to the area will be curtailed by the proposed project.[102]

These and other environmental impacts from Armstrong Energy's project will severely degrade the Colville River Delta and its wildlife. This plus its climate change impacts of the project run counter to the public interest, thus the Corps should deny the permits.

II. THE DRAFT EIS FAILS TO COMPLY WITH THE NATIONAL ENVIRONMENTAL POLICY ACT

NEPA's fundamental purposes are to guarantee that: (1) agencies take a hard look at the environmental consequences of their actions before these actions occur; and (2) agencies make the relevant information available to the public so that it may also play a role in both the

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[92] Bromaghin, J.F. et al. 2015. Polar bear population dynamics in the southern Beaufort Sea during a period of sea ice decline. *Ecological Applications* 25(3): 634–651.
[93] *Id.*
[94] *Id.*
[95] Amstrup, S. C. 1993. Human disturbances of denning polar bears in Alaska. *Arctic* 46(3):246-250.
[96] *Id.*
[97] Lentfer, J.W. (Convener). 1990. Workshop on Measures to Assess and Mitigate the Adverse Effects of Arctic Oil and Gas Activities on Polar Bears. Final Report to the U.S. Marine Mammal Commission. U.S. Department of Commerce National Technical Information Service, Washington, D.C., USA iv + 39pp.
[98] DEIS 3-431.
[99] DEIS 3-439.
[100] DEIS 3-454.
[101] DEIS 3-621.
[102] *Id.*

decision-making process and the implementation of that decision.[103] NEPA, the nation's "basic national charter for protection of the environment," seeks to "insure that environmental information is available to public officials and citizens before decisions are made and before actions are taken," and to "help public officials make decisions that are based on understanding of environmental consequences, and take actions that protect, restore, and enhance the environment."[104] To assure transparency and thoroughness, agencies also must "to the fullest extent possible...[e]ncourage and facilitate public involvement" in decision-making.[105] NEPA requires federal agencies to prepare an EIS for all "major federal actions significantly affecting the quality of the human environment."[106] The public must be given adequate information about the project and its environmental effects to be able to provide input prior to the issuance of the permits.

A. <u>The Corps' purpose and need statement is too narrow.</u>

The Corps' purpose and need statement fails to comply with NEPA. NEPA's implementing regulations provide that an EIS should "specify the underlying purpose and need to which the agency is responding in proposing the alternatives including the proposed action."[107] This purpose and need inquiry is crucial for a sufficient environmental analysis because "[t]he stated goal of a project necessarily dictates the range of 'reasonable' alternatives."[108] Thus, "an agency cannot define its objectives in unreasonably narrow terms" without violating NEPA.[109]

The Corps stated purpose and need is "to construct infrastructure to safely produce, process, and transport commercial quantities of liquid hydrocarbons to market via pipeline from the Alpine C and Nanushuk reservoirs to meet the public's need for oil resources."[110] This purpose and need is inadequate because the Corps thus considered an unreasonably narrow range of reasonable alternatives. The Clean Water Act's purpose is to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters."[111] The goals of the Clean Water Act are to guarantee "water quality which provides for the protection and propagation of fish, shellfish, and wildlife and provides for recreation" and to promptly eliminate water pollution.[112] The Corps is charged with implementing the Clean Water Act for purposes of 404 permits, and thus the purpose and need must comply with its statutory duties under the Clean Water Act. Additionally, all federal agencies are charged with conserving endangered species and their habitats.[113]

Moreover, NEPA evaluation must take place "*before* decisions are made and *before* actions are taken."[114] Such an approach ensures that agencies will take the requisite "hard look" at

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[103] See, e.g. 40 C.F.R. § 1500.1.
[104] 40 C.F.R. § 1500.1(a)-(c).
[105] 40 C.F.R. §1500.2(d).
[106] 42 U.S.C. § 4332(2)(C); see also 40 C.F.R. § 1501.4.
[107] 40 C.F.R. § 1502.13.
[108] *Carmel-by-the-Sea v. U.S. Dep't of Transp.,* 123 F.3d 1142, 1155 (9th Cir. 1997).
[109] *Id.*
[110] DEIS at 1-10.
[111] 33 U.S.C. § 1251(a).
[112] *Id.*
[113] 16 U.S.C. §1536(a)(1).
[114] 40 C.F.R. § 1500.1(a) (emphasis added).

environmental consequences *before* approving any major federal action.[115] But the Corps' purpose and need statement indicates that it did just the opposite. In other words, the purpose and need statement demonstrates that the Corps has already decided to authorize the construction and operation of the drilling project and that its entire analysis was framed in a way to support that pre-determined outcome. The Corps' backward approach reflects a fundamental misunderstanding of its legal obligations and an apparent desire to appease the oil industry at the expense of the aquatic environment.

B. The Corps failed to evaluate a reasonable range of alternatives.

The Corps' draft EIS fails to analyze a reasonable range of alternatives. EISs must include a reasonable range of alternatives,[116] and provide "a clear basis for choice among options by the decisionmaker and the public."[117] NEPA requires a "detailed statement" of "alternatives to the proposed action."[118] The purpose of this section is "to insist that no major federal project should be undertaken without intense consideration of other more ecologically sound courses of action, including shelving the entire project, or of accomplishing the same result by entirely different means."[119]

The alternatives analysis must "rigorously explore and objectively evaluate all reasonable alternatives."[120] While an agency is not obliged to consider every alternative to every aspect of a proposed action, the agency must "consider such alternatives to the proposed action as may partially or completely meet the proposal's goal."[121]

The alternatives considered by the Corps were substantially similar and failed to provide options that had any meaningful environmental benefits. The Corps considered five alternatives: (1) no action, (2) proposed action, (3) southern access, (4) northern access, and (5) reconfigured infield roads. These alternatives were nearly identical with only slight reconfigurations, except the no action alternative.

Here are some excerpts from the draft EIS that demonstrate the similarity of the alternatives and lack of meaningful analysis of alternatives to the proposed action throughout the draft EIS:

- Because *there are no key differentiators among the action alternatives*, effects on the Project from climate change or from climate change on the Project, would not be substantially different.[122]
- GHG emissions would be *similar under all action alternatives*.[123]

[115] *Kleppe v. Sierra Club,* 427 U.S. 390, 410, n. 21 (1976); *see also* 40 C.F.R. § 1502.5 (analysis must "not be used to rationalize or justify decisions already made").
[116] 42 U.S.C. § 4332(2)(C)(iii), (E), 40 C.F.R. § 1508.9(b).
[117] 40 C.F.R. § 1502.14.
[118] 42 U.S.C. § 4332(2)(c).
[119] *Environmental Defense Fund v. Corps of Engineers*, 492 F.2d 1123, 1135 (5th Cir. 1974).
[120] 40 C.F.R. § 1502.14.
[121] *Nat. Resources Defense Council, Inc. v. Callaway*, 524 F 2d. 79, 93 (2d Cir. 1975).
[122] DEIS 3-23.
[123] DEIS 3-27.

- The likelihood, magnitude, and duration of impacts to geology and mineral resources from Project activities *would be the same under all action alternatives*. The differentiating factor among alternatives would be the volume of gravel resources [0.2 mcy] required for the individual alternative.[124]
- Although the total road lengths, alignments, and fill volumes differ by alternative, the *variations are not substantial enough to create notable differences* among the action alternatives.[125]
- The magnitude, duration, and likelihood of effects to air quality *would be similar among all action alternatives.* Estimated emissions *would be the same for the action alternatives*.[126]
- Though action alternatives would differ slightly in the amounts of gravel fill, miles of ice roads, and exact amounts of wetland types affected, the likelihood, magnitude, and duration of *effects would be similar*.[127]
- Though action alternatives would differ in the amounts of gravel fill, miles of ice roads, and their locations, and thus affect different bird habitats and densities, the magnitude, extent, duration, and likelihood of effects to birds *would be similar among action alternatives*.[128]
- Though the action alternatives would differ in the amounts of gravel fill, miles of ice roads, and locations of the CPF and operations center, and thus affect different terrestrial mammals and habitats, the magnitude, extent, duration, and likelihood of effects on terrestrial mammals *would be similar among the action alternatives*.[129]
- Though action alternatives would differ in the amounts of gravel fill, miles of ice roads, locations of the CPF and operations center, the likelihood, magnitude, duration, and extent of effects to marine mammals *would be similar among all action alternatives*.

Because all of the alternatives are virtually identical there is no meaningful analysis of the differences between the alternatives. This does not meet the requirements of NEPA.[130]

The Corps should revise its draft EIS to consider some true alternatives that provide the decisionmaker with detailed information about the environmental differences between the alternatives.

Several alternatives should have been considered in the EIS including:

1. Roadless development, using ice roads in the winter season.
2. Phased development, reducing the footprint of the project and reclaiming areas as phases proceed.
3. Redesigning locations and sizes of roads and drill pads to address (1) anticipated climate change conditions such as rising sea levels, erosion and melting permafrost;[131] (2)

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[124] DEIS 3-40.
[125] DEIS 3-58.
[126] DEIS 3-117.
[127] DEIS 3-281.
[128] DEIS 3-341.
[129] DEIS 3-395.
[130] DEIS 3-449.
[131] Raynolds et al. 2014.

wildlife migration, fish passage, and corridors for caribou to access habitat; (3) reduced dust deposition.

4. Prohibiting hydraulic fracturing and other unconventional well stimulation techniques that increase air pollution, risk of chemical or oil spill, and risk of earthquakes, among other hazards.
5. Processing the oil off-site, for example at the underutilized Kuparuk processing facility.
6. Seasonal restrictions, for example during polar bear denning, to reduce environmental impacts.

