THE WILDLIFE SOCIETY
ALASKA CHAPTER

The Alaska Chapter of The Wildlife Society strives to enhance the ability of wildlife professionals to conserve biological diversity, sustain productivity, and ensure responsible use of wildlife resources in Alaska for the benefit of society.

March 7, 2021

Ms. Chel Ethun, Project Manager
Central Yukon Field Office
Bureau of Land Management
222 University Avenue
Fairbanks, Alaska 99709

Dear Ms. Ethun:

The Alaska Chapter of The Wildlife Society is pleased to provide our formal comments on the Draft Resource Management Plan and Environmental Impact Statement (RMP/DEIS) for the Central Yukon planning area. We believe this plan is important because it will directly affect BLM's management of 13.1 million acres and could influence environmental conditions on many times that acreage of Federal, State, and Native lands that are adjoining.

The Wildlife Society (TWS) is a non-profit scientific and educational association dedicated to excellence in wildlife stewardship through science and education. Our mission is to inspire, empower and enable wildlife professionals to sustain wildlife populations and habitats through science-based management and conservation.

The Alaska Chapter of TWS (hereafter referred to as 'Alaska Chapter') has about 200 members including wildlife scientists, resource managers, educators and administrators in Alaska. Our members have experience working in state and federal agencies, Native organizations, universities, non-profit groups and consulting firms. Our collective knowledge regarding wildlife and its habitat in Alaska is our greatest asset, so we offer these constructive comments in hopes that they will be used to improve the analyses and decisions in the RMP/DEIS.

We find the RMP/DEIS has a number of strengths, including appendices for Standard Operating Procedures (SOPs), Adaptive Management, Dall Sheep and Caribou Habitat Management, Aquatic and Riparian Resources, Reclamation Requirements, Reasonable Foreseeable

Development, and Subsistence. We were impressed with the extensive preliminary work found in the Scoping Report (USBLM Scope 2015), and the Analysis of the Management Situation (USBLM AMS 2016).

We also have significant concerns, however, finding the RMP/DEIS considered a narrow range of action alternatives, especially the blended alternatives C1 and C2. A new blended alternative is needed that more equitably balances multiple-use development with wildlife interests.

Our findings include:

Alternatives C1 and C2 do not provide for sufficient long-term habitat connectivity between existing Federal Conservation System Units (CSUs), especially along the Dalton Highway, because of the proposed changes in land tenure (revocation of PLO 5150 and D1 withdrawals).

Alternatives C1 and C2 do not provide for sufficient watershed integrity and conservation of riparian and aquatic habitats.

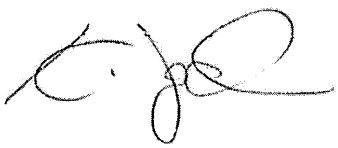
Alternatives C1 and C2, pose unreasonable threats to ecosystem resilience and watershed health on BLM lands and the adjacent CSUs.

Alternatives C1 and C2 provide insufficient protection for key wildlife species such as caribou, Dall sheep, and avian species of concern because no new ACECs are approved, most of the existing ones are abolished, and other types of protection measures are mainly focused within Alternative B.

The impacts analyses did not sufficiently consider the trade-offs in valuing long-term sustainable multiple uses involving wildlife, as compared with short-term gains offered by extractive mining uses.

Overall, we recommend BLM select a final course of action that most resembles Alternative B, with modifications and incorporation of many aspects from the no-action Alternative A. Our reasoning and concerns are spelled out in the following detailed comments. Please contact me if there are questions about these comments, or if our membership can otherwise assist with the FEIS.

Sincerely,



Kim Jochum, Ph.D.
President
Alaska Chapter, The Wildlife Society

The Wildlife Society, Alaska Chapter
Specific comments to BLM Central Yukon RMP/DEIS, March 7, 2021

Background

The Alaska Chapter is well aware that substantially divergent views about multiple-use management exist, ranging from permitting wide open development to maximizing protection. Instead of balancing development with sustainable resource use and protection we believe that the two "blend" alternatives, C1 and C2, significantly favor mineral resource development. Below, we present substantive comments indicating the basis of our concerns that the RMP/DEIS does not sufficiently recognize the importance of maintaining productive wildlife habitat and ecosystem integrity essential for sustaining diverse and abundant wildlife populations that are resilient to future perturbations, including climate change.

We appreciate the attention that has been given for analyzing the potential impacts of land management decisions among the four action alternatives. We recognize that this process started over eight years ago, and involved a huge effort to gather pertinent environmental, economic, social, and realty information. We know that BLM made great efforts to engage Cooperating Agencies, Tribes, and the public. We appreciate that meetings were held in most of the nearby communities, and that BLM made the extra step to seek input in late 2016 and early 2017 on preliminary alternative concepts from Cooperating Agencies and Tribes before publishing the RMP/DEIS.

Wildlife

We noted the following statements documented in the Scoping Report comments:

> *"Wildlife habitat management in the planning area must be consistent with U.S. Department of the Interior guidance, adjacent federal land agencies policies and purposes, Alaska Department of Fish and Game objectives…" (USBLM Scoping 2015, pg. 146.); and, "…Except for some migratory species, population goals and objectives are the responsibility of the State. The RMP should accurately describe the BLM's land management role in habitat management, and ADFG's authority as the manager of fish and wildlife" (USBLM Scoping 2015, pg. p147).*

Our comments are therefore aimed at habitat aspects of land management, and we underscore the need for the three DOI sister agencies with adjacent lands - Bureau of Land Management (BLM), National Park Service (NPS), and Fish and Wildlife Service (FWS) - to cooperate with the Alaska Department of Fish and Game (ADFG) in this regard.

We agree with the goals and objectives laid out in Table 2-4 (USBLM 2020, pg. 2-22), and the designation of moose, caribou, Dall sheep, and beaver as priority species for all alternatives. We question why apex predators such as grizzly bear or gray wolf were not also included. Presence of either of these two species at the top of the food chain is an indicator of a healthy ecosystem, therefore, we recommend consideration of both predators to your suite of priority

species. These are iconic Alaska wilderness species that have largely been eliminated or substantially reduced throughout their former ranges south of Alaska and are important ecological components of adjacent national interest lands including national parks and national wildlife refuges. They could act as excellent indicator species.

Caribou. We appreciate that Alternative B designates ACECs to protect caribou ranges of Galena Mountain Herd, Ray Mountains Herd (Spooky Valley) and Hodzana Hills Herd (Upper Kanuti River). We also appreciate that Alternative C1 creates a different protective option, termed "Core Caribou Ranges" (Appendix A, Map 2.1), however, we believe that caribou are such an important resource that *both* Alternatives C1 and C2 should have designated Core Caribou Ranges for all three small herds. The Alaska Chapter also believes BLM should add the designation of a Core Caribou Range for the Hodzana Hills Herd, in addition to the Ray Mountain Herd and Galena Mountain Herd. There is compelling scientific documentation that the Hodzana Herd is discrete and of sufficient size to warrant permanent protective measures in any "blended" alternative (estimated 1,150-1,500 animals, Horne et al. 2014, or 700-1000 animals Longson 2020). We present an assortment of population estimates for these herds:

Herd	Source	Estimate
Hodzana HHH	Horne et al. 2014 Hollis 2014 Longson 2020	1,150-1,500 662 minimum count 700-1,000
Ray Mtns. RMH	Horne et al. 2014 Hollis 2011 Hollis 2014 Longson 2020	Avg. 1,245 (range 656-1,564) 1,200 853 minimum count 1,200
Galena Mtn. GMH	Robinson 1991 Robinson 1991 Longson 2020	500 estimated in 1987 258 minimum count in 1987 162 (2012)

These three small isolated mountain caribou herds represent an aspect of biodiversity unique to interior Alaska. Mager et al. (2014) reported genetic similarity to the larger northern mainland herds, but also noted each of these smaller herds "appeared relatively discrete" with a heterogeneity in ecotype that may be driven by differences in behavior, habitat, and predation risk. This warrants consideration and protection by BLM.

The DEIS should highlight recent estimates of the three herds and commit to continued monitoring of abundance and distribution in cooperation with other agencies like ADFG, NPS, and USFWS. (This is mentioned in the AMS, USBLM 2016 pg. 235, but we did not find where this specifically is carried forward in the RMP/DEIS). Such information would be essential to evaluate whether BLM-permitted development activities affect habitats and herd abundance or distribution and must be included in the final RMP/FEIS.

We are concerned about BLMs overlooking of the Hodzana herd in the following statements:

> *"Under all action alternatives, the amount of land segregated to locatable mineral entry would decrease, compared with Alternative A, for the GMH and RMH range, but it would increase for the HHH range" (USBLM 2020 CYRMP pg 3-83).*

> "*Under alternative C1… an additional 745,000 acres would be proposed for closure from May 1 through June 30 for caribou calving in the Galena and Ray Mountains core caribou ranges. These restrictions would preclude OHV travel in those regions and restrict access during that time period, but they would not prevent access during other times" (USBLM 2020 CYRMP pg. 3-155).*

We again question why the Hodzana herd is singled out for less protection. We recommend similar protective measures for *all three* small caribou herds in the selected alternative in the final RMP/FEIS:

(1) ROW avoidance (Table J.5, pg J-36)
(2) May 1-June 30 OHV restrictions (Table J.6, pg. J-38)
(3) reduce acreage open to locatable mineral development (Table J.7, pg. J44-J45)

We recommend these similar actions in all three herd ranges, including Hodzana, because of their limited abundance and the species' well-known susceptibility to disturbance (see below).

