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May 6, 2013

U.S. Fish and Wildlife Service
Montana Field Office
Attn: Brent Esmoil
585 Shepard Way
Helena, MT 59601

RE: State of Idaho's Comments on the Proposed Rule to List the North American Wolverine Distinct Population Segment as Threatened under the Endangered Species Act. Docket No. FWS-R6-ES-2012-0107.

Dear Mr. Esmoil,

The Idaho Office of Species Conservation (OSC), on behalf of the State of Idaho (State), submits the following comments in response to the U.S. Fish and Wildlife Service's (Service) proposal to list the North American wolverine (wolverine) as threatened under the Endangered Species Act (ESA or Act), dated February 4, 2013. The State has a vested interest in the outcome of this proposed rule and appreciates the Service taking the State's comments into consideration.

Idaho does not take the conservation of wolverine lightly. In fact, the State has been a regional leader in research and conservation in the northern Rocky Mountain States. We support continuing efforts that aim to better understand wolverine migration and behavior and advocate for increased local and national coordination. However, listing the wolverine as threatened is unwarranted and unnecessary, and therefore, the State opposes the proposed rule.

Primarily, the State disagrees with the Service's determination that the North American wolverine qualifies as a distinct population segment (DPS). Without such distinction, the wolverine cannot be listed as threatened. In addition, the ESA does not provide the flexibility, nor is it equipped, to adequately manage and recover a species that faces a single ubiquitous threat like climate change. However, in the event the Service lists the wolverine, the 4(d) proposal, with the addition of incidental trapping, provides at least some predictability by exempting certain land-use activities from liability under section 9 of the ESA.

I. The North American wolverine does not warrant protection under the Endangered Species Act.

The State of Idaho opposes the Service's proposal to list the North American wolverine as threatened under the Endangered Species Act. Like the Service, the State is uncertain as to what effect climate change will have on our ecosystem. However, we will continue in our efforts to maintain and improve Idaho's already sustainable wolverine population. Nevertheless, listing the wolverine based on climate change does not comport with ESA regulations and does not provide a path towards recovery.

First, the wolverine does not qualify as a DPS because the population is not discrete, and loss of the subspecies in the contiguous United States would not represent a significant gap in relation to its entire range, which includes areas within the contiguous United States, Canada, and Alaska. The population and habitat area in the lower 48 states represent a small fraction of the entire range; meaning that, for ESA purposes, the wolverine is insignificant when compared to the entire North American subspecies.

In addition, and perhaps more importantly, the ESA does not provide the wolverine with any additional substantive protection that cannot be provided by the states, and listing based solely on climate change does not allow the Service to develop a meaningful recovery plan for the species. The State of Idaho is well equipped to monitor and manage the species without federal protection, especially considering the fact that the ESA cannot halt climate change.

However, in the event the Service does move forward with listing the wolverine as threatened, the exemptions under section 4(d) of the ESA must be carried through and must include incidental trapping. The Service is basing their listing determination solely on the threats associated with climate change, and they do not point to any other threat that, alone, would be sufficient to support a listing. The 4(d) exemptions would release several human-related activities from liability should an incidental take occur. Again, the State opposes a listing, but the 4(d) exemptions would provide a scenario where some of the impacts on land-use activities would be mitigated.

II. The North American wolverine cannot be listed as threatened in the contiguous United States because it does not qualify as a distinct population segment.

A species must first qualify as an entity or population eligible for a listing in order to be classified as threatened or endangered under the ESA. Generally, a species or a subspecies is the lowest taxonomic classification that is allowed under the ESA, but the Act also allows for federal protections to extend to distinct population segments (DPS).[1] To qualify as a DPS under the ESA, a species must be <u>discrete</u> in "relation to the remainder of the species to which it belongs,"

[1] *See* 16 U.S.C. § 1532(16) (defining the term "species").

and significant "to the species to which it belongs."[2] If a population is found to be discrete and significant, the determination is then made as to whether the species even warrants protection as threatened or endangered.[3]

A. Discrete

A population is "discrete" if it is (1) "markedly separated from other populations of the same taxon as a consequence of physical, physiological, ecological, or behavioral factors" or (2) "delimited by international government boundaries within which differences in control of exploitation, management of habitat, conservation status, or regulatory mechanisms exist that are significant…."[4] The Service concluded that the population in the contiguous United States was discrete largely due to the Canadian border and the difference in conservation status between the two neighboring countries. The State of Idaho questions the Service's determination that the North American wolverine qualifies as a discrete population.