The Corps' decisions to eliminate several alternatives from consideration were arbitrary and capricious because they were conclusory, ignored important factors, and were not rationally supported. For example, the Corps concluded that a roadless development would be more environmentally damaging because of the need for flights and eliminated this alternative from consideration; however, it is impossible to know whether an increase in flights would have a greater environmental impact without any analysis. There is no analysis of how many flights would be needed when ice roads are unavailable, nor what the environmental impact of those flights are compared to hundreds of miles of 38-foot wide gravel roads.

The Corps may not simply adopt Armstrong's rationale as its own for why the eliminated alternatives were impracticable or not less damaging to the environment. The Corps' duty under NEPA is to examine a reasonable range of alternatives and evaluate their environmental impacts, which it has failed to do here.

C. The Corps must meaningfully analyze the impacts of climate change and ocean acidification.

1. The Arctic is extremely vulnerable to climate change.

Climate changes impacts in Alaska are "already pronounced," as summarized by the 2014 National Climate Assessment, including greater-than-average warming, rapid melting of sea ice, widespread glacier retreat, thawing permafrost, and rapid ocean acidification.[132] Alaska has warmed more than twice as rapidly as the rest of the United States over the past 60 years.[133] During this period, average annual temperatures in Alaska increased by 3ºF, with 6ºF of warming in winter.[134] Absent significant reductions in greenhouse gas emissions, Alaska is expected to warm by an additional 10°F to 12°F in the north, 8°F to 10°F in the interior, and 6°F to 8°F in the rest of the state by the end of the century.[135]

One of the most disruptive consequences of climate change is the rapid melting of Arctic sea ice. Arctic summer sea ice is receding faster than climate models have predicted and is expected to virtually disappear before mid-century.[136] Summer sea ice extent and thickness have decreased

[132] Melillo et al. 2014.
[133] *Id.*
[134] *Id.*
[135] *Id.*
[136] *Id.*

by half over the past few decades,[137] with an accompanying drastic reduction in volume.[138] The length of the sea ice season is shortening, as ice melts earlier in spring and forms later in autumn.[139] Sea-ice losses have been particularly large in the Chukchi and Beaufort Seas.[140] In the Chukchi and Beaufort Seas, sea-ice thickness declined by -64% and -50%, respectively, between 1958 to 2007,[141] and the length of the ice season decreased by 35 days between 1979 and 2007.[142]

Arctic summer sea ice is expected to virtually disappear before mid-century, with estimates of 2020 or earlier, 2030 on average, and 2040 or later based on three modeling approaches.[143] Winter sea ice is also declining faster than IPCC climate models have projected.[144] In the Bering Sea, winter (March and April) sea-ice cover is expected to decline by ~43% by 2050 under a mid-range A1B emissions scenario.[145] The rapid loss of Arctic sea ice is disrupting ecosystems, leading to greater access for shipping and offshore development, and increasing vulnerability to coastal erosion.[146]

Alaska houses some of the world's largest glaciers and is experiencing among the fastest losses of glacial ice on the planet, which has been attributed to rising temperatures from global warming.[147] More than 98% of Alaska's glaciers are retreating and/or thinning, leading to massive ice loss,[148] and the rate of Alaskan glacier retreat and thinning has accelerated in recent decades.[149] The global decline in glacial ice loss is predicted to be one of the largest contributors to global sea level rise during this century.[150]

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[137] *Id.*; Melillo et al. 2014; Stroeve, J., M. et al., 2008. Arctic sea ice extent plummets in 2007. *EOS Transactions*, AGU 89:13-14; Kwok, R., and D. A. Rothrock. 2009. Decline in Arctic sea ice thickness from submarine and ICESat records: 1958-2008. *Geophysical Research Letters* 36:L15501, doi:15510.11029/12009GL039035.

[138] Schweiger, A., J. Zhang, R. Lindsay, M. Steele, and H. Stern. 2012. Arctic Sea Ice Volume Anomaly, version 2, Polar Science Center, http://psc.apl.washington.edu/wordpress/research/projects/arctic-sea-ice-volume-anomaly/.

[139] Parkinson, C.L. 2014. Spatially mapped reductions in the length of the Arctic sea ice season, *Geophysical Research Letters* 41:4316–4322.

[140] Meier, W., J. Stroeve, and F. Fetterer. 2007. Whither Arctic sea ice? A clear signal of decline regionally, seasonally and extending beyond the satellite record. Annals of Glaciology 46:428-434; Parkinson, C. L., and D. J. Cavalieri. 2008. Arctic sea ice variability and trends, 1979-2006. *Journal of Geophysical Research* 113: C07003, doi:10.1029/2007JC004558.

[141] Kwok and Rothrock 2009.

[142] Markus, T., J. Stroeve, and J. Miller. 2009. Recent changes in Arctic sea ice melt onset, freezeup, and melt season length. *Journal of Geophysical Research* 114:C12024, doi:10.1029/2009JC005436.

[143] Overland, J.E. and M. Wang. 2013. When will the summer Arctic be nearly sea ice free? *Geophysical Research Letters.* DOI: 10.1002/grl.50316.

[144] Stroeve, J., M. M. Holland, W. Meier, T. Scambos, and M. Serreze. 2007. Arctic sea ice decline: Faster than forecast. *Geophysical Research Letters* 34:L09501, doi: 10.1029/2007GL029703.

[145] Wang, M., J. E. Overland, and N. A. Bond. 2010. Climate projections for selected large marine ecosystems. *Journal of Marine Systems* 79:258-266.

[146] Melillo et al. 2014.

[147] *Id.*

[148] Molnia, B. F. 2007. Late nineteenth to early twenty-first century behavior of Alaskan glaciers as indicators of changing regional climate. *Global and Planetary Change* 56: 23–56.

[149] Arendt, A.A., et al., 2002. Rapid wastage of Alaska glaciers and their contribution to rising sea level. *Science* 297:382–386; Dyurgerov, M. and G.J. McCabe. 2006. Associations between accelerated glacier mass wastage and increased summer temperature in coastal regions. *Arctic, Antarctic, and Alpine Research* 38:190-197.

[150] Melillo et al. 2014

Permafrost underlies 80% of the land surface in Alaska, and permafrost thaw is already underway in interior and southern Alaska where permafrost temperatures are near the thaw point.[151] In northern Alaska, permafrost temperature has increased by up to 2 to 3°C since the 1980s, including areas of the coastal Arctic National Wildlife Refuge.[152] Models project that permafrost in Alaska will continue to thaw, and that near-surface permafrost may be entirely lost from large parts of Alaska by the end of the century.[153] As permafrost thaws, it releases carbon dioxide and the powerful greenhouse gas methane into the atmosphere, which contribute to further warming in a reinforcing feedback loop.[154] Permafrost plays an essential role in the Alaskan ecosystem by making the ground watertight and maintaining the vast network of wetlands and lakes across the tundra that provide habitat for animals and plants.

Alaskan shorelines are eroding at an accelerating rate due to the combined effects of sea-ice loss, increasing sea surface temperatures, increasing terrestrial permafrost degradation, rising sea levels, and increases in storm power and corresponding wave action.[155] In Alaska, coastal erosion rates have doubled in the past 50 years along the Beaufort Sea shoreline.[156] Increasing coastal erosion jeopardizes species that use coastal habitats for breeding, such as the polar bear, which uses coasts and barrier islands for denning.[157]

Sea level rise in many regions of the Arctic is advancing much faster than the global average, with particularly rapid increases in sea level occurring in recent years. Global average sea level rose by roughly eight inches (19 centimeters) over the past century, and sea level rise is accelerating in pace.[158] Recent studies indicate that a global mean sea level rise of 3 to 4 feet is likely within this century, and 6.6 feet is possible, with estimates as follows: 0.5 to 1.4 m,[159] 0.75 m to 1.90 m,[160] 0.8 m to 2.0 m,[161] 0.8 m to 1.3 m,[162] and 0.6 m to 1.6 m.[163] In its 2012 sea-level

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[151] *Id.*

[152] Jorgenson, M. T., Y. L. Shur, and E. R. Pullman. 2006. Abrupt increase in permafrost degradation in Arctic Alaska. Geophysical Research Letters 33, L02503, doi:10.1029/2005GL024960; Osterkamp, T. E., and J. C. Jorgenson. 2006. Warming of permafrost in the Arctic National Wildlife Refuge, Alaska. *Permafrost and Periglacial Processes* 17:65-69.

[153] Melillo et al. 2014.

[154] Koven, C. D., B. Ringeval, P. Friedlingstein, P. Ciais, P. Cadule, D. Khvorostyanov, G. Krinner, and C. Tarnocai. 2011. Permafrost carbon-climate feedbacks accelerate global warming. *PNAS* 108:14769-14774; Schaefer, K., T. Zhang, L. Bruhwiler, and A. P. Barrett. 2011. Amount and timing of permafrost carbon release in response to climate warming. *Tellus Series B-Chemical and Physical Meteorology* 63B:165-180.

[155] Jones, B. M., C. D. Arp, M. T. Jorgensen, K. M. Hinkel, J. A. Schmutz, and P. L. Flint. 2009. Increase in the rate and uniformity of coastline erosion in Arctic Alaska. *Geophysical Research Letters* 36:L03503, doi:10.1029/2008GL036205.