The impacts analysis of alternative selection focused mainly on the number of acres affected by mineral exploration/development permitting, Rights of Way (ROW), etc. (e.g. Appendix P, Table P-2, pg. P-1 to P-3, and pages 3-81 to 3-89). The Alaska Chapter appreciates that there was some consideration given to how the types of permitted development listed in Table P-2 could affect caribou behavior, distribution and abundance:

> "*Calving caribou near northern Alaska oilfields occur at lower density within 2–5 kilometers of active roads and pads for 2–3 weeks (Dau and Cameron 1986, Lawhead 1988, Nellemann and Cameron 1998, Johnson et al. 2020)" (USBLM 2021 CYRMP pg 3-81).*

> *"Caribou are sensitive to disturbance, especially during calving (Dau and Cameron 1986; Cameron et al. 1992); therefore, those species may be impacted to a greater degree by the differing management regimes among alternatives" (USBLM 2021 CYRMP pg 3-89).*

> *"Caribou still avoid active roads and pads by about 4 kilometers during calving (Dau and Cameron 1986; Cameron et al. 1992; Lawhead et al. 2004), but the amount of displacement is lower during other seasons (Smith et al. 1994; Murphy and Lawhead 2000; Haskell et al. 2006), and caribou use gravel roads and pads for oestrid fly relief in midsummer (Noel et al. 1998)" (USBLM 2021 CYRMP pg 3-89).*

In addition to the above-mentioned citations, there is a significant body of research on how developments in the arctic and sub-arctic have affected caribou (see below). We are also concerned about what we believe to be potentially an over-generalized consideration of caribou response to road developments in the case of the Hodzana Herd:

> *"The Dalton Utility and Transportation corridor bisect the range of the HHH [Hodzana Herd]. The herd annually crosses the road, the TAPS, and other linear features, and do not appear to be restricted by their movements. It appears standard stipulations regarding linear infrastructure sufficiently mitigate impacts on caribou movements" (USBLM 2020 CYRMP Appendix I, pg. I-7);* and,
>
> *"Concerns were raised during scoping regarding the impacts of linear ROWs on caribou movement. While the Dalton Highway and Dalton Utility Corridor bisect the range of the HHH, these caribou cross the road, Trans-Alaska Pipeline System, and other linear features yearly and do not appear to be restricted in their movements. It appears standard stipulations regarding linear infrastructure sufficiently mitigate impacts on caribou movement" (USBLM CYRMP 2020 Volume 2, Appendix Q, pg. Q-70).*

We question that interpretation for two reasons:

(1) We wonder if it is based on the same sample size of radio-telemetry observations that Horne et al. (2014) recognized as being insufficient for accurate population estimation; and,

(2) This conclusion runs counter to nearly all of the literature on caribou and developments that we are aware of (see below).

We offer the following best-available caribou disturbance literature that we believe BLM should consider to evaluate potential impacts of permitted developments in caribou habitat under the different alternatives.

There is widespread evidence that human disturbance can disrupt animal movement globally (Doherty et al. 2021). Specific to caribou, numerous studies document altered distribution and movement behavior. For example, studies of the Western Arctic Herd report altered movement behavior, delays and displacement as caribou approach the Red Dog Mine road (Dau 2013, Wilson et al. 2016). The RMP/DEIS states:

> "ROWs for linear projects are required to provide for unimpeded movements for caribou and other priority species" *(USBLM 2021 CYRMP pg 3-81).*

It is unclear that physical ROW adjustments alone can adequately protect caribou. There is significant evidence that behavioral response of caribou to activities on the roads is important. Generally, some caribou appear to habituate to the presence of structures in oil fields (Ballard et al. 2000) but not to human presence and vehicular traffic (Nelleman and Cameron 1998). We note that previously constructed roads, with mitigation measures in place, did not achieve unimpeded movement - as evidenced by the studies above, statements in the RMP/DEIS about delays and deflections persisting (USBLM 2021 CYRMP pg 3-83), and the additional study evidence we provide below.

Published scientific literature reports a wide range of estimates of human impacts on caribou leading to displacement from disturbance, including:

- avoidance of mines up to 4 km (USBLM Ambler DEIS, pg. H-51);
- avoidance of mines 11-14 km (Boulanger et al. 2012);
- avoidance of mines 6 - 19 km (Boulanger et al. 2021);
- avoidance of mines 20-23 km (Plante et al. 2018);
- displacement from disturbance 9.6 km (USBLM Ambler DEIS pg. 3-74);
- displacement from roads up to 15 km (Plante et al. 2018);
- displacement from human settlements up to 18 km (Plante et al. 2018).

While there is variability in the reported distances of response by caribou, and recent work suggests responses vary by year and due to other factors such as herd size and environmental conditions (Boulanger et al. 2021), the information above stands in sharp contrast to the RMP/DEIS' claim that "standard stipulations regarding linear infrastructure sufficiently mitigate impacts on caribou movement."

Studies of caribou and other ungulates also have failed to find strong evidence of habituation to other forms of development and human activity. Boulanger et al. (2012) examined caribou disturbance responses near a diamond mine in Canada and found variation in avoidance responses over time but no clear evidence of habituation. Another recent Canadian study found avoidance of long-established infrastructure, "suggesting that long-term habituation is unlikely" (Plante et al. 2018, p. 138). A study in Norway found no evidence of habituation by reindeer to ski resorts, trails, and recreational cabins over a 20-year study (Nellemann et al. 2010). Similarly, recent work on the Central Arctic Herd in northern Alaska found continued avoidance of energy infrastructure during calving, post-calving, and mosquito relief seasons (Johnson et al. 2020). This shows a lack of habituation to development over a 40-year period, despite the presence of proposed mitigation measures (Johnson et al. 2020). These varied sources emphasize that there is not clear evidence of caribou habituation to infrastructure and human activity. Their movement behavior may be altered, even at traffic levels below 15 vehicles per hour, leading to caribou avoidance of roads (Curatolo and Murphy 1986, Cronin et al. 1994, USBLM Ambler DEIS 2019, pg.151).

Traditional knowledge from subsistence hunters in northern Alaska has indicated concerns about aircraft influences on caribou for decades (e.g., Georgette and Loon 1988, Jacobson 2008, Halas 2015). We note that Appendix Q (Subsistence) describes aircraft altitude restrictions during the caribou calving season:

> *"Alternative B includes the requirement that aircraft associated with all BLM-authorized land use activities would be required to fly a minimum of 2,000 feet above ground level in caribou calving areas associated with the GMH and the RMH from May 1 through June 30, in Dall sheep habitat from May 1 through August 31, and in 10 different ACECs during various times. This would be done to reduce the potential impacts on caribou and Dall sheep" (USBLM CYRMP 2020, pg. Q-81).*

We suggest that this altitude minimum become a SOP, that it also applies to the Hodzana Herd, and that it be included in the action alternative selected for the final RMP/FEIS. We appreciate that Appendix I (pg. I-3-I-4) defines an excellent set of actions for "effects minimization and mitigation" for Dall sheep. We believe that some of these similar actions must be implemented for caribou and defined in Appendix I, (pg. I-6 to I-8). They should include clear permitting management prescriptions specific to caribou and be applicable to the Alternative B caribou ACECs and/or the Alternative C1 Core Caribou Ranges. These caribou management prescriptions should also be consistent with, and incorporated into, the Wildlife SOPs in Appendix F (pg. F8-F10). They should be required to apply to all permitted activities in the final alternative selected in RMP/FEIS and approved in a Record of Decision (ROD).

We believe that additional consideration and analysis should be given to the potential facilitating role mining-development related access roads could play for predation on caribou. Linear features act like highways for wolves, allowing them to travel through woodlands faster and farther, as well as altering their habitat selection patterns, increasing their contact with and predation of caribou (e.g., James and Suart-Smith 2000, Dickie et al. 2017, DeMars and Boutin 2018). Wolf predation, facilitated by linear corridors, is thought to be one factor driving recent declines in woodland caribou in Canada (McLoughlin et al. 2003; Hervieux et al. 2013; Hebblewhite 2017). With the small size and relatively isolated nature of the Ray Mountain, Galena Mountain, and Hodzana Hills herds, potential for increased predation is concerning. Additional information regarding caribou and road impacts can be found in TWS (2019, Comment letter from Alaska Chapter to BLM regarding Ambler Road DEIS).

There is insufficient discussion of potential impacts to the North Slope caribou herds in the RMP/DEIS. For example, the Teshekpuk Caribou Herd is only referenced three times in Volume 1 (pg 3-81, 3-89, and 3-90). The RMP/DEIS claims that the decision area is only occasionally used by caribou from the Teshekpuk Herd (pg 3-81), however Person et al. (2007) depict the area as containing one of the wintering areas for the herd, used by 21% of the herd. While not all of this wintering area overlaps with the RMP/DEIS decision area, it nonetheless is important to provide a robust accounting of potential impacts and their consequences for the herd. To better visualize potential impacts for the Teshekpuk Caribou Herd, a seasonal distribution map should be added to Appendix A, similar to Map 3.12 for the Central Arctic Herd. The outline of the project area should be added to both this and Map 3.12 to facilitate clearer interpretation or range overlap and potential impacts.

Similarly, potential impacts to the Central Arctic Herd are inadequately included in the draft text. For example, while the RMP/DEIS acknowledges that portions of Central Arctic Herd migratory and winter range occur in the decision area (pg 3-81), Map 3.12 in Appendix A indicates that the decision area is also overlapped by the area used by the Central Arctic Herd for calving, oestrid fly relief, and late summer foraging. These uses should also be discussed in Chapter 3 and include description and quantification of potential implications for the Central Arctic Herd. Furthermore, the cumulative impacts section acknowledges that potential development such as the Ambler mining access road, potential pipelines, or other projects may have detrimental impacts on the Western Arctic Herd and Teshekpuk Caribou Herd but fails to

mention similar impacts for the Central Arctic Herd (pg 3-90). Given the distributions shown in Map 3.12 it is reasonable to conclude that there may be similar impacts for the Central Arctic Herd, so that herd should also be included in the cumulative impacts description.

We urge the BLM to consider the above literature and additional information we provided to re-evaluate how habitat of the three small caribou herds near the Dalton highway, as well as the larger North Slope herds, can be adequately protected into the future. Most the land used by the three small herds is managed by BLM and the final RMP/FEIS should provide clearer strategies as to how caribou habitat will be managed. We recommend and would prefer that the final alternative selected include the ACECs of Alternative B with boundaries adjusted to encompass a majority of the documented habitat used by the three small caribou herds, Ray Mountains (RMH), Hodzana (HHH), and Galena Mountain (GMH). If a "blended" alternative ends up being selected, the final RMP/FEIS must include designated Core Caribou Ranges for all three small herds. Finally, clear management prescriptions specific to caribou must be included in Appendices F and I and be required to consistently apply to all permitted activities in all action alternatives in the final RMP/FEIS and ROD.