The proposed rule, which relies on the Service's 2010 Warranted but Precluded analysis, determines that the international boundary delimits the wolverine population largely due to effective population differences; as well as, limited habitat availability and small population sizes.[5] The essence of the Service's argument is that the wolverines' connectivity between the contiguous United States and Canada is lacking due to a difference in regulatory mechanisms. Wolverine habitat and populations in Canada and Alaska are plentiful so the Service concludes that the mechanisms in the contiguous United States are insufficient, thereby, creating a difference in conservation status.[6]

This determination that the wolverine population in the contiguous United States is discrete is arbitrary and without merit because the only regulatory mechanism that the Service concludes is lacking is one that exists internationally; that is, the current inability to regulate climate change.[7] Otherwise, the regulatory mechanisms currently in place in the lower 48 states have been deemed by the Service to be adequate.[8] The Service cannot justify its discrete determination based on the United State's inadequate regulatory mechanisms when the only inadequate mechanism cited by the Service applies to both countries. It is illogical to conclude there is a difference in conservation status when the difference affects both nations. Because the

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[2] Policy Regarding the Recognition of Distinct Vertebrate Population Segments under the Endangered Species Act, 61 Fed. Reg. 4722, 4725 (Feb. 7, 1996) ("DPS Policy") (emphasis added).
[3] Id.
[4] Id.
[5] 12-Month Finding on a Petition to List the North American Wolverine as Endangered or Threatened, 75 Fed. Reg. 78030, 78037-78039 (Dec. 14, 2010) (The proposal to list the wolverine references the 12-Month finding to support its significance determination) ("Wolverine 12-Month Finding")
[6] Id. at 78040.
[7] Threatened Status for the Distinct Population Segment of the North American Wolverine, 78 Fed. Reg. 7864, 7883 (Feb. 4, 2013) ("Proposed Rule")
[8] Id.

wolverine does not qualify as discrete, it cannot be classified as a DPS and, therefore, cannot be listed as threatened or endangered under the ESA.

B. Significant

Next, if the species is found to be discrete, the Service then determines whether the discrete population is "significant" in relation to the remainder of the species, or subspecies in this case. The DPS Policy lays out a non-exhaustive list of factors that aid in making this determination, including:

> 1. Persistence of the discrete population segment in an ecological setting unusual or unique for the taxon,
> 2. Evidence that loss of the discrete population segment would result in a significant gap in the range of a taxon,
> 3. Evidence that the discrete population segment represents the only surviving natural occurrence of a taxon that may be more abundant elsewhere as an introduced population outside its historic range, or
> 4. Evidence that the discrete population segment differs markedly from other populations of the species in its genetic characteristics.[9]

Any one or combination of these factors, along with other considerations, can be used to substantiate a significance finding. Commonly, however, significance determinations are supported by information showing that loss of the species would result in a significant gap in the range of the taxon.[10] With this particular listing proposal, the State of Idaho disagrees with the Service's conclusion that the loss of the discrete North American wolverine population within the contiguous United States would result in a significant gap in the range of the subspecies.

i. <u>Standard for evaluating whether loss of the DPS would result in a significant gap in the range of the taxon.</u>

While agencies are afforded a great deal of deference when making listing decisions, they are still required to "articulate a satisfactory explanation" for their determinations.[11] The DPS Policy expressly states that discrete population designations should be used sparingly, and the Service intends for the listing proposals to "explain in detail why it is considered to satisfy both the

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[9] DPS Policy, *supra* note 2, at 4725.

[10] *See*, *e.g.*, Final Rule to Remove the Douglas County Distinct Population Segment of Columbian White-Tailed Deer, 68 Fed. Reg. 43647, 43649 (July 24, 2003); Final Rule to List the Columbia Basin Distinct Population Segment of the Pygmy Rabbit, 68 Fed. Reg. 10388, 10398 (March 5, 2003); *but see* 12-Month Finding on a Petition to List the Sonoran Desert Area Bald Eagle, 77 Fed. Reg. 25792, 25809 (May 1, 2012) ("Sonoran Bald Eagle Petition").

[11] Nw. Motorcycle Ass'n v. U.S. Dep't of Agriculture, 18 F.3d 1468, 1478 (9th Cir. 1994).

discreteness and significance tests of the policy."[12] Any loss within the range of a taxon would arguably result in a gap, therefore; in order to meet the threshold requirement, the analysis depends on whether the gap is significant.