[156] Lantuit, H., and W. H. Pollard. 2008. Fifty years of coastal erosion and regrossive thaw slump activity on Herschel Island, southern Beaufort Sea, Yukon Territory, Canada. *Geomorphology* 95:84-102; Mars, J. C., and D. W. Houseknecht. 2008. Quantitative remote sensing study indicates a doubling of coastal erosion rate in past 50 yr along a segment of the Arctic coast in Alaska. *Geology* 35:583-586; Jones et al. 2009.

[157] Durner, G. M., S. C. Amstrup, and K. J. Ambrosius. 2006. Polar bear maternal den habitat in the Arctic National Wildlife Refuge, Alaska. *Arctic* 59:31-36.

[158] IPCC, 2013: Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 1535 pp; Melillo 2014.

[159] Rahmstorf, S. 2007. A semi-empirical approach to projecting future sea-level rise. *Science* 315:368-370.

[160] Vermeer, M., and S. Rahmstorf. 2009. Global sea level linked to global temperature. *PNAS* 106:21527-21532.

rise assessment, the National Research Council estimated global sea level rise at 8 to 23 cm by 2030, 18 to 48 cm by 2050, and 0.5 m to 1.4 m by 2100.[164] The 2014 National Climate Assessment reported that sea level is projected to rise by 1 to 4 feet in this century, with the possibility of 6.6 feet of rise.[165]

The waters off Alaska are particularly vulnerable to ocean acidification.[166] Seasonal aragonite undersaturation is already occurring in the Bering, Chukchi, and Beaufort Seas.[167] Mean surface pH values in the Gulf of Alaska, Bering, Chukchi and Beaufort Seas have decreased by 0.1 to 0.14 pH units since pre-industrial times, equivalent to a more 30% increase in acidity, with future surface pH projected to decrease by another 0.34 to 0.37 pH units by the end of the century.[168] Acidification has spread rapidly in the Arctic with it expanding norward 300 miles off the coast of northwestern Alaska and increasing in depth from 325 feet to 800 feet.[169] If current emissions trends continue, by 2050 all Arctic surface waters are expected to be corrosive to organisms that use aragonite to build their shells, and that most of the Arctic, including regions of the Bering and Chukchi Seas, will be corrosive to calcite-using organisms by 2095.[170]

Across Alaska marine waters, one of the taxa with the greatest sensitivity to declines of aragonite saturation conditions are mollusks, especially pelagic pteropods.[171] As aragonite saturation horizon ($\Omega_{\text{aragonite}} = 1.0$) shoals (from >100 m to <75 m deep) pteropod abundance decline at depths below 100 m where waters are less saturated with respect to aragonite. In addition, severe shell dissolution is observed at depths where $\Omega_{\text{aragonite}} = 1.1$ to 1.4.[172] Declines in pteropod

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[161] Pfeffer, W. T., J. T. Harper, and S. O'Neel. 2008. Kinematic constraints on glacier contributions to 21st-century sea-level rise. *Science* 321:1340-1343.

[162] Grinsted, A., J. C. Moore, and S. Jevrejeva. 2010. Reconstructing sea level from paleo and projected temperatures 200 to 2100 AD. *Climate Dynamics* 34:461-472.

[163] Jevrejeva, S., J. C. Moore, and A. Grinsted. 2010. How will sea level respond to changes in natural and anthropogenic forcing by 2100. *Geophysical Research Letters* 37:L07703, doi:07710.01029/02010GL042947.

[164] National Research Council. 2012. Sea-Level Rise for the Coasts of California, Oregon, and Washington: Past, Present, and Future. Washington, DC: The National Academies Press. https://doi.org/10.17226/13389.

[165] Melillo et al. 2014.

[166] Mathis, J. T., S. R. Cooley, N. Lucey, S. Colt, J. Ekstrom, T. Hurst, C. Hauri, W. Evans, J. N. Cross, and R. A. Feely. 2015. Ocean acidification risk assessment for Alaska's fishery sector. *Progress in Oceanography* 136:71–91; Fabry, V., J. McClintock, J. Mathis, and J. Grebmeier. 2009. Ocean Acidification at High Latitudes: The Bellwether. *Oceanography* 22:160–171.

[167] Bates, N. R., M. I. Orchowska, R. Garley, and J. T. Mathis. 2013. Summertime calcium carbonate undersaturation in shelf waters of the western Arctic Ocean – how biological processes exacerbate the impact of ocean acidification. *Biogeosciences* 10:5281–5309; Fabry et al. 2009; Yamamoto-Kawai, M., F. McLaughlin, E. C. Carmack, S. Nishino, and K. Shimada. 2009. Aragonite undersaturation in the Arctic Ocean: effects of ocean acidification and sea ice melt. *Science* 326:1098-1100.

[168] Mathis 2015.

[169] Qi, Di & Chen, Liqi & Chen, Baoshan & Gao, Zhongyong & Zhong, Wenli & Feely, Richard & G. Anderson, Leif & Sun, Heng & Chen, Jianfang & Chen, Min & Zhan, Liyang & Yuanhui, Zhang & Cai, Wei-Jun. 2017. Increase in acidifying water in the western Arctic Ocean. *Nature Clim. Change*.

[170] Fabry 2009; Feely 2009.

[171] Comeau, S., J.-P. Gattuso, A.-M. Nisumaa, and J. Orr. 2012. Impact of aragonite saturation state changes on migratory pteropods. *Proceedings of the Royal Society of London B: Biological Sciences* 279:732–738; Lischka, S., and U. Riebesell. 2012. Synergistic effects of ocean acidification and warming on overwintering pteropods in the Arctic. *Global Change Biology* 18:3517–3528.

[172] Bednaršek, N., and M. Ohman. 2015. Changes in pteropod distributions and shell dissolution across a frontal system in the California Current System. *Marine Ecology Progress Series* 523:93–103

abundance can directly affect those species that feed on them. For example, 30 % of the variability of pink salmon survival during spring-summer in Prince Williams Sound, southern Alaska, has been directly related changes in the abundance and distribution of the pteropod *Limacina helicina.*[173] Several species that are most intensely affected by ocean acidification (e.g., shellfish and mollusk) contribute substantially to Alaska's commercial and traditional subsistence fisheries.[174] Several studies have shown negative biological responses from ocean acidification.

Table 1 Commercially, economically, and ecologically important species in Alaska waters and their known physiological response to ocean acidification under elevated pCO_2 levels. *Table modified after Mathis et al. 2015.*

Species	Physiological Impact	Reference
Alaska pollock, (*Theragra chalcogramma)*	Increase otolith deposition rate in juveniles	(Hurst et al. 2012, 2013)
Pink salmon, *(Oncorhynchus gorbuscha)*	Growth and survival decreases if pteropods decline	(Aydin et al. 2005, Doubleday and Hopcroft 2015, Haigh et al. 2015)
Tanner/Snow Crab, (*Chionoecetes* spp.)	Uncompensated acidosis in Tanner crab	(Pane and Barry 2007, Long et al. 2013)
Red king Crab, (*Paralithodes spp.)*	Lower survival, growth, and calcium content	(Sigler et al. 2008, Long et al. 2013)
Pacific Herring, (*Cluplea pallasii*)	Abundance decline if krill decline due to increase toxicity of harmful algal blooms to ocean acidification	(Bargu et al. 2002, Tatters et al. 2012)
Copepod (*Calanus glacialis)*	pH 6.9 delayed egg hatching and reduced overall hatching success	(Weydmann et al. 2012)
Shelled pteropod (*Limacina helicina)*	Calcification decrease, shell exterior dissolution	(Orr et al. 2005, Fabry et al. 2008, Comeau et al. 2010, Bednaršek et al. 2014)
Cold water corals, *multiple*	Growth rate decreases	(Stone 2005, Guinotte and Fabry 2008)
Dungeness crab *(Cancer magister)*	Temporary acid-base shift followed by compensation	(Pane and Barry 2007)
Spider crab *(Hyas araneus)*	Slower larval development and reduced larval growth and fitness	(Walther et al. 2009)
Edible crab (Cancer pagurus)	High CO_2 and temperature enhanced sensitivity, reduced protein synthesis rate	(Metzger et al. 2007)
Pacific oyster *(Crassostrea gigas)*	Decreased growth and survival	(Barton et al. 2012, Gazeau et al. 2013, Waldbusser et al. 2015)
Olympia oyster (*Ostreola conchaphila)*	Decreased in larvae shell growth, juveniles growth smaller	(Hettinger et al. 2012, 2013a, 2013b)
Pinto abalone (*Haliotis kamtschatkana)*	Decreased larval survival, increased shell abnormalities	(Crim et al. 2011)

[173] Doubleday, A. J., and R. R. Hopcroft. 2015. Interannual patterns during spring and late summer of larvaceans and pteropods in the coastal Gulf of Alaska, and their relationship to pink salmon survival. *Journal of Plankton Research* 37:134–150

[174] Mathis 2015.

2. The Corps must quantify greenhouse pollutants caused by the project.

The Corps has failed to quantify and analyze the environmental impacts of the emissions from the use of the oil produced by the project. Armstrong's Project will exacerbate the impacts of climate change by emitting significant volumes of greenhouse gases. Accordingly, the Corps must consider the direct and indirect impacts of climate change, including sea ice and permafrost melt, sea level rise, warming oceans, and ocean acidification, and the attendant impacts on Arctic wildlife. While the draft EIS quantifies and describes the climate impacts of the construction and operations, it fails to disclose the impacts from downstream use of the oil — the largest component of greenhouse gas emissions will arise from the combustion of the oil and gas.