Dall Sheep. The opening paragraph for Dall sheep in the Wildlife section of the DEIS includes the statements:

> *"Dall sheep habitat is primarily in PLO 5150, which becomes State land with valid State of Alaska selections following the BLM's revocation of this PLO; therefore, a full or partial revocation of PLO 5150 could indirectly impact Dall sheep, depending on how the State handles selections; it is unknown how the State would manage the lands…. a full or partial revocation of PLO 5150 could impact Dall sheep if other protective mitigation measures are not enacted. SOPs for Dall sheep would reduce or minimize impacts of some activities on Dall sheep. These include recommending low-profile road and facility designs, ROW avoidance and traffic controls, and clustering facilities as closely together as possible." (USBLM 2020 CYRMP, pg. 3-83).*

These statements portray an uncertain future for Dall sheep habitat on BLM-managed lands in the Dalton Highway corridor because it implies a high likelihood that the land ownership pattern will change, habitat may become fragmented, and managers will mainly have to rely on two SOPs (11 and 12, in Vol 2, Appendix F.2, Page F-9). While these SOPs put some constraints on construction and mineral development methods, they are likely not adequate to protect the Dall sheep habitat and population in the long term. We recommend that BLM incorporate some of the sheep management prescriptions in Appendix I, (pg. I-3 to I-6) into additional SOPs in Appendix F, and that they become required actions consistently applied to permitting across all activities in the final alternative selected in the RMP/FEIS and approved in the ROD.

We believe that the DEIS selection of preferred Alternative C2 does not sufficiently consider the impacts of increased road and mining-related development on Dall sheep. Alternatives A and B recommend the original set, and, respectively, one additional ACEC for sheep. Alternative C1 designates a Dall Sheep Movement Corridor (DSMC), a Dall Sheep Study Area (DSSA) and small Dall Sheep Habitat Areas (DCHAs), which in our judgement are of insufficient size to protect

sheep into the future. Alternative C2 offers even less to protect sheep, and we caution BLM against the negative ramifications of selecting that choice.

We believe that more protective measures are needed because Dall sheep are vulnerable to road-related disturbance. A study at Denali Park found:

> *"…Dall's sheep in Denali responded negatively to increased traffic volumes by increasing their movement rates when approaching the road and shifting away from the road at higher traffic levels. While many studies have investigated the potential for vehicles to affect sheep behavior and distribution, most have examined individual or group responses to the approach of individual vehicles, or general distribution of sheep relative to road corridors, rather than volume or patterns of traffic…… Our results reflected a threshold distance for response to disturbance by showing that sheep within 300 meters (984 ft) of the road shifted farther away at higher traffic volumes and that small increases in the number of vehicles on the road could have impacts on Dall's sheep movements. Movement of sheep away from the road corridor at higher traffic volumes may decrease the amount of habitat available for foraging. This may be most relevant to sheep during the spring season, when they most frequently cross the road and "green-up" has not yet occurred at higher elevations" (Phillips et al. 2010).*

We appreciate that the Analysis of Management Situation (USBLM AMS 2016, pg. 59) recommends adjustments to ACECs to help in sheep habitat management. The AMS specifically recommends that "Snowden Mountain ACEC should be extended to encompass the headwaters of Matthews Creek, an area that all collared sheep in that subpopulation used frequently." The AMS further recommends "(1) the expansion of the Poss Mountain ACEC and (2) the establishment of an additional ACEC near the community of Wiseman" (AMS, USBLM 2016, pg. 60). The AMS also cautions about the area between Midnight Dome and Smith Dome:

> "If the mining claims on these domes were to become active, it would likely be detrimental to this subpopulation near the community of Wiseman. Subsistence and sport hunter conflicts related to sheep harvest have been ongoing and, especially if sheep populations in the region exhibit a decline in population, require management attention (USBLM AMS 2016, pg. 60)."

It appears to the Alaska Chapter that BLM did not consider these recommendations with their decision to prefer Alternative C2. We recommend revising the decision to adequately take into account the findings of the AMS, and adjust the sheep ACECs and/or specially designated sheep management areas accordingly in the final alternative set forth in the RMP/FEIS.

Craig and Leonard (2009) studied Dall sheep distribution within five existing ACECs to evaluate the effectiveness of the boundaries, describe habitat use, and provide minimum counts between 2000 and 2006. Curiously, neither the RMP/DEIS nor the AMS cite this information. This information should be incorporated into the final RMP/FEIS. The AMS provided an estimate of approximately 1,400 sheep in 422 square miles of sheep habitat in the Dalton Highway corridor in 2012 and 2013. We believe there should be a solid plan in the final RMP/FEIS to monitor sheep numbers and distribution, in cooperation with ADFG and/or NPS,

especially given the lack of protective measures in the preferred Alternative C2, and the lack of sheep-specific ACECs in Alternative C1. Monitoring of terrestrial wildlife is mentioned in the AMS, (USBLM 2016 pg. 235), and in Table 2-4 (pg. 3-22) in a general way. We urge BLM to make a formal commitment for sheep monitoring in a finalized Table 2-4 in the RMP/FEIS. Such information would be essential in order to evaluate whether BLM-permitted development activities affect sheep habitat, abundance or distribution.

We appreciate that sheep-specific ACECs are retained in Alternative B and appreciate that some of the boundary adjustments noted above in the AMS (pg. 60) would be implemented into the sheep-specific ACECs. We recommend that the BLM reconsider the boundaries of these ACECs in Alternative B for the final RMP/DEIS. Should this aspect of Alternative B not be carried forward into the final RMP/FEIS, we recognize that Alternative C1 proposes a viable alternative by creating the three special designations: Dall Sheep Habitat Area, Dall Sheep Movement Corridor, and Dall Sheep Study Area (pgs. 3-8-, 3-83, 3-86, and Appendix I, pg. I-2).

The Alaska Chapter applauds BLM for the list of "effects minimization and mitigation" measures for permitted activities in the sheep management areas of Alternative C1 (Dall Sheep Habitat Area, Dall Sheep Movement Corridor, and Dall Sheep Study Area, Appendix I, pg. I-3 to I-4). We appreciate that Appendix I articulates specific management parameters of these special areas, however, we believe some of those parameters may be too lenient (e.g. disturbance limit, noise restrictions, and ROW permissiveness) based on information from the Phillips et al. (2010) study cited above. We recommend tightening those parameters, including them in the SOPs of Appendix F, and making them consistent and required to be applied across all activities in the action alternative selected in the final RMP/FEIS and ROD.

Moose. Unlike caribou and sheep, moose are more tolerant of human activities, so we would not be as concerned with more intensive levels of multiple uses in moose habitat, as with the former species. Moose are one of the most sought-after wildlife species among hunters accessing BLM lands. We caution that State and Federal moose hunting regulations in the Unit 24A portion of the ADFG-designated Dalton Highway Corridor Management Area, and nearby Unit 24B, are some of the most complex in the State of Alaska. Two restrictions are in place to prevent overharvest -- no use of firearms or off-road vehicles within 5-miles of the highway/pipeline for all non-rural hunters. Moose hunting is further complicated by long-standing subsistence practices and dependence by residents from several villages (Wiseman, Allakaket, Bettles and Evansville) who have federal subsistence priority because of their rural residency. Decisions proposed in the RMP/DEIS, particularly with land tenure, ROW, and travel management could further complicate an already complex regulatory environment that is challenging for both wildlife managers and for hunters. Any change that eases access, or otherwise changes opportunity for rural, or non-local hunters, will have to be weighed against chances of overharvesting the population.

The RMP/DEIS states:

> *"The BLM-managed lands around Coldfoot and Wiseman contain the greatest concentrations of areas with medium to high locatable mineral potential; the abundance, availability, and access*

> *to subsistence users and resources could be affected by mineral development through disturbance, displacement, changes to subsistence access, and competition for resources" (USBLM 2020 CYRMP pg. 3-189);* and,
>
> *"Lands transferred to the State of Alaska would be unavailable for subsistence activities conducted under Title VIII of ANILCA. Though the State manages for subsistence on any lands that may be conveyed, it does not have a rural preference and those federally qualified subsistence hunters that have a federal preference for access and harvest type would no longer have that preference" (USBLM 2020 CYRMP pg. 3-190).*

We encourage the BLM to work with ADFG and the Federal Subsistence Board to avoid actions that may unnecessarily and further complicate moose harvest management. We did not find a sufficiently thorough discussion of how BLMs proposed significant changes in land tenure could affect the complexity of moose hunting regulations causing an even more challenging situation to other managers (particularly to USFWS for subsistence, and ADFG for all other regulatory issues, and see Realty section, below). This aspect must be addressed in the final RMP/FEIS.

A comprehensive radio-telemetry study found considerable movement of moose between the BLM-managed Dalton Highway corridor and the Gates of the Arctic National Park and Preserve to the west of the corridor (Joly et al. 2015). The same study also documented movements, less frequent, between Kanuti NWR and BLM-managed lands to the south (Ray Mountains) and east (Dalton Highway corridor). We found that BLM did not consider this aspect in the RMP decision making. The upper Koyukuk River watershed area should be considered the habitat of a regional moose population that is not confined to any single agency's managed lands, thereby requiring all agencies to work closely together on issues affecting moose habitat and moose harvest. Management of access, harvest, and habitat will require close cooperation of neighboring land managers and the ADFG. We did not find an explicit commitment for such cooperative work in the RMP/DEIS (although it does appear in the AMS, USBLM 2016 pg. 235). We encourage the BLM to make a formal commitment for moose monitoring in a finalized Table 2-4 in the RMP/FEIS. The BLM should also work closely with ADFG and the neighboring federal agencies (NPS and FWS) on future monitoring and study efforts like that which made the Joly et al. (2015) study possible.

Birds. We appreciate that the RMP/DEIS considered the importance of federally-protected threatened and endangered species, under the Endangered Species Act, the Bald and Golden Eagle Protection Act, State of Alaska Species of Greatest Conservation Need, and BLM "Special Status Species"(SSS pg. 3-77). We also appreciate the detailed consideration of special status species undertaken by BLM in the Analysis of Management Situation (USBLM 2016 AMS, Table 2.8, pg. 65-67), and in the BLM Alaska Special Status Species List (USBLM 2019b). We found some discrepancies between the 2016 AMS analysis of sensitive species and the 2019 Alaska Special Status Species list cited in the RMP/DEIS. We recommend for the final RMP/FEIS that BLM correct those discrepancies and also consult the Partners in Flight concern list, Audubon Alaska Red List 2017, and Audubon Alaska Yellow List 2017 (Audubon 2017) where additional avian species of concern are listed due to statewide or continental population declines.