The proposed rule to list the North American wolverine as threatened bases its significance determination solely on the conclusion that the loss of the species "in the contiguous United States would represent a significant gap in the range of the taxon."[13] This determination by the Service is conclusory and unsupported by the information within the proposed rule. The only support proffered for this determination is a dubious finding that the loss of the discrete population would result in a 40 percent decrease in the species' latitudinal range.[14] At first blush, a 40 percent decrease in latitudinal range seems significant; yet, the percentage is inflated due to narrow habitat peninsulas, largely consisting of historic range, that extend down into the western United States.[15] The Service does not provide any detail that explains how or why the 40 percent is significant.

The significance analysis does not include any habitat or population percentages to illustrate how the contiguous United State's wolverine population actually relates to the overall North American wolverine population. Without any sort of analysis relating the discrete population to the larger taxon, or subspecies in this case, the significance finding is arbitrary and devoid of the detail contemplated by the DPS Policy. The Service attempts to support their significance determination by claiming that a loss of the population would eliminate wolverines in the contiguous United States, however this very argument has been deemed insufficient to support a finding that such a loss would result in a significant gap.[16] The proposed rule lacks any substantive facts or data to support their determination that the wolverine population in the contiguous United States is significant in relation to its taxon.

ii. <u>The discrete population of wolverine does not qualify as a DPS because it is not significant in relation to its taxon.</u>

Notwithstanding the lack of information provided by the Service to show that the wolverine population is significant, there exists ample information throughout the proposed rule to support the conclusion that the population is not significant in relation to the much larger, North American wolverine population. In the proposed rule the Service claims that loss of the wolverine in the lower 48 states would reduce the historic range of the taxon, as opposed to the current range, creating a significant gap. The Ninth Circuit, in *National Association of Home Builders v. Norton* (*Home Builders*), provided guidance as to what constitutes a significant gap in relation to a species historic range.[17] The Circuit Court in *Home Builders* held that a loss of the

[12] DPS Policy, *supra* note 2, at 4723.
[13] Wolverine 12-Month Finding, *supra* note 5, at 78040.
[14] Id. at 78041.
[15] COSEWIC ASSESSMENT AND UPDATE STATUS REPORT ON THE WOLVERINE 6 (FIGURE 2) (2003).
[16] *See* Nat'l Ass'n of Home Builders v. Norton, 340 F.3d 835, 849 (9th Cir. 2003) ("Home Builders").
[17] Id. at 848.

pygmy-owls would not be significant because the Service could not support their conclusion that the historic range constituted a "major geographical area."[18]

Using the loss of latitudinal range does not provide a rational basis for concluding that the loss in the lower 48 states would be significant in relation to the taxon. While the language in the proposal does not expressly posit that the Service is comparing the historic range to the taxon, the Service uses the species' historic range to calculate the latitudinal loss percentage. Previous listing decisions have been able to successfully substantiate a significant gap claim using the loss of historic range, but these decisions were supported by data that clearly showed a loss would be significant in terms of actual loss percentages; not latitudinal range loss percentage.[19] This is not to suggest that the Service did not have the best available information; rather, the Service ignored, or chose not to use, certain information they possessed to make the proper determination. The Service admits that information on the current and historical range of the wolverine is lacking, but fails to use the information they do possess within their significance analysis.[20] Furthermore, the proposal does not provide any information in the way of actual overall percentages of habitat or population that would be lost if the wolverine was extirpated from the contiguous United States.

In fact, information within the proposed rule actually suggests that loss of the discrete population would not be significant in relation to the taxon.[21] The proposed rule states that "the bulk of the range of North American [wolverine] is found in Canada and Alaska," and population estimates in western Canada include "approximately 15,089 to 18,967 individuals;" compared to an estimated "250 to 300 individuals" in the contiguous United States.[22] In addition, there is estimated to be over 10,000 wolverines in Alaska.[23] When compared to the western Canadian and Alaskan populations, the population in the contiguous United States makes up, at most, 1.2 percent of the entire North American population.