NEPA requires the disclosure of the full greenhouse gas emissions of a project.[175] The proposed project allows the development of significant oil resources that will be consumed. Indeed the stated purpose of the action is to "construct infrastructure to safely produce, process, and transport commercial quantities of liquid hydrocarbons to market via pipeline from the Alpine C and Nanushuk reservoirs to meet the public's need for oil resources."[176] Inherent in the stated purpose is the public's use of Nanushuk oil, and thus the greenhouse gas pollution from that use must be evaluated in the EIS.

The Corps anticipates that the project will produce 120,000 barrels of oil per day. The Nanushuk reservoir is estimated to hold 1.2 billion barrels of proven recoverable reserves. According to a lifecycle greenhouse gas analysis, this could emit a median of 640,000,000 tonnes of CO_2e — or the equivalent greenhouse gas emissions of more than 137 million passenger cars being driven for a year.[177] That volume added to the 16,290,000 tonnes of CO_2e estimated for construction and operations must be evaluated in the EIS. It would be arbitrary and capricious for the Corps to assume that downstream greenhouse gas emissions would be similar to the no action alternative, and courts have rejected this substitution assumption for the purposes of an EIS.[178]

Not only must the Corps quantify the greenhouse gas emissions from using the oil, but it must also describe what those additive impacts are to the environment. It is insufficient, as the Corps has done in the draft EIS, to state that the emissions mix globally and thus "the magnitude of impact resulting from Project emissions would be difficult to specify in terms of global impact."[179] This approach fails to comply with the requirements of NEPA. Part of the analysis should include what the projects' greenhouse gas impacts will be on the sensitive Arctic environment and its ice-dependent wildlife.

In addition to disclosing the environmental impacts of construction, operation, and downstream greenhouse gas emissions, the Corps should also quantify the social cost of carbon. Despite Trump's March 28, 2017, Executive Order seeking a review of the Social Cost of Carbon, it would run counter to the best available information and the law to use anything lower than the

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[175] *Ctr. for Biological Diversity v. Nat'l Highway Traffic Safety Admin.*, 538 F.3d 1172, 1194 (9th Cir. 2008)

[176] DEIS at 1-10.

[177] This estimate is based on model developed by scientists at EcoShift Consulting. Those models and the emissions scenarios are described in http://www.ecoshiftconsulting.com/wp-content/uploads/Potential-Greenhouse-Gas-Emissions-U-S-Federal-Fossil-Fuels.pdf

[178] *WildEarth Guardians v. Bureau of Land Management*, Case No. 15-8109 (10th Cir. 2017).

[179] DEIS 3-25.

2013 federal estimate. Agencies may not avoid quantifying these costs in the NEPA context because "a tool is and was available: the social cost of carbon protocol."[180] The social cost of carbon is an estimate of the economic costs associated with an increase in carbon dioxide emissions, developed by the U.S. Government's Interagency Working Group on the Social Cost of Carbon.[181] It is designed to estimate damages from climate change impacts, including changes in net agricultural productivity, human health, and property damages from increased flood risk. A dozen departments and agencies originally developed the protocol in 2010 to measure the costs and benefits of proposed regulations as required by Executive Order 12866.[182] In 2013, the Federal Interagency Working Group increased its estimates of the social cost of carbon by 50%.[183] Notably, recent studies have found that the numeric value assigned to the social cost of carbon vastly underestimates the true cost.[184] Anything less than the 2013 federal estimate would be indefensible for the Corps to use, and the latest scientific information indicates that it should be valued at $220 per ton or more.

The Corps should also quantify the emissions of black carbon. Black carbon, or soot, consists of particles or aerosols released through the inefficient burning of fossil fuels, biofuels, and biomass.[185] Black carbon warms the atmosphere, but it is a solid, not a gas. Unlike greenhouse gases, which warm the atmosphere by absorbing longwave infra-red radiation, soot has a warming impact because it absorbs shortwave radiation, or visible light.[186] Black carbon is an extremely powerful greenhouse pollutant. Scientists have described the average global warming potential of black carbon as about 500 times that of carbon dioxide over a 100 year period.[187] This powerful warming impact is remarkable given that black carbon remains in the atmosphere

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[180] *High Country Conservation Advocates v. U.S. Forest Service*, No. 1:13-cv-01723, 2014 U.S. Dist. LEXIS 87820, *30 (D. Col. June 27, 2014); *see also Ctr. for Biological Diversity v. Nat'l Highway Traffic Safety Admin,* 538 F.3d 1172 (9th Cir. 2008).

[181] Interagency Working Group on Social Cost of Carbon. May 2013. 2013 Technical Support Document (TSD): Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866.

[182] Interagency Working Group on Social Cost of Carbon, Technical Support Document (Feb. 2010) at 1,3.

[183] Interagency Working Group on Social Cost of Carbon, United States Government, Technical Support Document: Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866 (Nov. 2013) at 3, available at http://www.whitehouse.gov/sites/default/files/omb/assets/inforeg/technical-updatesocial-cost-of-carbon-for-regulator-impact-analysis.pdf.

[184] Ackerman & E. Stanton, Climate Risks and Carbon Prices: Revising the Social Cost of Carbon, in Economics, vol. 6 (Apr. 4, 2012) (the social cost of carbon could be almost $900/tCO2 in 2010, rising to $1,500/tCO2 in 2050); *See e.g.*, Than, K., 2015. *Estimated social cost of climate change not accurate, Stanford scientists say*, Stanford Report, http://news.stanford.edu/news/2015/january/emissions-social-costs-011215.html (estimating the social cost of carbon to be $220 per ton rather than $37 as estimated by the government); *see also* Marten, A.L., and Newbold, S.C., 2012. *Estimating the social cost of non-CO2 GHG emissions: Methane and nitrous oxide*, 51 Energy Policy 957, available as EPA Working Paper No. 11-10 at http://yosemite.epa.gov/ee/epa/eed.nsf/ec2c5e0aaed27ec385256b330056025c/f7c9fc6133698cc38525782b00556de1/$FILE/2011-01v2.pdf (estimating the social cost of nitrous oxide to be $4,300 to $33,000 per metric ton in 2015).

[185] Quinn, P.K., T.S. Bates, E. Baum, N. Doubleday, A. Fiore, M. Flanner, A. Fridlind, T. Garrett, D. Koch, S. Menon, D. Shendell, A. Stohl, and S.G. Warren. 2007. Short-lived pollutants in the Arctic: Their climate impact and possible mitigation strategies. *Atmos. Chem. Phys*. 8:1723-1735.

[186] Chameides, W.L., and M. Bergin. 2002. Soot takes center stage. *Science* 297:2214-2215.

[187] Hansen, J. et al. 2007. Dangerous human-made interference with climate: a GISS modelE study. *Atmospheric Chemistry and Physics* 7:2287-2312; *see also* Reddy, M.S., and O. Boucher. 2007. Climate impact of black carbon emitted from energy consumption in the world's regions. *Geophysical Research Letters* 34:L11802, doi:10.1029/2006GLO28904.

for only about four to seven days, with a mean residence time of 5.3 days.[188] Black carbon contributes to Arctic warming through the formation of "Arctic haze" and through deposition of particles on snow and ice which transform heat-reflecting surface into heat-absorbing surface thereby increasing heat absorption.[189]

Soot also contributes to heating when it is deposited on snow because it reduces reflectivity of the white snow and instead tends to absorb radiation. A recent study indicates that the direct warming effect of black carbon on snow can be three times as strong as that due to carbon dioxide during springtime in the Arctic.[190] Black carbon emissions that occur in or near the Arctic contribute the most to the melting of the far north.[191]

Reductions in black carbon therefore provide an extremely important opportunity to slow Arctic warming in the short term, and mitigation strategies should focus on within-Arctic sources and northern hemisphere sources that are transported by air currents most efficiently to the Arctic. Conversely, allowing black carbon emissions to increase in the Arctic as the result of oil and gas development, will accelerate Arctic warming and consequent loss of seasonal sea ice, leading to the extinction of the polar bear and other species. Black carbon reductions would also provide air quality and human health benefits.

3. Climate change will damage project infrastructure.

The Corps must improve its analysis of the effect of climate change on the project infrastructure, including consideration of an alternative that addresses the changing conditions in the Colville River Delta due to climate change. While acknowledging that warming is changing the Arctic environment, the draft EIS fails to adequately discuss the risks to the project from climate change. Climate change is causing, and will continue to cause sea level rise, sea ice melt, erosion, and permafrost melt in the project area. As discussed previously, erosion has doubled in along the Beaufort Sea coast in just decades.[192]

The draft EIS fails to adequately discuss and account for sea level rise, permafrost melt, sea-ice melt, coastal erosion, and increasing storms and wave action in the project design and operation. One exception is that the Corps recognizes that the proposed 5-foot-thick gravel pads would allow thaw penetration, and that a 6.4-foot-thick pad would be necessary.[193] However, the Corps does not analyze an alternative that would address this problem. Overall, the pads, roads, and pipelines are vulnerable to melting permafrost and sea level rise. Subsidence may destabilize facilities and pipelines. This will also impact the safety and vulnerability of the operations, increasing the risk of accidents, oil spills and other hazards. These predictable changes in the near future must be evaluated, modeled and the project needs to meaningfully account for them.

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188 Reddy and Boucher 2007.
189 Quinn et al. 2007; Reddy and Boucher 2007.
190 Flanner, M. G., C. S. Zender, J. T. Randerson, and P. J. Rasch , 2007. Present-day climate forcing and response from black carbon in snow. *J. Geophys. Res*. 112:D11202, doi:10.1029/2006JD008003.
191 Reddy and Boucher 2007; Quinn et al. 2007.
192 Lantuit, H., and W. H. Pollard. 2008. Fifty years of coastal erosion and regrossive thaw slump activity on Herschel Island, southern Beaufort Sea, Yukon Territory, Canada. *Geomorphology.* 95:84-102; Mars & Houseknecht. 2008; Jones et al. 2009.
193 DEIS 3-26.