Much of the information used by governments and NGOs to determine species of concern comes from monitoring efforts such as the continental breeding bird survey. We support BLMs continued monitoring of landbirds/songbirds/shorebirds by participating in the breeding bird survey, and recommend a formal commitment specifically for this monitoring in a finalized Table 2-4 in the RMP/FEIS. We note that Appendix A, Map 3.13 documents this participation, but inadvertently left out three USFWS breeding bird survey routes which have a long history of data in the western portion of the CYRMP area: Ruby Road, Galena, and Bear (Whakatna) Creek. These should be added to the map.

We would like to call attention to BLM that the bird species listed below, that occur in the planning area, have suffered significant population declines. These species are variably associated with boreal wetland habitats, mesic spruce forests, upland shrublands, and alpine tundra, all of which would be affected by permitted mineral development and ROW access decisions in the action alternatives. In addition, impacts of these development activities may be exacerbated by habitat changes resulting from climate change. Shorebird and landbird species with significant population declines within interior Alaska (all species listed) and across North America (*) include the following (Alaska Shorebird Group 2019, Handel and Sauer 2017, Sauer et al. 2017):

- Surfbird (alpine tundra)*
- Wandering tattler (alpine tundra)
- Lesser Yellowlegs (boreal wetlands)*
- Red-necked Phalarope (boreal wetlands)*
- Olive-sided Flycatcher (boreal wetlands)*
- Western Wood-Pewee (boreal wetlands)*
- Violet-green Swallow (boreal wetlands)*
- Bank Swallow (riparian sand banks and bluffs)*
- Cliff Swallow (riparian bluffs and cliff faces)
- Ruby-crowned Kinglet (mesic spruce forests)
- Orange-crowned Warbler (shrublands)
- Blackpoll Warbler (boreal wetlands)*
- Wilson's Warbler (boreal wetlands, shrublands)
- Savannah Sparrow (boreal wetlands, shrublands, alpine meadows)*
- White-crowned Sparrow (shrublands)
- Rusty Blackbird (boreal wetlands)*

Out of the 16 species listed above, only three species (Olive-sided Flycatcher, Blackpoll Warbler, and Rusty Blackbird) were listed as BLM Sensitive or Watchlist Species in the Special Status Species (SSS) analysis for birds in the Analysis of Management Situation (USBLM 2016 AMS, Table 2.8, pg. 65-67, and Table 2.11, pg. 76). One additional species (Bank Swallow) from the above 16 was also listed in the 2019 BLM Special Status Species List (USBLM 2019b). The Lesser Yellowlegs, Olive-sided Flycatcher, Rusty Blackbird, and Blackpoll Warbler are of particular conservation concern because of marked continental population declines, their breeding

distribution restricted to boreal wetlands, and their relatively low population sizes (Handel and Sauer 2017). The Olive-sided Flycatcher is listed as a Threatened Species in Canada and as a Near-threatened Species by the IUCN. The Bank Swallow is also listed as a Threatened Species, and the Red-necked Phalarope is listed as a Species of Concern in Canada. The above-listed 16 species would likely be negatively affected by permitted activities that reduce boreal shrublands, riparian floodplains and wetlands, or alpine tundra transition habitats, because of the greater amount of development area is allowed under Alternatives C1, C2, and D compared to A or B.

We note that the AMS recommended special treatment of habitats where sensitive avian species occur:

> *"Wetland and riparian areas as well as actual waterbodies (e.g. lakes, ponds, rivers/streams and associated shorelines) are likely to provide important habitat for one or more designated sensitive species (e.g. rusty blackbirds, yellow-billed loon, olive-sided flycatcher, blackpoll warbler, trumpeter swan) and should be given special consideration in planning (USBLM AMS 2016, pg. 80).*

We could not find where those recommendations are stated or referenced in the RMP/DEIS.

The Alaska Chapter recommends that BLM publish a revised sensitive bird species list in the Wildlife section of Chapter 3 in the final RMP/FEIS (to include the 16 species we list above, and also consider adding the Audubon watch list species). This is to provide needed recognition for managers to consider how their permitting decisions may affect the habitats of these important landbird and shorebird species. Such information should not be relegated to a separate document. Furthermore, Chapter 3, Affected Environment, Wildlife (pg. 3-77 to 3-90) and Appendix P (pg. P1-P6), Wildlife, did not address how BLM-permitted developments allowed by the four action alternatives may affect habitats that support some of these species of national and statewide concern. We therefore offer some suggestions on possible impacts, and ways to reduce those impacts, which should be included in the final RMP/FEIS:

Some of the most important habitats for boreal landbirds and shorebirds include the riparian shrublands and forests that line rivers and creeks in the planning area. Issues concerning shrub-inhabiting birds include placer mining and construction of transportation and utility corridors (Andres et al. 1999). Riparian shrub and forest habitats in Central Alaska support a diverse assemblage of landbirds and shorebirds (Spindler and Kessel 1980, Kessel 1998, Tauzer 2013). According to the *Landbird Conservation Plan for Alaska Biogeographic Regions*:

> *"Loss of shrub and other riparian habitats to placer mining or transportation and utility corridor developments, which often follow drainages or rely on gravel mining, is a concern for landbirds. Removal of shrubs along riparian corridors would negatively affect birds such as the Gray-cheeked Thrush, Blackpoll Warbler, and other shrub dependent species. Riparian forests are important to the Olive-sided Flycatcher. Remediation of disturbed riparian may diminish the long-terms effects of vegetation removal" Andres et al. (1999)*

We urge BLM to increase the protection of riparian shrubs and forest in whatever is chosen for the final preferred alternative. We believe that Alternatives C1, C2, and D in their current form do not provide adequate protection for riparian habitats.

Large-stature spruce forests along riparian areas and on south-facing slopes are also important, according to Andres et al. (1999):

> "*Harvest of large white spruce trees from coniferous and mixed deciduous/coniferous forests would reduce populations of Townsend's Warblers, White-winged Crossbills, Boreal Chickadee and other species dependent upon mature spruce forest. Selective harvest of aspen and birch would negatively affect the Hammond's Flycatcher and other species that use mature deciduous forests. Logging of any forest type would provide a short-term benefit to birds preferring openings, grasslands, forbs, shrub and sapling seral stages."*

Examples of the seral stage-preferring species would be: Gray-cheeked Thrush, Orange-crowned Warbler, White-crowned Sparrow, Tree Sparrow, Fox Sparrow, (Spindler and Kessel 1980, Kessel 1988, Tauzer 2013).

We urge BLM to reconsider the vast acreages that will be opened to locatable mineral entry in all of the RMP/DEIS action alternatives because of potential impacts to habitats of bird species of concern, particularly in wetlands and the riparian zone. Furthermore, managers must be guided by the Final EIS/RMP to minimize impacts to the habitats of these species of concern when making permitting decisions, especially relative to locatable mineral development and ROW access to these sites. We recommend BLM add to Appendix F some prescriptive SOPs targeting avian habitats, particularly for wetlands, riparian shrubs and forests, and large stature spruce in uplands, and require them to be consistent and applicable across all activities in the action alternative selected for the final RMP/FEIS. These measures should also be included in FLPMA-required permit-specific environmental analyses.

Lands and Realty decisions and how they could affect wildlife habitats

The Alaska Chapter appreciates the Action Alternative Objective (land use authorizations Table 2-19, pg. 2-49) because it recognizes the high value to wildlife habitat connectivity, and the importance of avoiding habitat fragmentation:

> "*Allow the Utility Corridor to continue to support existing and future anticipated transportation and utility projects, while maintaining visual, recreational, and ecological values, <u>including connectivity between conservation units adjacent to the corridor</u>, to the extent practicable"* (emphasis added).

We are concerned this objective cannot be met with the action alternatives (B, C1, C2, D) that have significant revocations of land withdrawals, PLO 5150 and D1. We therefore recommend

an Alternative A-level (no action) that includes no such revocations in the final alternative in the RMP/FEIS and ROD.

We applaud the BLM for including Standard Operating Procedure SOP LANDSCAPE-1 (Appendix F) to achieve this objective. We also appreciate that the BLM intends to consider habitat connectivity as part of their adaptive management strategy as described in Appendix G (pg. G8-G9 and Map G-3). We are pleased that "structural connectivity corridors [are] proposed for all action alternatives" (B, C1, C2, D; Appendix G, page G8), however, we are concerned with another potentially conflicting statement in Chapter 3 implying applicability only to Alternative B: "New SOPs would be applied to maintain landscape connectivity corridors" (pg. 3-84). We request that BLM clarify in Chapter 3 that their consideration of landscape connectivity corridors will *apply across all* management activities and to the final alternative that is selected in the RMP/FEIS, and carried forward into the ROD.

We note that the basis of these corridors are enduring geographic features (Magness et al. 2018). Since that work was published subsequent connectivity research in the same geographic area has incorporated climate change effects to habitat connectivity (Gabrielson 2019). We urge the BLM to consider this new climate change effects research as applied to connectivity corridors in a revised Appendix G for the final RMP/FEIS.

We would like to emphasize that challenges to wildlife species anticipated with climate change would be exacerbated if habitat connectivity is lost. We are pleased that the RMP/DEIS states "Maintaining connectivity corridors, resilience, and adaptability are key to managing for such changes" (Page G-2). However, many of the realty decisions proposed in the DEIS, in combination with the reasonably foreseeable development scenario (particularly mining and associated ROWs) would negatively affect habitat connectivity, ecological benchmarks, large mammal migrations, overall health of the watersheds, and resilience of ecosystems. We therefore question how the connectivity objective above can reasonably be accomplished when the realty decisions proposed in all action alternatives could involve the wholesale transfer of lands in the Dalton Highway corridor out of the federal domain (revoke PLO 5150), and/or, in a similar large-scale manner, revoke D1 withdrawals to increase the acreage open to locatable mineral development, and provide the necessary ROWs to access such claims. We find alarming the massive acreage proposed for revocation of D1 withdrawals, 5.253 million acres, in all action alternatives. Only 1.4 million acres would be recommended for replacement FLPMA withdrawals in the most protective Alternative B, and zero in the preferred Alternative C2 (Table 3-20, pg. 3-138). We recommend some significant changes to address this shortcoming.