Besides just population numbers, a species' habitat can be used to support a significance determination, as well. Similar to the issue in *Home Builders*, the proposed rule does not offer any information to support their conclusion that the range in the lower 48 states is significant, and other data actually supports a determination to the contrary.[24] The Service simply concludes that loss of the population would result in a 40 percent decrease in historic latitudinal range; however, as previously mentioned, this is insubstantial and misleading because the proposal does

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[18] Id.
[19] *See* Id.
[20] Proposed Rule, *supra* note 7, at 7869.
[21] *See generally* Motor Vehicle Mfrs. Ass'n v. State Farm, 463 U.S. 29, 43 (1983) ("Normally, an agency rule would be arbitrary and capricious if the agency has … offered an explanation for its decision that runs counter to the evidence before the agency").
[22] Proposed Rule, *supra* note 7, at 7868-7869.
[23] Wolverine 12-Month Finding, *supra* note 5, at 78037.
[24] COSEWIC, *supra* note 15.

not tell us anything about the discrete population's range in relation to the entire range of the subspecies.[25]

The wolverine proposal is also similar to the 2012 proposal to list the Sonoran bald eagle where the Service determined that the eagle did not qualify as a DPS because, amongst other reasons, the Sonoran population was not significant in relation to its taxon.[26] This determination was largely supported by the fact that, when compared to the entire bald eagle population in North America, the Sonoran population "represent[ed] much less than one half of a percent of the number of breeding pairs throughout the range of the species."[27] As with the Sonoran bald eagle, the proposed wolverine population and habitat in the lower 48 states is not numerous and does not constitute a significant percentage of the entire subspecies' range. Furthermore, like the Sonoran bald eagle, the wolverine population in the coterminous United States does not possess distinctive traits or genetic variations that would negatively impact the subspecies if this specific population was lost.

The proposed rule does not provide any substantive information or data to support its conclusion that loss of the wolverine in the contiguous United States would result in a significant gap in the range of the taxon. In fact, the proposal actually contradicts its own significance determination by providing information that shows the discrete population is not significant in relation to the taxon. In addition, the Service candidly admits that they do not possess sufficient data on the overall range of the species. Because the Service cannot support the significance determination, the wolverine population in the lower 48 states does not qualify as a DPS and, therefore, is not a listable entity under the ESA.

III. The ESA is not a means through which the Service can regulate climate change.

Undoubtedly our climate is changing, and the future effects of such change are largely unknown. The Service, in 2008, listed the polar bear as threatened in response to temperature variations, citing climate change as the primary threat facing the species.[28] This polarizing decision by the Service brought equal amounts praise and opposition. Much of the opposition was centered on the fact that the positive listing determination stemmed almost entirely from the

[25] *See generally* SEC v. Chenery Corp., 332 U.S. 194, 196-197 (1947) ("It will not do for a court to be compelled to guess at the theory underlying the agency's action"); A helpful comparison is to imagine a uniform lake 10 miles in length from north to south, and 100 miles wide from east to west. Also, imagine the lake has a narrow inlet extending an additional 8 miles south from the southwest corner of the lake. With all else equal, if you were to drain the inlet, more than 40 percent of the lake's range from north to south would be lost (8 miles out of 18). However, in reality, draining the inlet would only result in less than a ½ percent loss of the total area occupied by the lake. This example is helpful in conceptualizing the Service's significance argument, and also shows how their determination is arbitrary and devoid of the facts necessary to support such a conclusion.

[26] Sonoran Bald Eagle Petition, *supra* note 10, at 25809.

[27] Id.

[28] Determination of Threatened Status for the Polar Bear throughout its Range, 73 Fed. Reg. 28212 (May 15, 2008) ("Polar Bear Final Rule").

threats associated with climate change, namely melting sea ice. Notwithstanding criticism and legal action from both ends of the environmental spectrum, the rule still stands today.

While the State of Idaho does not attempt posit its own rationale for habitat variations, the State does question the Service's use of warming temperatures as a means to list a species. As it relates to the North American wolverine, the State's concerns are two-fold. First, the ESA, as a regulatory tool, was never meant to address global threats that are far less proximate than threats originally contemplated by the Act. Second, even if the species is listed, the Service cannot provide any substantive federal protections and will be unable to develop a recovery plan that can ameliorate the effects of climate change.

A. The ESA is not able to address the global effects of climate change.

The overarching purpose behind the ESA is to "provide a means whereby the ecosystems upon which [listed] species depend may be conserved."[29] "Conservation" includes "procedures which are necessary to bring any [listed] species to the point at which the measures provided pursuant to this act are no longer necessary."[30] Clearly, the Act was not meant to list a species in perpetuity.[31] However, the Service and various federal courts have conceded that threats stemming from climate change, such as habitat fragmentation, are sufficient to warrant a listing under section 4 of the ESA.[32] The State's contention is that the ESA does not have the authority to address such a ubiquitous threat because such regulation goes beyond the scope of the Act.