While the draft EIS discusses some of the ways that climate change may alter the project area and conditions, the infrastructure features were not designed to withstand more extreme weather patterns, scouring, permafrost melting, and other projected effects of climate change. The Corps should model the impacts of climate change, and evaluate how the infrastructure will respond to predicted changes.

D. The Corps' draft EIS should include a discussion of the impacts of a catastrophic oil spill, and its analysis of oil spill impacts on sensitive Arctic wildlife is deficient.

1. The project risks harmful oil spills that will have long-term damage on the Colville River Delta.

The Corps' analysis of an oil spill is inadequate. Essentially, the agency acknowledges that small to large spills will happen during the construction phase, and small to medium-sized spills during the life of the project; but, it fails to meaningfully evaluate the impacts of a spill. The draft EIS discounts oil spills as likely to be contained and cleaned up while still on gravel pads and roads.[194] Moreover, there is very little disclosure of the environmental impacts of an oil spill. For example, the draft EIS concludes that "[s]pills from these [drilling and operations] sources would not be expected to result in damage to tundra or adjacent waterbodies and therefore have negligible effects on birds."[195] As described below this is a woefully inadequate evaluation of what would happen to the Colville River Delta's birdlife and habitat.

Oil and gas development consistently results in both chronic and disaster-related oil spills. These spills cause irreversible damage to marine and coastal environments, and the destructive impacts of large spills are immediate and severe. Large and catastrophic oil spills are particularly devastating. In 2010, the BP Deepwater Horizon spilled an estimated 206 million gallons of oil into the Gulf of Mexico over the course of almost three months. While the draft EIS says that the model included analysis of a catastrophic oil spill, there is no additional information on that analysis or evaluation of the effects of a catastrophic oil spill.

Transporting oil by pipeline is dangerous and carries a significant risk of oil spills. An analysis of federal records shows that nationally there have been nearly 8,000 significant incidents with U.S. pipelines, involving death, injury, and economic and environmental damage, since 1986 — more than 300 per year. The study is based on records from the federal Pipeline and Hazardous Materials Safety Administration, which maintains a database of all U.S. pipeline incidents that are classified as "significant," those resulting in death or injury, damages more than $50,000, more than five barrels of highly volatile substances or 50 barrels of other liquid released, or where the liquid exploded or burned. Federal data show that new pipelines also carry a high risk of spills, mostly because of faulty design or construction.[196] These data indicate there are more oil spills in the first two years of pipeline's life than in the next seven years combined.

[194] DEIS 4-38.
[195] DEIS 3-340.
[196] Stover, Richard, PhD, *Review of the US Department of Transportation Report The State of the National Pipeline Infrastructure*, Aug. 2013, *available at* http://www.icogitate.com/~oildrop/PHMSA_report_analysis.pdf.

This project is located near the Colville River and the coast and it crosses two tributaries to the river. There is a significant likelihood that an oil spill will not only affect the wetlands, but will also contaminate the river and the sea. For an oil spill that reaches the ocean, a 2014 report by the National Research Council found that "[t]he lack of infrastructure in the Arctic would be a significant liability in the event of a large oil spill."[197] In fact, the nearest U.S. Coast Guard facility is over 1,000 miles away. Moreover, traditional control measures such as in situ burning and mechanical recovery will be rendered infeasible for a large percentage of the time by ice, wind, weather and visibility conditions.[198]

The full range of environmental and wildlife impacts of an oil spill need to be analyzed in the EIS, and below is a discussion of some of the potential impacts to wildlife.

2. An oil spill will harm Arctic wildlife.

Oil spills in the Arctic would have persistent, long-term contamination and would have significant harmful consequences on wildlife. A study of a controlled oil spill in northern Alaska was studied 25 years after the experiment, and soil samples still contained oil demonstrating the long-term persistence of oil in the cold sub-Arctic environment.[199] Numerous sensitive species would be harmed by an oil spill from the proposed project.

Polar bears are particularly vulnerable to oil spills. Polar bears must maintain a pristine hair coat as insulation against the cold. When a polar bear comes into contact with spilled oil, it can soak a polar bear's pelage and persist for several weeks where it will be groomed and ingested, irritate the skin, and destroy the insulating abilities of the fur.[200] Studies show that fatalities can occur from physiological effects on lungs, kidneys, blood, gastrointestinal tract, and other organs and systems, even in the absence of the thermal effect.[201] In other words, available data suggest that if oil is spilled in leads occupied by polar bears, they will become fouled and that an oil-coated bear that is not cleaned and rehabilitated will probably die.[202] This is a significant concern given that oil spilled in sea ice habitat would likely concentrate in leads and between ice floes resulting in direct exposure of polar bears, and the lack of capacity to deal with an oil spill or rehabilitate oil-soaked polar bears. Oil spills may also impact polar bears' food supply by impacting lower

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[197] National Research Council. 2014. Responding to Oil Spills in the U.S. Arctic Marine Environment. National Academy of Sciences, Washington, DC at 8.

[198] Nuka Research and Planning Group, LLC. 2014. Estimating an Oil Spill Response Gap for the U.S. Arctic Ocean. September 10. Seldovia, AK. Available at http://www.nukaresearch. com/files/140910_Arctic_RGA_Report_FNL.pdf

[199] Braddock, J.F., Jon E Lindstrom, Roger C Prince. 2003. Weathering of a subarctic oil spill over 25 years: the Caribou-Poker Creeks Research Watershed experiment, *Cold Regions Science and Technology*, 36:11-23.

[200] Lentfer 1990. Stirling, I. 1998. *Polar Bears*. University of Michigan Press, Ann Arbor, Michigan, USA. 220 pp; Stirling, I. 1990. Polar bears and oil: ecological effects. Pp. 223-234. *In: Synthesis of Effects of Oil on Marine Mammals* [Geraci, J.R. and D.J. St. Aubin (eds.)] Academic Press, New York; Amstrup, S.C. 2006. Estimating Potential Effects of Hypothetical Oil Spills on Polar Bears. U.S. Geological Survey.

[201] Lentfer 1990; National Research Council of the National Academies ("NRC"). 2003. *Cumulative Environmental Effects of Oil and Gas Activities on Alaska's North Slope*. The National Academies Press, Washington, D.C., USA 288 pp.; Stirling 1998.

[202] Lentfer 1990; Stirling 1998.

benthic levels, which could have cascading affects through the food chain or by direct impacts on ringed or bearded seal populations.

Oil spills can also kill individual ice seals and have population-level impacts on ringed and bearded seals by decreasing survival and reproductive success, inhibiting their normal behaviors, and exerting deleterious effects on their health. Seals depend on scent to establish a mother-pup bond, and mothers often do not recognize their oil-coated pups.[203] Oiled pups may be prematurely abandoned, reducing the pup's chances of survival. During the nursing period, ringed, bearded, and spotted seals return to the water several times a day between nursing bouts, increasing the chances of repeated contact with oil.[204] Oil spills also impede seals' foraging activities. When oil is present in the sea seals are reluctant to enter into the water,[205] reducing their chances of getting food. Exposure to oil may also interfere with locomotion, especially in young seals. Davis and Anderson (1976, cited in St. Aubin (1990)) observed two gray seal pups drowning because their flippers were stuck to the sides of their bodies, preventing them from swimming.

Additionally, contact with oil and inhalation of hydrocarbon fumes poses a health risk to ringed and bearded seals. Petroleum hydrocarbons are extremely irritating to the mucous membranes that surround the eyes and line the oral cavity, respiratory surfaces, and anal and urogenital orifices of pinnipeds. After a few minutes of experimental exposure to crude oil-covered water, ringed seals began to lacrimate profusely and eventually had difficulty keeping their eyes open.[206] Within 24 hours they developed severe conjunctivitis, swollen nictitating membranes and corneal abrasions and ulcers.[207] Inhalation of hydrocarbon vapors can be toxic for pinnipeds. In particular, free-ranging pinnipeds stressed by parasitism or other metabolic disorders may be susceptible to even brief exposure to relatively low concentrations of hydrocarbon vapors. The exposure may even be fatal if combined with other factors that could elicit a major adrenal response.[208] Parasitized lungs, a relatively common finding in pinnipeds, can exacerbate the effects of even mild irritation of respiratory tissues; some of the components of petroleum are toxic if ingested.[209] Ingested hydrocarbons irritate and destroy epithelial cells in the stomach and intestine, affecting motility, digestion, and absorption.[210] Exposure to toxic fumes from petroleum hydrocarbons during oil spills can cause mortality in other marine mammals, even years after such accidents.[211] For example, a new study in determined that the Deepwater Horizon oil spill caused adrenal and lung lesions in bottlenose dolphins which led to their deaths.[212]

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[203] St. Aubin, D. J. 1990. Physiological and toxic effects on pinnipeds. Pages 235-239 in J. R. Geraci and D. J. St. Aubin, editors. Sea Mammals and Oil: Confronting the Risks. Academic Press, Inc., San Diego, CA.
[204] *Id.*
[205] *Id.*
[206] Smith, T. G. 1975. The effect of contact and oil ingestion on ringed seals of the Beaufort Sea, *Beaufort Sea. Technical Reports* 5: 1-67.
[207] *Id.*
[208] St. Aubin 1990.
[209] *Id.*
[210] *Id.*
[211] Venn-Watson, S. *et al.* Adrenal Gland and Lung Lesions in Gulf of Mexico Common Bottlenose Dolphins (Tursiops truncatus) Found Dead following the Deepwater Horizon Oil Spill. *PLoS ONE* 10:0126538 (2015).
[212] *Id.*