According to the connectivity analyses in Appendix G (pages G-8-9), there are several key areas between Federal Conservation System Units (CSUs) where we recommend BLM do everything possible to avoid habitat fragmentation. Simple right of way (ROW) avoidance may not be sufficient to avoid significant impacts from mineral, utility, and transportation development in some of these key areas over the life of the plan. Referring to Maps G-3, and Volume 2, Appendix A, Maps 2.29, 2.30. 2.31, and 2.32, the following key areas allow crucial habitat

connections between Conservation System Units (listed in order from north to south and east to west, including the relevant Public Land Order withdrawals, PLOs):

1 Arctic NWR with Gates of the Arctic NPP; PLO 5150
2 Kanuti NWR with Yukon Flats NWR; PLOs 5150, 5173, 5179, 5180, 5184
3 Kanuti with Koyukuk NWR; PLOs 5179, 5184
4 Denali NPP with Nowitna NWR; PLOs 5173, 5179, 5184
5 Nowitna with Koyukuk NWR; PLOs 5180, 5179
6 Koyukuk with Innoko NWR; PLOs 5179, 5184
7 Koyukuk with Selawik NWR; PLOs 5173, 5174

Dalton Highway Corridor. The Alaska Chapter believes that the proposed decisions regarding Lands and Realty in the RMP/DEIS do not provide a range of alternatives that can support wildlife habitat connectivity into the future. All action alternatives propose revoking 100% of all PLO 5150 withdrawals in the outer Dalton Highway corridor with no provision for habitat connectivity between CSUs should these lands leave the federal domain. There are no action alternatives that retain all of the outer corridor, or a portion of the outer corridor. There are no action alternatives that indicate replacement FLPMA withdrawals will be recommended for the important habitat connectivity areas defined on page G9. We strongly recommend that the final action alternative selected in the RMP/FEIS recognize ALL of the important connectivity lands listed in 1 and 2 above (Arctic NWR to Gates NPP and Kanuti to Yukon Flats NWRs).

Appendix G provides an estimate of 369,325 acres of connectivity corridors (USBLM 2020 CYRMP pg. G8). We would like to stress that this is an estimate of the areal extent of these corridors resulting from scientific modelling of enduring landscape features without field ground truthing. The Alaska Chapter maintains that there should be some buffers or margins around the modeled corridors depicted on page G9. We recommend that, with buffers, an estimated 20 townships, or 460,000 acres, in the outer Dalton corridor, should remain in the federal domain, and be designated as important wildlife habitat connectivity corridors. These two connectivity areas along the Dalton Highway outer corridor should be protected by at least ROW avoidance, but preferably ROW exclusion and/or permanent FLPMA replacement withdrawal.

As regards revocation of PLO 5150 for the entire outer Dalton Highway corridor, it seems highly imprudent to the Alaska Chapter that BLM propose the above-listed habitat connectivity areas leave federal ownership at this time, especially in light of bi-partisan support of pending federal legislation enacting wildlife connectivity corridors (116th Congress, SB 1499/HR2795, Wildlife Corridors Conservation Act). Should this action become law in the next session the PLO 5150 lands clearly have a significant national interest importance to wildlife. Furthermore, effective January 27, 2012 Executive Order 14008, Section 216, recommends the Secretary of Interior make recommendations to "achieve the goal of conserving at least 30 percent of our lands and waters by 2030." Hopefully wildlife corridor conservation measures that allow for lighter sustainable multiple uses that do not cause habitat fragmentation could count towards this national goal.

Connectivity outside the Dalton. We recommend that BLM also formally designate connectivity areas 3,4,5,6, and 7, listed above, and provide added levels of protection that at a minimum would increase amounts of ROW avoidance or ROW exclusion in the final selected alternative. We believe that the range of Alternatives proposed for ROW exclusion areas in the present RMP/DEIS (Alt B = 17.6%; Alts. C1 and C2 = 2%) is not adequate to avoid habitat fragmentation in key connectivity areas over the life of the plan. Likewise, the range of alternatives proposed for ROW avoidance (B = 30%; C1 = 3% and C2 = 0.6%) would not adequately guard against fragmentation of these corridors during the life of the plan. We recommend the percentage of lands with ROW restrictions in the final-selected RMP/FEIS alternative be increased: for example, at least 17% ROW exclusion and 30% ROW avoidance, respectively (Alternative B-levels), targeting the above-listed key connectivity areas in order to avoid habitat fragmentation.

D1 revocation and replacement FLPMA withdrawals. The Alaska Chapter is also concerned about implications for wildlife habitat connectivity or fragmentation caused by the RMP/DEIS proposal to revoke 5.253 million acres of D1 withdrawals (Table 2-1, pg 2-10). Many of these withdrawals presently do not allow locatable mineral entry (see listed PLOs in connectivity areas 1-7, above). The BLM proposes ZERO acres of FLPMA replacement withdrawals in preferred Alternative C2. Even protective Alternative B proposes only 1.4 million acres of FLPMA replacement withdrawals (Table 3-20, pg. 3-138). We understand that even the potential FLPMA replacement withdrawals are not certain because the final RMP does not complete this action, only the Secretary of the Interior and Congress can. Until approval of replacement FLPMA withdrawals can be assured, the Alaska Chapter recommends that BLM use existing formal designations to call out the need to maintain wildlife habitats and avoid fragmentation in connectivity areas 1-7, Possible strategies would be to re-analyze the ACECs, approved and proposed, and both sets of Ecological Benchmarks proposed in Alternative B and C1, to ensure they include the 7 key connectivity areas we list above. Another possibility would be to create another new formal designation such as “Connectivity Corridors” applied to all of the areas depicted in Figure G9 (similar to what BLM proposes for Dall sheep habitat in Alternative C1). The Alaska Chapter opposes the large-scale D1 withdrawal revocation until the interim protection they provide can be replaced by other means, therefore Alternative A is better in this regard.

Ecological Benchmarks and adaptive management

We applaud the BLM for inclusion of an Adaptive Management Framework and strategy to monitor effects of multiple use management and climate change on the landscape. We believe the set of Ecological Benchmarks proposed in Alternative B is an excellent part of an adaptive management strategy. Benchmarks should serve the BLM well in comparing areas that have intensive or moderate land uses (analogous to an experimental “treatment”) *versus* areas of much less intensive use that would be monitored for changes (analogous to experimental “control”), (Appendix G, pg. G1-G7; SOPs Benchmark 1, 2, and 3, Appendix F, pg. F-15). We recognize that BLM has a robust national Assessment, Inventory and Monitoring (AIM) program

(USBLM 2014 - AIM Technical note 445). We recommend that BLM incorporate a commitment to funding and supporting such efforts in their final action alternative, and this should be articulated in a finalized Appendix G and finalized version of Table 2-4 in the RMP/FEIS.

Despite the above, we are concerned that the threshold of maintaining 85% intactness in SOP Benchmark 1 (Appendix F, pg. F-15) may not achieve the purpose of having sufficient valid spatial data in a "control" area benchmark to compare with the "experimental treatment" of more intensive multiple use management. We recommend that BLM consult with experts and perform modelling to determine AIM sensitivity and robustness in that sampled area, especially with climate change scenarios. These results should be incorporated into the Final RMP/FEIS. We believe that a threshold of <5% reduction of intactness would better achieve the goal.

The Wildlife Society strongly agrees with the statement in Appendix G-4, pg G-4:

> *"The BEACONS geographic system products and techniques can also be used as a tool to identify areas with minimal conflict between maintaining ecological integrity and connectivity and potential development permitting scenarios."*

Our overall impression of the RMP/DEIS is that BLM tried to fit habitat conservation strategies such as connectivity corridors, benchmarks, wetlands, high value watersheds and riparian zones within a matrix of more intensive multiple uses. In contrast, the BEACONS process recommends proactively establishing the protective benchmarks areas first, and then fitting the multiple useless around those key areas (BEACONS 2017). We therefore request that BLM add an additional SOP "Benchmark 4" in Appendix F that requires managers to utilize BEACONS-type GIS products to identify areas with minimal conflict between maintaining ecological integrity and connectivity with each locatable mineral and ROW permit decision. That is one of the most useful tools of the BEACONS process (BEACONS 2017). Such data should be made available to the public to inform future permit-specific FLPMA Environmental Assessments in the NEPA comment process.

Areas of Critical Environmental Concern (ACECs)

The Alaska Chapter agrees with the goal and objective of ACECs as listed in Table 2-11 (Page 2-37), and we agree that Alternative B provides needed protections to habitats and connectivity commensurate to their value to wildlife. We support the proposed Alternative B-level of about 4 million acres of ACECs (Table 2-1, pg 2-9). One of the most important features of an ACEC is that notice-level mineral explorations with surface disturbances of <5 acres require a plan of operations and greater permitting scrutiny. If sensitive habitats are not designated as an ACEC, such explorations for locatable minerals may include surface disturbances up to 5 acres in size without a plan of operations, which can result in habitat loss or damage. We believe that the ACEC acreage in Alternatives C1 and C2 is not adequate (C1 = 3% of lands; C2 = 0.6% of lands). We recommend that the selected alternative defined in the final RMP/FEIS include a minimum ACEC area of 30% of the lands in the planning area (Alternative B proposal). We note that Alternative B proposed about 4 million acres of ACECs (Table 2-1, pg 2-9), while Table 3-20 (pg.

3-138) recommends 1.4 million acres be withdrawn from locatable mineral entry. Appendix Table J-7, pg. J39-J48) indicates closures to mineral entry or withdrawal from mineral entry for the ACECs but does not specify the acreages. The final RMP/FEIS should indicate specific acreages recommended for FLPMA withdrawals to support the goals and objectives of the particular ACECs.

Water resources, riparian habitats, wetlands, watershed integrity, and fisheries

We state that sufficient in-stream flow and water quality are prerequisites for maintenance of productive habitats such as river-connected wetlands, which are important for waterfowl and shorebirds. Furthermore, quality aquatic habitat is necessary to support piscivorous wildlife (e.g. fish-consuming river otter, mink, diving sea-ducks, loons, etc.).

The DEIS acknowledges impacts of past management on water quality:

> *"a declining trend in watershed condition on BLM-managed lands within the planning area due to authorization of surface-disturbing activities" (DEIS pg. 3-34);*

and again, with regards to wetland habitats:

> *"BLM long-term evaluations described in the AMS show a declining trend in watershed condition and the associated functioning status of wetlands on BLM-managed lands within the planning area due to authorization of surface-disturbing land use activities" (DEIS pg. 3-57);*

and again, with regard to fisheries and aquatic species, an important aspect of the wildlife food web:

> *"Withdrawal of lands from locatable mineral entry likely provides the single most meaningful protection for fish and aquatic species and their habitats…Mining would likely result in additional sedimentation into waterbodies, which impacts fish and aquatic species through changes in water quality parameters (USBLM 2020 DEIS pg. 3-66).*

Several BLM studies have documented the degradation of watersheds and riparian habitat due to permitted placer mining activity and mixed success in reclamation following cessation of mining activities (USBLM EIRMP 2012, Chapt. 4, pg. 427, Arnett 2005). Brady et al. (2018) found that none of the ten stream reaches studied were functioning properly for bank cover and stability on BLM-managed land in eastern interior Alaska. To correct this pattern, we applaud the BLM for a comprehensive set of 16 SOPs for Water and Fish in the RMP/DEIS (Appendix F, pg. F-4 to F-6). For the final alternative in the RMP/FEIS we recommend BLM require these 16 SOPs across all management activities.