While the State recognizes that statutes must be flexible enough to deal with issues that were not contemplated by Congress at the time of enactment, the ESA is not structured to handle listings based solely on climate change.[33] Even beyond the Act's structure, ESA authority only extends as far as our borders. It is not capable of regulating climate change internationally, where the biggest offenders operate. Even beyond the issues associated with ESA's scope and authority, sections 7 and 9 reveal that climate change and the ESA are incompatible. Section 7 deals with interagency consultation, and section 9 addresses liability for take.

The regulatory agencies openly recognize the dilemma associated with climate change and an action agency's duty to consult. Both the Service and the National Marine Fisheries Service (NMFS) admit that "section 7(a)(2) simply was not intended to deal with global processes at individual project level consultations."[34] At its core, the issue stems from the inability to establish a causal connection between an individual emitter of greenhouse gases and a specific species, except in those rare circumstances where the emitter may be in the immediate area and

[29] 16 U.S.C. § 1531(b).
[30] Id. at § 1532(3)
[31] *See* Id. at § 1533(f)(1)(B)(ii).
[32] *See, e.g.*, Polar Bear Final Rule, *supra* note 28; In re Polar Bear, 709 F.3d 1, 9 (D.C. Cir. 2013) (holding that the polar bear listing rule was not arbitrary and capricious).
[33] *See generally* Massachusetts v. EPA, 549 U.S. 497 (2007).
[34] Interagency Cooperation under the Endangered Species Act, 73 Fed. Reg. 76272 (Dec. 16, 2008).

there is a direct causal link. Otherwise, in almost all circumstances, section 7 becomes all bark and no bite because it is impossible to discern whether a single facility emitting greenhouse gasses will be likely to adversely affect a specific species.

Similarly, section 9 has little to no impact on species threatened by climate change due to the fact that, in most cases, the causation would be too tenuous to support a takings claim. Under section 9, liability is only found when it has been determined that the person or entity accused of take is the proximate cause of the take.[35] Proving proximate cause is not possible, as was the issue with section 7, when the problem is caused by an amalgamation of toxins from emitters across the globe. Again, the regulatory purpose behind the ESA has been defeated when climate change is the only threat facing the species.

In reality, while proponents would celebrate a minor victory with a listing, the force and effect of the ESA is rendered null when a species is listed because of climate change. The ESA is not equipped to handle this type of threat and that quickly becomes apparent once section 7 and section 9 come into play. Many support a listing simply because it may provide an avenue for funding and bring notoriety to the species. While the State does not disagree that funding and attention are important, there are other more appropriate ways of accomplishing these tasks without inappropriately using the ESA as a means to an end.

B. The ESA does not provide the wolverine with any substantive protections nor is the Service able to develop a realistic recovery plan.

As intimated in the previous section, listing the North American wolverine as threatened would provide the species with little more than a titular place on the endangered species list. Generally, a listing has a prescriptive effect on certain activities that are identified as threats to the species. The classic example is the impact of DDT on the bald eagle. However, with climate change, there is no tangible threat that can be addressed and mitigated. In addition, a recovery plan generally entails a series of attainable goals that, if met, will likely result in the species' recovery; yet, the Service's inability to regulate such a threat makes the development of a recovery plan an exercise in futility.

The State of Idaho is responsible for monitoring and managing wildlife within its borders, and Idaho currently supports a functioning wolverine population.[36] The State also recognizes the need for more information on the wolverine and has been a leader in wolverine research and conservation in the northern Rocky Mountain States.[37] Considering that the federal government is in no better position to provide for the conservation of the species, State management of the species should continue. Efforts should continue to focus on studying and monitoring the

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[35] Babbitt v. Sweet Home Chapter of Communities, 515 U.S. 687, 708 (1995).
[36] I.C. § 36-103; Proposed Rule, *surpra* note 7, at 7871.
[37] *See, e.g.*, DR. KIMBERLY HEINEMEYER & DR. JOHN SQUIRES, IDAHO WOLVERINE WINTER RECREATION PROJECT: INVESTIGATING THE INTERACTIONS BETWEEN WOLVERINES AND WINTER RECREATION 2011-2012 PROGRESS REPORT (2012).

wolverine, rather than expending resources on an unnecessary federal effort. The ESA is not a golden ticket, and there are other, more beneficial, ways of providing the wolverine the protection it needs.

In addition, section 4(f) requires the Service to develop a recovery plan for the conservation of species listed as either threatened or endangered under the ESA.[38] The State is aware of the caveat which gives the service discretion to develop a plan. However, the inability to provide practical steps towards recovery further supports the notion that the Act is not the proper venue for addressing threats from climate change. It will likely be argued that a recovery plan is able to support certain actions, such as habitat restoration, but, again, this can be achieved without a listing through local and collaborative efforts.