Seabirds, shorebirds, and wading birds are vulnerable to becoming coated with oil in wetland habitat, at the water surface, and shoreline. Oiling destroys the water-proofing and insulating properties of the feathers, thereby compromising their buoyancy and ability to thermoregulate.[213] Oiled birds rapidly deplete their fat reserves due to their inability to forage and regulate their body temperature, and quickly become emaciated, dehydrated, and hypothermic, often leading to mass die-offs.[214] The *Exxon Valdez* spill, for example, killed an estimated 250,000 seabirds in the days after the spill.[215] If spills occur during the breeding season, oiled adults returning to the nest can contaminate their eggs and chicks with oil. Studies on the effects of oil on eggs have shown significant mortality and developmental defects in embryos.[216] Oiled birds are also at high risk of ingesting oil when they preen their feathers.[217] Ingested oil can damage the gastrointestinal tract, evidenced by ulcers, diarrhea, and a decreased ability to absorb nutrients, and inhibit proper hormone function.[218] Inhalation of volatile hydrocarbons can result in pneumonia, neurological damage, and absorption of chemicals that can lead to cancer.[219]

In addition to the immediate effects from oiling, birds experience many chronic effects from oil spills, particularly those related to PAH toxicity. PAHs can continue to contaminate the tissues of oiled birds, particularly the liver, for several months following initial exposure.[220] Documented long-term effects on birds include anemia, inflammation, low weight gain, liver and kidney damage, immunosuppression, reduced reproductive success, and lower survivorship.[221] Oiling may also indirectly affect seabirds by reducing the availability of key food species.[222] These chronic impacts can suppress the recovery of seabird populations.[223]

Studies conducted in the years immediately following major oil spills illustrate the wide range of chronic impacts on seabirds across a variety of species. Common guillemot (*Uria aalge*) over-winter mortality doubled following major oil pollution incidents in the North Atlantic.[224] Black-legged kittiwakes (*Rissa tridactyla*) in an oiled colony showed significant evidence of anemia and reduction in breeding success (resulting from missed breeding years and disrupted social

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[213] Jenssen, B. M. 1994. Review Article: Effects of oil pollution, chemically treated oil, and cleaning on the thermal balance of birds. *Environmental Pollution* 86:207-215.
[214] *Id.*
[215] Peterson, C. H., S. D. Rice, J. W. Short, D. Esler, J. L. Bodkin, B. E. Ballachey, and D. B. Irons. 2003. Long-term ecosystem response to the Exxon Valdez oil spill. *Science* 302:2082-2086.
[216] Jenssen 1994.
[217] Briggs, K. T., M. E. Gershwin, and D. W. Anderson. 1997. Consequences of petrochemical ingestion and stress on the immune system of seabirds. *Ices Journal of Marine Science* 54:718-725.
[218] Jenssen 1994.
[219] Oiled Wildlife Care Network, http://www.owcn.org/about-oiled-wildlife/effects-of-oil-on-wildlife
[220] Troisi, G., L. Borjesson, S. Bexton, and I. Robinson. 2007. Biomarkers of polycyclic aromatic hydrocarbon (PAH)-associated hemolytic anemia in oiled wildlife. *Environmental Research* 105:324-329.
[221] *Id.*; Alonso-Alvarez, C., I. Munilla, M. López-Alonso, and A. Velando. 2007. Sublethal toxicity of the *Prestige* oil spill on yellow-legged gulls. *Environment International* 33:773-781.
[222] Velando, A., I. Munilla, and P. M. Leyenda. 2005. Short-term indirect effects of the *Prestige* oil spill on European shags: changes in availability of prey. *Marine Ecology Progress Series* 302:263-274.
[223] Troisi et al. 2007.
[224] Votier, S. C., B. J. Hatchwell, A. Beckerman, R. H. McCleery, F. M. Hunter, J. Pellatt, M. Trinder, and T. R. Birkhead. 2005. Oil pollution and climate have wide-scale impacts on seabird demographics. *Ecology Letters* 8:1157-1164.

structure) compared with unoiled colonies following the *Braer* tanker spill in Scotland.[225] European shags (*Phalacrocorax aristotelis*) suffered lower reproductive success and chick condition via reduced availability of a highly preferred forage-fish compared to unoiled colonies following the *Prestige* oil spill in Spain.[226] Adult yellow-legged gulls (*Larus michahellis*) breeding in oiled colonies also suffered sublethal health impacts seventeen months after the *Prestige* spill.[227] An oil spill could kill nesting, broodrearing, or staging spectacled eiders.

Even more striking, long-term studies illustrate that impacts from oil spills can last for decades. Nearly a decade after the *Exxon Valdez* spill, female harlequin ducks (*Histrionicus histrionicus*) suffered significantly reduced winter survival in oiled areas of Prince William Sound, Alaska, compared to unoiled areas.[228] Harlequin ducks continued to be exposed to residual *Exxon Valdez* oil up to 20 years after the spill, as evidenced by higher EROD enzyme activity in ducks from oiled areas compared to unoiled areas.[229] Ten years after the Exxon Valdez spill, pigeon guillemots (*Cepphus columba*) at oiled sites still suffered delayed population recovery, including lower adult mass, body condition, and nestling survival due to continued exposure to residual oil and the reduced availability of a key prey species.[230]

Caribou, muskoxen, grizzly bears, and Arctic foxes may frequent the project area and could be negatively impacted in the result of an oil spill. For example, caribou and muskoxen may become oiled or ingest contaminated vegetation. Caribou and muskoxen that become oiled could suffer from a loss of thermoinsulation, and lead to their death in the case of young calves, and they could also absorb oil through the skin or inhale toxic hydrocarbons.

The draft EIS should be revised to provide a comprehensive analysis of the effects of an oil spill on wildlife and its habitat.

E. <u>The Corps failed to disclose the amount of hydraulic fracturing and other well stimulation and their harmful effects.</u>

The Corps' analysis must properly account for the risks of fracking and acidizing used for the drilling project. The Corps and applicant disclose that the project will include hydraulic fracturing to stimulate oil production, but the draft EIS fails to disclose the environmental impacts of the practice, which is increasingly being used onshore and offshore Alaska.[231]

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[225] Walton, P., C. M. R. Turner, G. Austin, M. D. Burns, and P. Monaghan. 1997. Sub-lethal effects of an oil pollution incident on breeding kittiwakes *Rissa tridactyla*. *Marine Ecology Progress Series* 155:261-268.

[226] Velando et al. 2005.

[227] Alonso-Alvarez et al. 2007.

[228] Esler, D., T. D. Bowman, K. A. Trust, B. E. Ballachey, T. A. Dean, S. C. Jewett, and C. E. O'Clair. 2002. Harlequin duck population recovery following the 'Exxon Valdez' oil spill: progress, process and constraints. *Marine Ecology Progress Series* 241:271-286.

[229] Esler, D., K. A. Trust, B. E. Ballachy, S. A. Iverson, T. L. Lewis, D. J. Rizzolo, D. M. Mulcahy, A. K. Miles, B. R. Woodin, J. J. Stegeman, J. D. Henderson, and B. W. Wilson. 2010. Cytochrome P4501A biomarker indication of oil exposure in harlequin ducks up to 20 years after the Exxon Valdez oil spill. *Environmental Toxicology and Chemistry* 29:1138-1145.

[230] Golet, G. H., P. E. Seiser, D. A. McGuire, D. D. Roby, J. B. Fischer, and K. J. Kuletz. 2002. Long-term direct and indirect effects of the 'Exxon Valdez' oil spill on pigeon guillemots in Prince William Sound, Alaska. *Marine Ecology Progress Series* 241:287-304.

[231] *See* Fracfocus.org (search for Alaska).

Fracking and acidizing cause environmental damages beyond those of conventional oil and gas development by producing water and air pollution, increasing the risk of earthquakes and oil spills, and prolonging the life of aging infrastructure and our use of dirty fossil fuels.

Water contamination is a significant risk of fracking because of the hundreds of chemicals used in fracking fluid. For example, a peer-reviewed study that examined fracking fluid products determined that more than 75% of the chemicals could affect the skin, eyes, and other sensory organs, and the respiratory and gastrointestinal systems; approximately 40 to 50% could affect the brain/nervous system, immune system, cardiovascular system, and the kidneys; 37% could affect the endocrine system; and 25% could cause cancer and mutations.[232] In addition to posing a significant health and safety risk to humans, fracking chemicals can kill or harm a wide variety of wildlife. Scientific research has indicated that 40% of the chemicals used in fracking can harm aquatic animals and other wildlife.[233] And an analysis of the chemicals used during offshore fracking events in California found that many of the chemicals could kill or harm a broad variety of marine organisms, including sea otters, fish, and invertebrates.[234]

Another recent study found that oil companies use dozens of extremely hazardous chemicals to acidize wells. Specifically, the study found that almost 200 different chemicals have been used and that at least 28 of these substances are F-graded hazardous chemicals—carcinogens, mutagens, reproductive toxins, developmental toxins, endocrine disruptors or high acute toxicity chemicals.[235] Hydrofluoric acid, for example, is acutely toxic, and exposure to fumes or very short-term contact with its liquid form can cause severe burns. The study notes that acidizing chemicals can make up as much as 18 percent of the fluid used in these procedures.[236] Further, each acidization can use as much as hundreds of thousands of pounds of some chemicals.[237]

Wastewater from well stimulation is injected underground. This disposal method can result in leaks and contamination through the loss of well casing integrity. Well stimulation can increase the risk of well casing damage.[238] For example, a recent scientific study found that older wells can become pathways for fluid migration, and that the high injection pressures used in fracking can "increase this risk significantly."[239] For this same reason, fracking can also increase the risk

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[232] Colborn, Theo, et al. 2011. Natural Gas Operations for a Public Health Perspective, *Human and Ecological Risk Assessment* 17:1039; Elliot, E.G. et al. 2016. A systematic evaluation of chemicals in hydraulic –fracturing fluids and wastewater for reproductive and developmental toxicity. *Journal of Exposure Science and Environmental Epidemiology* 1–10.