It is of concern to us that miners can explore existing claims by performing surface disturbing activities on areas up to five acres under "notice operations" without a Plan of Operations or the guidance of SOPs and permit oversight. We recommend that the final RMP/FEIS require

these 16 Appendix F SOPs apply to notice-level mining exploration operations of <5 acres (which is currently not the case) because such small operations are the source of many degradation problems. Alaska Chapter members have observed multiple instances of notice-level operators near the Dalton Highway failing to reduce their impacts to an acceptable level for protection of sensitive watershed areas and fish habitats. Because existing SOP's, policies, regulations, guidance, and actual compliance levels have not reversed the trend of degraded riparian and wetland habitat in placer-mined areas, as documented by BLM, above, we suggest better strategies would be:

(1) reduce the amount of acreage open to locatable mineral development;
(2) reduce the amount of acreage open to ROW development;
(3) reduce the amount of acreage of revoked D1 and PLO 5150 withdrawals;
(4) approve all of the ACEC recommendations in Alternative B to carry forward into the final selected alternative and NOT adopt the C1/C2 alternatives.
(5) consider FPLMA withdrawals to replace D1 and PLO 5150 withdrawals in the most critical watersheds.

We recommend the above changes especially in the watersheds that drain into valuable wildlife and fisheries habitats in seven affected National Wildlife Refuges: Arctic, Innoko, Kanuti, Koyukuk, Nowitna, Selawik, and Yukon Flats, and two affected National Park/Preserve units: Gates of the Arctic, and Denali.

We believe that Alternative B would be the best choice for amount of ROW development and Alternative A the best choice for least amount of acreage open to placer mining because the RMP/DEIS states:

> *"Alternative B would have the fewest cumulative impacts on water resources by decreasing acreage of sensitive water resources open to placer mining and ROW development….Alternative A would open fewer acres to placer mining and would open more areas to ROW development, compared with the action alternatives" (DEIS pg. 3-47).*

As regards water, wetlands, fish and aquatic resources, we are particularly disturbed by the admission about future impacts of the preferred alternative C2 in the RMP/DEIS:

> *"Under Alternative C2, no lands would be withdrawn from leasing and development or locatable mineral entry; thus, there is a higher chance of development than if they were fully withdrawn…Increasing the area of high value fish habitat open to mineral entry would likely increase the impacts on fish and aquatic species, such as habitat degradation or the potential for injury or mortality" (USBLM 2020 DEIS pg. 3-75).*

The Alaska Chapter believes that the current RMP/DEIS does not provide a reasonable balance between conservation and development by placing undue weight on accommodating the economic development opportunities sought by the State of Alaska, the ANCSA Regional Corporations, and development-oriented NGOs. This results in diminished opportunities for BLM to fulfill its management responsibilities to adjacent Tribal, National Wildlife Refuge, and

National Park lands insofar as potential for downstream watershed impacts. The preferred Alternative C2, by providing significant economic opportunities for locatable mineral and ROW development on upstream reaches of BLM watersheds, appears to transport the environmental impacts of those developments downstream onto Refuge, Park, and Tribal lands (e.g. sedimentation, contaminants, degraded water quality, etc.). The Alaska Chapter wishes to remind the BLM that both the National Park Service and U.S. Fish and Wildlife Service provided comments on preliminary alternatives in March of 2017 in support of watershed integrity and habitat connectivity:

> *"We view the CY-RMP as an opportunity to enhance ecological connectivity, and connectivity-planning across land ownerships. The comments that follow reflect NPS interest in a plan that includes a variety of environmental, biological, recreation, and cultural factors considered on a conservation gradient moving outward from largely pristine and undisturbed areas…Creation of high priority watersheds were based on fish diversity indices. We recommend they be expanded to include watersheds that have high ice-content soils (e.g. Todatonten ACEC's) Erosion induced by climate warming, could strongly affect stream water quality in these areas (e.g. turbidity, total suspended solids, and mining induced contamination) and fish habitat quality" (Gates of the Arctic Park Superintendent Greg Dudgeon, letter to Chel Ethun, BLM, April 1, 2017).*

> *"In the Central Yukon RMP we ask that the BLM place a high priority on the protection of water quality and quantity in watersheds upstream of conservation system units (CSUs). We are highly concerned about the potential impacts of mineral and transportation permitting upstream of CSUs and the possibility that these actions could affect maintenance of fish spawning, rearing, and overwintering areas on refuges and federally managed waters. We urge the BLM to take every measure possible to guarantee that water quality and quantity will be maintained in BLM-managed watersheds that feed our refuges and federally-managed fisheries." Letter from Greg Siekaniec, USFWS Regional Director, to Chel Ethun, March 17, 2017.*

We note the CYRMP Scoping Report included numerous statements from public commenters, especially rural residents, concerned about development impacts, watershed health, and subsistence. Here are two examples that we would like to remind the BLM of:

> *"Both Alaska Natives and surrounding communities depend upon the bounty of the lands and waters for their livelihoods as commercial fisherman, and for subsistence, cultural and traditional practices. Development projects including mines, roads and associated infrastructure could pose significant negative impacts on surrounding communities, including water degradation and reduced access to subsistence resources." (USBLM Scope 2015, pg. 95); and,*

> *"Traditional ways of knowing should be used to learn more about the history and traditions of the area, the value of resources, and the observed changes. There is a stigma against non-western ways of knowing and a standard that western science is the only means to document, monitor, and make decisions. In areas such as the Central Yukon area where an abundance of Traditional Ecological Knowledge (TEK) exists and little western science exists, the BLM should work to form a hybrid of balanced perspectives using information from both local experts and existing science" (USBLM Scope 2015, pg. 100).*

We recommend the BLM once again review the scoping comments, the science, and the traditional knowledge and take a more balanced approach as regards watershed integrity. The current RMP/DEIS appears to have disregarded significant concerns about impacts of potential permitted development, resulting in Alternatives C1 & C2 that are heavily skewed in favor of extractive economic activity, in our judgement. We recommend that BLM select a final alternative in the RMP/FEIS that maintains watershed integrity and health by considering the above-listed five strategies.

Backcountry Conservation Area

The Backcountry Conservation Area (BCA) proposed for the outer Dalton Highway corridor (Table 2-7, pg. 2-31, and in Appendix A, Map 2.4) has important wildlife habitat aspects that the Alaska Chapter supports:

> *"This BCA would be managed to protect the intact and undeveloped character and to manage habitats to support migration/movement corridors for recreationally important species of fish and wildlife, big game winter range, summer range, parturition areas, migration corridors, associated stopover areas, and migratory bird habitats" (USBLM 2020 CYRMP pg. Q78-Q79).*

We believe this designation proposed for Alternative B sets some valuable wildlife habitat priorities for the outer Dalton Highway Corridor that may complement the need for protection of connectivity corridors, riparian areas, and wetlands. We support the management actions outlined in Table 2-7 (USBLM 2020 CYRMP pg. 2-31) to maintain wildlife habitat connectivity while allowing some levels of "lighter" multiple uses. A specific wildlife goal and objective is needed in Table 2-7 that supports wildlife habitat quality, connectivity corridors, and prevents habitat fragmentation, between Kanuti and Yukon Flats NWRs and between Arctic NWR and Gates of the Arctic NP.

Non-native invasive species (NNIS)

The Alaska Chapter appreciates the robust goals and objectives in Table 2-14 (pg. 2-40) that apply to all action alternatives and provide clear guidance to future managers that would minimize introduction and spread of NNIS. Chapter 3 (pg. 3-50) properly calls attention to three terrestrial plant species of concern (*Melilotus alba, Vicia cracca,* and *Hordeum jubatum*) that have infested the Dalton Highway, and have a high potential to spread into any areas that connect to the Dalton Highway *via* temporary or permanent ROWs. We also note that infestations of the aquatic plant *Elodea canadensis* have been found near Fairbanks, and *E. nuttallii* near Anchorage (USFWS 2020). These also have high potential to spread in the planning area and should be called out for special attention in a finalized Table 2-14 and in Chapter 3 of the RMP/FEIS.

We also appreciate that Appendix F specifies 17 separate SOPs aimed at minimizing introduction and spread of NNIS. In the last decade the Dalton Highway infestations have

worsened (McMillan and Callear 2014), and *Elodea* has spread some distances outside of Fairbanks and Anchorage (USFWS 2020). All these species have potential to alter terrestrial and aquatic wildlife habitats. We recommend that BLM specifically require NNIS prevention, detection, and eradication as action items in Appendix L, Reclamation of surface-disturbing activities. We also recommend wording in SOP VEG/NNIS16 be changed from "The BLM may require modifications…critical habitat" to "The BLM will require modifications…critical habitat."

Wild and Scenic Rivers

We appreciate that the BLM considered 11 rivers and 603 river-miles as suitable for designation under the Wild and Scenic Rivers Act in Alternative B (Table 2-9, pg. 2-34). We believe that the ½-mile riparian buffer strip that could be afforded by eventual Wild and Scenic River designation, and current interim management, would be valuable to providing for future wildlife habitat connectivity along important water courses. As noted above, the riparian zone is most productive for wildlife. Especially in the northern portions of the planning area, some of the best avian forest and tree cavity nesting sites occur within the riparian zone. We are concerned about the recommended action in Alternatives C1, C2, and D to "Determine all 11 eligible stream segments as not suitable for inclusion in the National Wild and Scenic River System and release them from interim management protections." We are concerned that such permanent action could cause harm to and reduce future resiliency in the face of climate change. We also note that the RMP/DEIS did not propose a reasonable range in the C1/C2 Alternatives. The blend/balanced alternatives should have at least included some suitable determinations. A fair range would be 5-6 Rivers in Alternative C1 and 2-3 rivers in Alternative C2, with zero rivers in Alternative D. We would prefer selection of a final alternative similar to the Alternative B-level of 11 rivers, 603 miles for WSR designation in the Final RMP/FEIS. If a mid-level compromise is required, then we recommend at least six rivers and 300 miles be approved for continued interim management of WSR qualities. In our judgement the six rivers most important for wildlife and fish habitat, and most threatened with development during the life of this plan are: Atigun, Dietrich, Jim, Kanuti, Kilolitna, and Mathews.