[233] CCST. 2014. Advanced Well Stimulation Technologies in California: An Independent Review of Scientific and Technical Information. August 28, 2014; Kassotis, Christopher D. et al. 2015. Endocrine-Disrupting Activity of Hydraulic Fracturing Chemicals and Adverse Health Outcomes After Prenatal Exposure in Male Mice. *Endocrinology*. 156(12):4458-73. DOI: 10.1210/en.2015-1375.

[234] California Council on Science and Technology. Advanced Well Stimulation Technologies in California: An Independent Review of Scientific and Technical Information (2014); CCST. An Independent Scientific Assessment of Well Stimulation in California, Volume II. Potential Environmental Impacts of Hydraulic Fracturing and Acid Stimulations (2015).

[235] Abdullah, K.,Timothy Malloy, Michael K. Stenstrom & I. H. (Mel) Suffet. 2016. Toxicity of acidization fluids used in California oil exploration, *Toxicological & Environmental Chemistry*.

[236] *Id.*

[237] *Id.*

[238] Davies, et al. 2014; U.S. EPA, Assessment of the Potential Impacts of Hydraulic Fracturing for Oil and Gas on Drinking Water Resources, External Review Draft (June 2015) at 6-11.

[239] CCST 2015.

of oil spills. This disposal method can also result in the contamination of aquifers and drinking water.[240]

Risks to wetlands and water quality can arise from the storage and transport of well stimulation chemicals. Unconventional well stimulation relies on numerous trucks to transport chemicals to the site as well as collect and carry disposal fluid from the site to processing facilities. A U.S. GAO study found that up to 1,365 truckloads can be required just for the drilling and fracturing of a single well pad[241] while the New York Department of Conservation estimated the number of truck trips to be about 3,950 per horizontal well.[242] During this transportation there is the potential for a chemical leak or spill.

Chemicals that are being stored for fracking can also be susceptible to accidental spills and leaks. Natural occurrences such as storms and earthquakes may cause accidents, as can negligent operator practices. The 2014 West Virginia chemical spill that contaminated drinking water for 300,000 people demonstrates the risk that chemical storage can pose.[243] Approximately 10,000 gallons of a chemical compound that is used in coal processing leaked from a hole in a storage tank.[244] Floods in Colorado have shown how weather events may result in uncontrolled chemical spills and leaks on a massive scale.[245] Fracking operations exacerbate the risk of a chemical spill.

Between 2005 and 2009, fourteen of the primary oil and gas service companies used 780 million gallons of hydraulic fracturing chemicals nationwide, not including the water mixed with the chemicals for injection into the wells.[246] Between 2000 and 2014, the average water used for fracking a horizontal well increased from 177,000 gallons to 4 million gallons.[247] The draft EIS has not adequately evaluated the volume, use, or impacts of water use for fracking.

In addition, new studies have drawn a strong connection between the recent rise in fracking wastewater injection and increased earthquake rates.[248] For example, the USGS has recognized that wastewater disposal from fracking is a "contributing factor" to the six-fold increase in the

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[240] DiGiulio and Robert B. Jackson. 2016. Impact to Underground Sources of Drinking Water and Domestic Wells from Production Well Stimulation and Completion Practices in the Pavillion, Wyoming, Field. *Environmental Science and Technology***.** DOI**:** 10.1021/acs.est.5b04970.

[241] U.S. Government Accountability Office, 2012. Oil and Gas: Information on Shale Resources, Development, and Environmental and Public Health Risks, GAO 12-732.

[242] New York Department of Environmental Conservation, Revised Draft Supplemental Generic Environmental Impact Statement on the Oil, Gas and Solution Mining Regulatory Program ("NYSGEIS") at 810 (2011).

[243] Plumer, Brad, Five big questions about the massive chemical spill in West Virginia, *Washington Post* (Jan. 21, 2014) http://www.washingtonpost.com/blogs/wonkblog/wp/2014/01/21/five-big-questions-about-the-massive-chemical-spill-in-west-virginia/.

[244] NPR, 2014. How Industrial Chemical Regulation Failed West Virginia; http://www.npr.org/2014/01/29/268201454/how-industrial-chemical-regulation-failed-west-virginia

[245] Trowbridge, A. 2013. Colorado Floods Spur Fracking Concerns. *CBS News*, available at http://www.cbsnews.com/8301-201_162-57603336/colorado-floods-spur-fracking-concerns/ (accessed Oct. 2, 2013).

[246] U. S. House of Representatives members Henry Waxman et al., 2011. Chemicals Used in Hydraulic Fracturing, U.S. House of Representatives Committee on Energy and Commerce Minority Staff Report.

[247] Gallegos, T. J., B. A. Varela, S. S. Haines, and M. A. Engle. 2015. Hydraulic fracturing water use variability in the United States and potential environmental implications, *Water Resour. Res*. 51: 5839–5845.

[248] Van de Elst, Nicholas J. et al. 2013. Enhanced Remote Earthquake Triggering at Fluid-Injection Sites in the Midwestern United States, *Science* 341:164.

number of earthquakes in Oklahoma.[249] Another recent study also found that wastewater injection is responsible for the dramatic rise in the number of earthquakes in Colorado and New Mexico since 2001.[250] Wastewater injection has been scientifically linked to earthquakes of magnitude three and greater in several states: Arkansas,[251] Colorado,[252] Ohio,[253] Oklahoma,[254] Texas,[255] and New Mexico.[256] And a recent study attributed wastewater injection from fracking operations to earthquakes in California.[257] Alaska is seismically active, and the impacts on this seismicity on the Colville River Delta need to be disclosed.

But it is not just wastewater injection that can lead to earthquakes. The practice of fracking itself has been found to contribute directly to seismic events.[258] Even if the earthquakes that fracking directly generates are small, fracking could be contributing to increased stress in faults that leaves those faults more susceptible to otherwise naturally triggered earthquakes of a greater magnitude.[259]

The Corps must analyze these serious hazards of fracking and well stimulation in its EIS.

F. The cumulative impacts analysis is insufficient.

The Corps must also fully disclose the cumulative effects of the project. "NEPA always requires that an environmental analysis for a single project consider the cumulative impacts of that project together with 'past, present and reasonably foreseeable future actions.'"[260] The Corps identifies similar oil and gas activities in the region that are in process, but it has not provided a meaningful analysis of the cumulative impact of those activities on polar bears and other sensitive Arctic wildlife. The cumulative effects analysis relied on the 2003 National Research

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[249] Sumy, D. F., *et al.* 2014. Observations of static Coulomb stress triggering of the November 2011 *M*5.7 Oklahoma earthquake sequence, *J. Geophys. Res. Solid Earth,* 119:1904–1923, DOI:10.1002/2013JB010612; USGS, 2014. *Record Number of Oklahoma Tremors Raises Possibility of Damaging Earthquakes.* http://www.usgs.gov/newsroom/article.asp?ID=3880.
[250] Rubinstein, J.L., et al. 2014. The 2001 – Present Induced Earthquake Sequence in the Raton Basin of Northern New Mexico and Southern Colorado. *Bulletin of the Seismological Society of America*, 2014 DOI: 10.1785/0120140009.
[251] Soraghan, M. 2013. USGS, Okla. warn of more drilling-related earthquakes in State, *E&E News*.
[252] *Id.*
[253] Ohio Dept. of Nat. Resources, 2012. *Executive Summary: Preliminary Report on the Northstar 1 Class II Injection Well and the Seismic Events in the Youngstown, Ohio Area*; Fountain, Henry, Disposal halted at well after new quake in Ohio, *New York Times*, Jan. 1, 2012.
[254] Holland, Austin, 2011. Examination of possibly induced seismicity from hydraulic fracturing in the Eola Field, Garvin County, Oklahoma, Oklahoma Geological Survey Open-File Report OF1-2011.
[255] Frohlich, Cliff. 2012. Two-year survey comparing earthquake activity and injection-well locations in the Barnett Shale, Texas. *Proceedings of the National Academy of Sciences*. 109: 35.
[256] Rubinstein, J. L, et al. 2014.
[257] Goebel, T. H. W. et al. 2016. Wastewater disposal and earthquake swarm activity at the southern end of the Central Valley, California, *Geophysical Research Letters*. 43: 1092–1099.
[258] Van der Elst 2013; BC Oil & Gas Commission, Industry Bulletin: 2015-32, Dec. 15, 2015, https://www.bcogc.ca/node/12951/download.
[259] Van der Elst, et al. 2013.
[260] *Native Ecosystems Council v. Dombeck*, 304 F.3d 886, 895 (9th Cir. 2002) (quoting 40 C.F.R. § 1508.7).

Council study of cumulative effects, which incorrectly concluded that climate change would not affect oil and gas activities on the North Slope and has been superseded.[261]

Additionally, the Corps has failed to take into account the Trump administration's plans to increase oil and gas development in the Arctic.[262] This includes additional reasonably foreseeable future actions. In 2017, the Bureau of Land Management will offer for lease approximately 10.3 million acres in the National Petroleum Reserve Alaska. The administration has also proposed to offer offshore oil and gas leases in the Beaufort and Chukchi Seas in a revised five-year leasing program, including in areas that were withdrawn from the leasing program by President Obama. Moreover, efforts to open the Arctic National Wildlife Refuge to oil and gas leasing are advancing. These additional oil and gas activities, though ill-advised, are reasonably foreseeable and must be addressed.

G. The Corps relies on mitigation plans in its draft EIS that have yet to be created.

In its draft EIS, the Corps cannot rely on mitigation plans that have yet to be developed, and are hypothetical at this point.[263] For example, the Corps describes several plans that will be used to reduce environmental impacts — a dust control plan, facility lighting plan, a wildlife interaction plan, and compensatory mitigation for wetland loss. The Corps impermissibly assumes that these plans will effectively mitigate harm to wildlife and the environment.

For example, the Corps' flawed assumption that a facility lighting plan will obviate harm to birds is arbitrary. Artificial light pollution from energy platforms, tankers, and other lighted structures associated with oil and gas development poses a significant threat to seabird species.[264] Artificial light attracts seabirds at night, especially nocturnally active species such as auks, shearwaters, and storm-petrels, and disrupts their normal foraging and breeding activities in several ways.[265] In a phenomenon called light entrapment, seabirds continually circle lights and flares on vessels and energy platforms, instead of foraging or visiting their nests, which can lead to exhaustion and mortality.[266] Seabirds also frequently collide with lights or structures around lights, causing injury or mortality, or strand on lighted platforms where they are vulnerable to injury, oiling or other feather contamination, and exhaustion.[267] Documented mortality of seabirds from collisions can be particularly high during migration when poor weather conditions force birds to fly at lower elevations where they are more susceptible to collisions with lighted structures.[268]

[261] Raynolds et al. 2014.
[262] *See e.g.,* Solomon, Christopher. 2017. America's Wildest Place Open for Business. *New York Times*. https://www.nytimes.com/interactive/2017/11/10/opinion/sunday/wildest-place-in-america.html
[263] *Dine Citizens Against Ruining our Environment v. Klein*, 747 F. Supp. 2d 1234, 1258-59 (D. Colo. 2010).
[264] Montevecchi, W. 2005. Influences of artificial light on marine birds. In C. Rich and T. Longcore, editors. *Ecological Consequences of Artificial Night Lighting*. Washington, D.C: Island Press,. 94-113.
[265] *Id.*
[266] Wiese, F. K., W. A. Montevecchi, G. K. Davoren, F. Huettmann, A. W. Diamond, and J. Linke 2001. Seabirds at risk around offshore oil platforms in the North-west Atlantic. *Marine Pollution Bulletin* 42:1285-1290.
[267] Telfer, T. C., J. L. Sincock, G. V. Byrd, and J. R. Reed. 1987. Attraction of Hawaiian seabirds to lights: conservation efforts and effects of moon phase. *Wildlife Society Bulletin* 15:406-413; Wiese et al. 2001; Le Corre, M., A. Ollivier, S. Ribes, and P. Jouventin. 2002. Light-induced mortality of petrels: a 4-year study from Réunion Island (Indian Ocean). *Biological Conservation* 105:93-102; Rodríguez, A., et al. 2017, Seabird mortality induced by land-based artificial lights. *Conservation Biology*, 31: 986–1001. doi:10.1111/cobi.12900.
[268] Weise 2001.

Migrating king eiders can only fly a few meters above the ground making them highly susceptible to collisions with human structures.[269] Fledgling seabirds appear to be particularly vulnerable to artificial light attraction. Fledglings petrels, for example, have been documented to incur particularly high mortality from attraction to artificial night lighting.[270] Similar impacts are likely for the species occurring in the Nanushuk Project area. Artificial night lighting can also increase susceptibility to predation by illuminating bird habitat areas.[271]

For the Corps to rely on mitigation, it must analyze the effectiveness of the mitigation. This can only be done once those plans are completed. Moreover, the permits should be conditioned on the implementation of such mitigation.

III. THE CORPS MUST COMPLETE CONSULTATION UNDER SECTION 7 OF THE ENDANGERED SPECIES ACT BECAUSE ITS ACTION MAY AFFECT LISTED SPECIES, AND IT MUST OBTAIN A PERMIT UNDER THE MARINE MAMMAL PROTECTION ACT.

Section 7(a)(2) of the Endangered Species Act requires federal agencies to "insure that any action authorized, funded, or carried out by such agency . . . is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the adverse modification of habitat of such species . . .determined . . . to be critical . . . ."[272] To accomplish this goal, agencies must consult with the delegated agency of the Secretary of Commerce or Interior whenever their actions "may affect" a listed species.[273]

The Endangered Species Act's consultation requirement applies to Federal agencies taking *any action.*[274] "Action means all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies in the United States or upon the high seas" including "the granting of licenses, contracts, leases, easements, rights-of-way, permits, or grants-in-aid."[275] The Supreme Court noted that the Act's section 7 command to Federal agencies "admits

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[269] Phillips, L. M., A. N. Powell, E. J. Taylor, and E. A. Rexstad. 2007. Use of the Beaufort Sea by king eiders breeding on the north slope of Alaska. *Journal of Wildlife Management* 71:1892-1898.

[270] Telfer et al. 1987; Le Corre et al. 2002; Day RH, Cooper BA, Telfer TC. 2003. Decline of Townsend's (Newell's) shearwaters (Puffinus auricularis newelli) on Kauai, Hawaii. *Auk* 120:669–679; Rodrıguez A, Burgan G, Dann P, Jessop R, Negro JJ, et al. (2014) Fatal Attraction of Short-Tailed Shearwaters to Artificial Lights. *PLoS ONE* 9(10): e110114. doi:10.1371/journal.pone.0110114.

[271] Nocera, J. J., and S. W. Kress. 1996. Nocturnal predation of Common Terns by Great Black-backed Gulls. *Colonial Waterbirds* 19:277-279; Mougeot, F., and V. Bretagnolle. 2000. Predation risk and moonlight avoidance in nocturnal seabirds. *Journal of Avian Biology* 31:376-386.; Keitt, B. S., B. R. Tershy, and D. A. Croll. 2004. Nocturnal behavior reduces predation pressure on Black-vented Shearwaters *Puffinus Opisthomelas*. *Marine Ornithology* 32:173-178; Oro, D., A. de Leon, E. Minguez, and R. W. Furness. 2005. Estimating predation on breeding European storm-petrels (Hydrobates pelagicus) by yellow-legged gulls (Larus Michahellis). *Journal of Zoology* 265:421-429.

[272] 16 U.S.C. § 1536(a)(2); 50 C.F.R. § 402.14(a).

[273] 16 U.S.C. § 1536(a)(2); 50 C.F.R. § 402.14(a).

[274] 16 U.S.C. § 1536(a)(2).

[275] 50 C.F.R. § 402.02 (emphasis added).

of no exception."[276] Moreover, the use of the word “shall” in a statute indicates Congress’ intent to impose a mandatory duty.[277]

The project may affect listed species such polar bears, bearded seals, spectacled and Steller’s eiders, among other sensitive species, and therefore the Corps must engage in consultation with the National Marine Fisheries Service and Fish and Wildlife Service.

Additionally, the Corps needs an authorization under the Marine Mammal Protection Act. The Act prohibits the taking of marine mammals, unless the take falls within certain statutory exceptions.[278] The statute defines “take” is as “to harass, hunt, capture, collect, or kill, or attempt to harass, hunt, capture, collect or kill, any marine mammal.”[279] Here, the project will harass and harm marine mammals and such authorization is required before the project can proceed.

IV. CONCLUSION

In sum, Armstrong Energy’s Nanushuk Project will cause a wide variety of serious harms to the environment, including greenhouse gas emissions that will exacerbate climate change and the impacts already being felt in the Arctic; oil spills that would be damaging and difficult to clean up; and further impacts to already imperiled wildlife such as polar bears, ice seals, eiders and bowhead whales. The project does not meet the Clean Water Act’s 404 guidelines, nor effectively mitigate the substantial damage that the project will have on the Colville River Delta and its fragile wildlife. Moreover, the Corps’ draft EIS is deficient in disclosing the environmental impacts and taking the hard look required by the NEPA.

If the Corps nevertheless decides to proceed with the project, numerous deficiencies within the draft EIS must first be addressed and remedied. The Corps must also engage in Section 7 consultation under the Endangered Species Act and conduct a thorough review under NEPA. The agency’s NEPA analysis must fill significant data gaps; adequately consider the myriad of direct, indirect and cumulative impacts of the project; and sufficiently analyze a reasonable range of alternatives, including an alternative that considers rejecting damaging new oil and gas developments in the Arctic.

Sincerely,

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[276] *Tenn. Valley Auth*., 437 U.S. v. Hill, 437 U.S. 153, 173 (1978). See also *Pacific Rivers Council v. Thomas*, 30 F.3d 1050, 1054-55 (9th Cir. 1994). (recognizing that Congress intended “agency action” to be interpreted broadly, admitting of no limitations.)
[277] *Bennett v. Spear*, 520 U.S. 154, 172 (1997) (use of “shall” creates a “categorical requirement”).
[278] 16 U.S.C. § 1371(a)(3).
[279] 50 C.F.R. § 216.3; 16 U.S.C. § 1362(13).

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