Economic considerations

We believe that Appendix S did not sufficiently analyze the economic costs *versus* benefits of an alternative, like C2, that greatly favors non-sustainable extractive locatable minerals mining over sustainable multiple uses that include wildlife, fish, and intact watersheds. For example, Appendix S did not analyze the trade-offs involving sustainable outdoor-supported tourism, and a rural subsistence-based economy, compared to the economic value derived from mining activities and its spinoffs. One illuminating fact is that in 2017 on an Alaska statewide basis McDowell Group (2018a, 2018b) reported employment in tourism/hospitality/outdoor recreation was five times greater than mining. The economic contribution of tourism/hospitality/outdoor recreation was three times greater than the contribution of mining, statewide. The final RMP/FEIS must perform a similar economic analysis specific to the

planning area to fully understand the trade-offs, and long-term cost-benefits of emphasizing sustainable multiple uses versus emphasizing extractive mineral development.

Collaboration and being a good Neighbor

As part of our commenting process, we not only reviewed the Central Yukon RMP/DEIS, and Appendices, but we also reviewed the Scoping Report (USBLM 2015) and the Analysis of Management Situation (USBLM 2016). Finally, we also consulted FLPMA and the BLM Land Use Planning Handbook (USBLM 2005). We would like to emphasize a key responsibility in FLPMA, the organic act, which states the BLM should:

> "coordinate the land use inventory, planning, and management activities for such lands with the land use planning and management programs of other Federal departments and agencies and of the States…" (Section 202 (c) (9)).

The BLM Land Use Planning Handbook states:

> *"A collaborative approach to planning entails BLM working with Tribal, state, and local governments; Federal agencies; and other interested parties; from the earliest stages and continuing throughout the planning process, to address common needs and goals within the planning area. At the same time, BLM should consider existing plans of Tribal, State, and Local governments and other Federal agencies" (USBLM 2005 pg. 4, emphasis added); and,*
>
> *"Section 202(c)(9) of FLPMA, as paraphrased, requires the BLM to provide for involvement of other Federal agencies and State and Local government officials in developing land use decisions for public lands, including early public notice of proposed decisions that may have a significant effect on lands other than BLM-administered Federal lands" (USBLM 2005, pg. 5).*

We were impressed that on the front end of the planning process, during scoping in 2013, and through development of preliminary alternatives in 2016, BLM reached out to neighboring land managing agencies, Tribes, and the State of Alaska, just as FLPMA and the Planning Handbook require. However, our review led us to conclude that completion of the RMP/DEIS during 2017-2020 discounted a significant amount of prior input from adjacent land management agencies, Tribes, and Villages. This is highly concerning to the Alaska Chapter and we believe it must be corrected in creation of the Final RMP/FEIS.

We remind BLM that Section 202(c)(9) of FLPMA requires:

> *"... on-going communication between BLM managers and state, local, and Tribal governments to ensure that the BLM considers pertinent provisions of non-BLM plans in managing public lands; seeks to resolve inconsistencies between such plans…."*

We know that communications occurred, but we fail to see where the RMP/DEIS evidences sincere efforts to consider neighboring land management goals and objectives, nor efforts to

resolve inconsistencies where these plans conflict. The Alaska Chapter did not find anywhere in the RMP/DEIS where the Comprehensive Conservation Plans for Koyukuk, Nowitna, Kanuti, or Selawik NWRs were mentioned or cited. We did not find anywhere in the RMP/DEIS where the Gates of the Arctic National Park General Management Plan was referenced. We did not find any instance where an Alaska DNR land management plan was cited. No ANSCA Corporation or Tribal land management plans were cited. We found only two instances where ADFG research was cited, but no wildlife or fish management plans were cited. Regarding coordination with these other entities we found only the following disclaimer: "The CYRMP does not change land use management for National Wildlife Refuge lands, National Park Service lands, or their subsurface lands. Planning decisions and descriptions in the RMP will not apply to private lands, lands conveyed through ANCSA, or lands conveyed to the State of Alaska through the Alaska Statehood Act" (USBLM 2020 CYRMP pg. 1-2). Better coordination of the RMP goals with all these neighbors is needed, particularly in the areas of watershed impacts and integrity and connectivity corridors. The final RMP/DIES must show efforts to resolve these inconsistencies by selection of a more balanced alternative.

Summary

To summarize, we find the current C1 and C2 "blend" alternatives do not achieve a balance between a B "protection" alternative and a D "development" alternative. As currently defined, Alternatives C1 and C2 do not provide for sufficient long-term habitat connectivity between existing federal Conservation System Units (CSUs), especially along the Dalton Highway with the proposed changes in land tenure. Alternatives C1 and C2 do not provide for sufficient watershed integrity and conservation of riparian and aquatic habitats. Alternatives C1 and C2, through emphasis on permitting of economic activities aimed at extracting mineral resources, and allowance of ROWs over extensive areas, pose threats to the ecosystem resilience and watershed health of BLM lands and the adjacent CSUs. We believe that C1 and C2 as currently defined do not provide sufficient protection for key wildlife species such as caribou, Dall sheep, and avian species of concern because no new ACECs are approved and nearly all existing ones would be abolished. We believe the RMP/DEIS failed to adequately consider the trade-offs between sustainable multiple uses involving fish and wildlife versus impacts related to extractive mineral development.

We recommend that the finalized RMP/FEIS adopt Alternative B, with the modifications we note above, because it does a better job of protecting wildlife and its habitat. If BLM decides that a "blend" alternative is needed, it must reject Alternatives C1 and C2, and create a new one that incorporates more elements of Alternatives A and B to balance wildlife habitat conservation with resource extraction.

==========

REFERENCES

ADFG. 2015. Alaska Wildlife Action Plan; Species of Greatest Conservation Need. Appendix, G, (pp 207-212). Alaska Dept. of Fish and Game, Juneau, AK. 221 pp. http://www.adfg.alaska.gov/static/species/wildlife_action_plan/2015_alaska_wildlife_action_plan.pdf

Alaska Shorebird Group. 2019. Alaska Shorebird Conservation Plan. Version III. Alaska Shorebird Group, Anchorage, AK.

Arnett, H. 2005. Harrison Creek reclamation, phase I: an overview of issues and updated approaches for the reclamation of placer-mined lands. Final report for Bureau of Land Management, Northern Field Office, Fairbanks, Alaska 99709. USKH, Anchorage, AK. 80pp.

Audubon. 2017. Alaska Watchlist - Red List of declining bird populations. Audubon Alaska, Anchorage, AK. 8pp. http://ak.audubon.org/sites/default/files/2017_akwatchlist_final_panels_highres.pdf

Audubon. 2017. Alaska Watchlist – Yellow list of vulnerable species. http://ak.audubon.org/sites/default/files/annotated_watchlist_yellow_2017.pdf

Ballard, W.B., M.A. Cronin, and H.A. Whitlaw. 2000. Caribou and oil fields. Pages 85-104 *in* J.C., Truett and S.R. Johnson, editors. The natural history of an Arctic oil field. Academic Press, San Diego, CA.

BEACONs. 2017. Ecological Benchmarks to Support Landscape Conservation Design in the Northwest Boreal LCC Planning Region. BEACONs Project, University of Alberta and Yukon College, Whitehorse, YT. http://nwb.ualberta.ca/downloads/main_report/BEACONs_benchmark_report.pdf.

Boulanger, J., Poole, K.G., Gunn, A., Wierzchowski, J. 2012. Estimating the zone of influence of industrial developments on wildlife: a migratory caribou *Rangifer tarandus groenlandicus* and diamond mine case study. *Wildlife Biology* 18: 164-179.

Boulanger, J., Poole, K.G., Funn, A., Adamczewski, J., Wierzchowski, J. 2021. Estimation of trends in zone of influence of mine sites on barren-ground caribou populations in the Northwest Territories, Canada, using new methods. Wildlife Biology 2021(1): wlb.00719.

Brady, C, M. Varner, J. Post, and S. Miller. 2018. Developing Quantifiable Management Objectives from Reference Conditions for Wadeable Streams in the Eastern Interior Field Office. Open File Report #169 Bureau of Land Management, Fairbanks, AK. 29pp.

Craig, T. and P. Leonard. 2009. Dall Sheep Use of Areas of Critical Environmental Concern in the Utility Corridor Management Area. Alaska Open File Report 114 BLM/AK/GI-09/009+6516+AKF031. BLM Fairbanks, AK, 30pp. https://eplanning.blm.gov/public_projects/lup/35315/48429/52593/Dall_Sheep_ACEC_Utility_Corridor_Alaska.pdf

Cronin, M.A., Ballard, W.B., Truett, J., Pollard, R. 1994. Mitigation of the effects of oil field development and transportation corridors on caribou. Final Report to the Alaska Caribou Steering Committee, LGL Alaska Research Associates, Inc., Anchorage, Alaska. pp. 125.

Curatolo, J.A., Murphy, S.M. 1986. The effects of pipelines, roads, and traffic on the movements of caribou, *Rangifer tarandus*. *Canadian Field-Naturalist 100*(2): 218-224.

Dau, J. 2013. Units 21D, 22A, 22B, 22C, 22D, 22E, 23, 24 and 26A. Pages 201–280 [*In*] P. Harper, editor. Caribou management report of survey and inventory activities 1 July 2010– 30 June 2012. Alaska Department of Fish and Game, Species Management Report ADF&G/DWC/SMR-2013-3, Juneau.

DeMars, C.A., Boutin, S. 2018. Nowhere to hide: Effects of linear features on predator-prey dynamics in a large mammal system. *Journal of Animal Ecology* 87: 274-284.

Dickie, M., Serrouya, R., McNay, R.S., Boutin, S. 2017. Faster and farther: wolf movement on linear features and implications for hunting behaviour. *Journal of Applied Ecology* 54: 253-263.

Doherty, T.S., Hays, G.C. & Driscoll, D.A. 2021. Human disturbance causes widespread disruption of animal movement. Nature, Ecology & Evolution. https://doi.org/10.1038/s41559-020-01380-1.

Executive Order-14008. 2021. Tackling the climate crisis at home and abroad. https://www.federalregister.gov/documents/2021/02/01/2021-02177/tackling-the-climate-crisis-at-home-and-abroad

Gabrielsen, C. 2019. Evaluating climate connectivity for proactive landscape conservation planning in Alaska and northwest Canada**.** Alaska Cooperative Fish and Wildlife Research Unit final report to US Fish and Wildlife Service. 28pp**.** https://www.sciencebase.gov/catalog/item/5be630c1e4b0b3fc5cf8cc00

Georgette, S., Loon, H. 1988. The Noatak River: fall caribou hunting and airplane use. Alaska Department of Fish and Game, Division of Subsistence. Technical Paper No. 162. Kotzebue, AK, USA.

Halas, G. 2015. Caribou migration, subsistence hunting, and user group conflicts in northwest Alaska: a traditional knowledge perspective. Thesis. University of Alaska Fairbanks, Fairbanks, AK, USA.

Handel, C.M., Sauer, J.R. 2017. Combined analysis of roadside and off-road breeding bird survey data to assess population change in Alaska. *The Condor: Ornithological Applications* 119: 557-575.https://www.researchgate.net/publication/318714081_Combined_analysis_of_roadside_and_off-road_Breeding_Bird_Survey_data_to_assess_population_change_in_Alaska

Hebblewhite, M. 2017. Billion dollar boreal woodland caribou and the biodiversity impacts of the global oil and gas industry. *Biological Conservation* 206: 102-111.

Hervieux, D., Hebblewhite, M., DeCesare, N.J., Russell, M., Smith, K., Robertson, S., and Boutin, S. 2013. Widespread declines in woodland caribou (*Rangifer tarandus caribou*) continue in Alberta. *Can. J. Zool*. 91(12): 872–882.

Hollis, A. L. 2011a. Units 20F, 21B, 21C, 21D, 24A, 24B, and 25D caribou. Pages 171-186 in P. Harper, editor. Caribou management report of survey and inventory activities 1 July 2008-30 June 2010. Alaska Department of Fish and Game. Project 3.0. Juneau, Alaska.

Horne, J.S., T. Craig, K. Joly, G. Stout, M. Cebrian and E. O. Garton. 2014 Population characteristics, space use and habitat selection of two non-migratory caribou herds in central Alaska, 1994 - 2009. *Rangifer* 34(1): 1-19. https://septentrio.uit.no/index.php/rangifer/article/view/2572

Jacobson C. 2008. Fall Hunting in Game Management Unit 23: Assessment of Issues and Proposal for a Planning Process. Juneau: Alaska Department of Fish and Game, Division of Wildlife Conservation. Juneau, AK, USA.

James, A.R.C., Suart-Smith, A.K. 2000. Distribution of caribou and wolves in relation to linear corridors. *Journal of Wildlife Management* 64: 154-159.

Johnson, H.E., Golden, T.S., Adams, L.G., Gustine, D.D., Lenart, E.A. 2020. Caribou use of habitat near energy development in arctic Alaska. The Journal of Wildlife Management 84(3): 401-412.

Joly, K, T. Craig, M. Sorum, J. McMillan, and M. Spindler. 2015. Moose movement patterns in the upper Koyukuk river drainage, northcentral Alaska. *Alces* 51: 87–96. https://alcesjournal.org/index.php/alces/article/view/150

Kessel, Brina. 1998. *Habitat Characteristics of Some Passerine Birds in Western North American Taiga*. Fairbanks, AK: University of Alaska Press. ISBN 9780912006987.

Longson, S. 2020. Galena Area Caribou Management Report and Plan, Game Management Units 20F, 21B, 21C, 21D, 24A, 24B, and 25D: Report Period 1 July 2012–30 June 2017. Alaska Dept. of Fish and Game, Species Management Report and Plan ADF&G/DWC/SMR&P–2020–33, Fairbanks, AK. 21pp. https://www.adfg.alaska.gov/static/research/wildlife/speciesmanagementreports/pdfs/caribou_2012_2022_galena.pdf

Magness, D.R., A.L. Sesser, and T. Hammond. 2018. Using topographic geodiversity to connect conservation lands in the Central Yukon, Alaska. *Ecology* 33:547-56.

Mager, K, K. Colson, P. Groves, and K. Hundertmark. 2014. Population structure over a broad spatial scale driven by nonanthropogenic factors in a wide-ranging migratory mammal, Alaskan caribou. *Molecular Ecology* 23: 6045–6057. https://www.researchgate.net/publication/268452574_Population_structure_over_a_broad_spatial_scale_driven_by_non-anthropogenic_factors_in_a_wide-ranging_migratory_mammal_Alaskan_caribou

McLoughlin, P.D., Dzus, E., Wynes, B.O.B., and Boutin, S. 2003. Declines in populations of woodland caribou. *Journal of Wildlife Management* 67(4), 755–761.

McDowell Group. 2018a. Economic impact of Alaska's tourism industry - 2017. https://www.mcdowellgroup.net/wp-content/uploads/2018/11/visitor-impacts-2016-17-report.pdf

McDowell Group. 2018b. 2017 economic benefits of Alaska's mining industry https://www.mcdowellgroup.net/wp-content/uploads/2018/06/miningsummaryonline4_9.pdf

Mcmillan, J., Callear, T. 2014. Invasive plants in the vicinity of the Dalton Highway, north of the Yukon River - A History and Update from the BLM Central Yukon Field Office Perspective. Powerpoint/pdf presentation. Bureau of Land Management, Fairbanks, AK. 23pp.

Nellemann, C. and R. Cameron. 1996. Effects of petroleum development on terrain preferences of calving caribou. Arctic 49:23-28.

Nellemann, C., Vistnes, I., Jordhøy, P., Støen, O.-G., Kaltenborn, B.P., Hanssen, F., Helgesen, R. 2010. Effects of recreational cabins, trails and their removal for restoration of reindeer winter ranges. *Restoration Ecology* 18(6), 873-881.

Person, B.T., Prichard, A.K., Carroll, G.M., Yokel, D.A., Suydam, R.S., George, J.C. 2007. Distribution and movements of the Teshekpuk Caribou Herd 1990 - 2005: Prior to oil and gas development. Arctic 60(3): 238-250.

Phillips, L., R. Mace and T. Meier. 2010. Assessing impacts of traffic on large mammals in Denal National Park and Preserve. *Park Science* 27(2):60-65. http://files.cfc.umt.edu/cesu/NPS/UMT/2007/09Miitchell_Park%20Science%20_Phillips_Mace_Meier_report.pdf

Plante, S., Dussault, C., Richard, J.H., Côté, S.D. 2018. Human disturbance effects and cumulative habitat loss in endangered migratory caribou. *Biological Conservation* 224, 129-143.

Robinson, S. 1991. Status of the Galena Mountain caribou herd. *Rangifer* 11(4): 116-122. https://www.researchgate.net/publication/47457196_Status_of_the_Galena_Mountain_caribou_herd#fullTextFileContent

Sauer, J.R., Niven, D.K., Pardieck, K.L., Ziolkowski Jr., D.J., Link, W.A. 2017. Expanding the North American Breeding Bird Survey analysis to include additional species and regions. *Journal of Fish and Wildlife Management* 8(1), 154-172.

Spindler, M and B. Kessel. 1980. Avian population and habitat use in interior Alaska taiga. *Syesis* 13: 61-104. https://publications.royalbcmuseum.bc.ca/product/syesis-vol-13/

Tauzer, L. 2013. Recent changes in plant and avian communities at Creamer's Refuge, Alaska using field and remote sensing observations. MS Theses, Univ. of Alaska, Fairbanks, AK https://scholarworks.alaska.edu/handle/11122/8280?show=full

TWS 2019. Comment letter to BLM regarding Ambler Road DEIS signed by President Nathan Svoboda, Alaska Chapter, The Wildlife Society. https://wildlife.secure.force.com/servlet/servlet.FileDownload?file=0155A00000AZMGfQAP

USBLM 2005. Land Use Planning Handbook. Washington DC.

https://www.blm.gov/sites/blm.gov/files/uploads/Media_Library_BLM_Policy_Handbook_h1601-1.pdf

USBLM. 2012. Eastern Interior Alaska Draft Resource Management Plan and Environmental Impact Statement, Volume 2. Eastern Interior Field Office, Fairbanks, AK. 492 pp. https://archive.org/details/easterninteriord02unit

USBLM. 2014. AIM-Monitoring: A component of the BLM Assessment, Inventory and Monitoring Strategy- Taylor, J.J., E.J. Kachergis, G.R. Toevs, J.W. Karl, M.R. Bobo, M. Karl, S. Miller, and C.S. Spurrier. 2014. AIM-Monitoring: A Component of the BLM Assessment, Inventory, and Monitoring Strategy. Technical Note 445. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. https://gis.blm.gov/AIMDownload/Docs/TN_445.pdf

USBLM 2015. Scoping Report for the Central Yukon Resource Management Plan. Central Alaska Field Office, Bureau of Land Management, Fairbanks, AK. 151 pp. https://eplanning.blm.gov/public_projects/lup/35315/56047/60740/CYRMP_Scoping_Report_Web_Final.pdf

USBLM 2016. Analysis of Management Situation, Central Yukon Resource Management Plan. Bureau of Land Management, Fairbanks, AK. 388pp. https://eplanning.blm.gov/public_projects/lup/35315/72940/80089/CYRMP_AMS_all_April_2016_Final.pdf

USBLM 2019a. Ambler Road Project Draft Environmental Impact Statement. Bureau of Land Management, Anchorage, AK. https://eplanning.blm.gov/public_projects/nepa/57323/20002264/250002689/Ambler_Road_Draft_EIS_Volume_1.pdf

USBLM 2019b. BLM Alaska Special Status Species List. BLM, Anchorage, AK. https://www.blm.gov/sites/blm.gov/files/uploads/Alaska_Special-Status-Species-List_2019.pdf

USFWS 2020. Rapid response plan for *Elodea* in Alaska. U.S. Fish and Wildlife Service, Alaska Regional Office, Anchorage, Alaska, 44 pp. https://www.fws.gov/alaska/sites/default/files/2020-08/Rapid%20Response%20Plan%20for%20Elodea%20in%20Alaska.pdf

Wilson, R.R., Parrett, L.S., Joly, K., Dau, J.R. 2016. Effects of roads on individual caribou movements during migration. *Biological Conservation* 195, 2-8.