The State takes the conservation of the North American wolverine very seriously and we hope to see the species remain a part of Idaho's heritage well into the future. However, the State also recognizes the import of working within the purview contemplated by the drafters of the ESA, and while flexibility is required in an ever-changing world, it is clear from the language of the Act that climate change cannot be adequately addressed.

IV. If the wolverine is listed, the special rules under 4(d) of the ESA must be carried through to the final rule.

The proposal to list the wolverine as threatened recognizes that most human-related activities have not had any appreciable impact on the species or its habitat. Idaho would be placed in a very difficult position without the special rules identified in the proposal. These special rules, which apply only to threatened species, grant the Secretary of Interior discretion to exempt certain activities from liability under section 9 of the ESA.[39] The activities identified as exempt in the proposal include recreation, land management activities, and infrastructure development.[40] The Service concludes, based on the data available to them, that the "overall impact of these activities is not significant to the conservation of the species."

However, the State requests that incidental trapping also be listed as an exemption under the 4(d) rule. The Service concludes that incidental trapping is not a threat, but surmises that it may become a threat if considered in conjunction with climate change.[41] Yet, the Service admits that in Montana, where trapping is still legal, wolverine populations have rebounded significantly, even with higher harvest rates.[42] In Idaho, where trapping wolverines is illegal, there have been five documented mortalities out of eleven incidental trappings in the last 48 years, and the recent increase in trapping has not resulted in a higher rate of incidentally trapped wolverines.[43] The

[38] 16 U.S.C. § 1533(f)(1).
[39] 16 U.S.C. § 1533(d).
[40] Proposed Rule, *supra* note 7, at 7888.
[41] Id. at 7882.
[42] Id. at 7881.
[43] *See*, Idaho Department of Fish and Game Comments, dated May 6, 2013 (attached).

Service must rely on the information available to them, and that information indicates that incidental trapping is not a threat to wolverines. The data actually shows that population trends are increasing, and even if the Service considers incidental trapping in conjunction with climate change, there is no substantive information to support their conclusion that incidental trapping "may" contribute to declines in wolverine population.

Idaho's economy and way of life depend heavily on such activities and since the Service has found that they have little to no effect, it is extremely important that they are exempted within the final rule. While the State hopes that a listing can be prevented, it is important that the final rule reflects the Service's own determination that the species' viability is not dependent on restricting the specified human-related activities.

V. Conclusion

It is our sincere hope to see this magnificent species remain a part of the ecosystem in Idaho. The State has already undertaken steps to conserve the wolverine and its habitat and has supported independent studies that seek to better understand the species and its behavior. Considering the type of threat facing the wolverine, the State is equipped to continue monitoring the species and welcomes support from local communities and beyond. Additional funding and recognition that are often concurrent with a listing can still be achieved through alternative avenues without the need for a listing.

In addition, it is important that the Service adhere to their policies and regulations and act within the constructs of the ESA. Based largely on the information and data used within the proposed rule, the wolverine does not qualify as a DPS in the contiguous United States. They are not discrete and do not represent a significant population when compared to the entire range of the subspecies. Furthermore, listing the wolverine based on climate change goes beyond the scope of the ESA and does not offer the species any substantive protections or a path toward recovery. However, if the Service determines that the wolverine qualifies as a threatened species, the 4(d) exemptions listed in the proposal, including incidental trapping, must be included in the final rule.

Enclosed you will find detailed technical comments from the Idaho Department of Fish and Game. Thank you for taking the time to review and consider the State of Idaho's comments during the rulemaking process. Please do not hesitate to contact our office at (208) 334-2189 if you have any questions.

Sincerely,

Dustin T. Miller

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C.L. "Butch" Otter / Governor
Virgil Moore / Director

Idaho Department of Fish and Game Comments Re: U.S. Fish and Wildlife Service proposal to list North American Wolverine, April 30, 2013

The U.S. Fish and Wildlife Service (Service) has proposed to list the population of North American wolverine occurring in the contiguous United States as a threatened species under the Endangered Species Act. The Service has requested comments or information from the State of Idaho concerning this proposed rule. The Idaho Department of Fish and Game (Department) has comments and information on many of the topics the Service has outlined important in the Service's decision-making process. Our technical comments reflect the topic outline provided by the Service's proposal. The Department previously provided technical information utilized in Idaho's Office of Species Conservation comments to the Service regarding the wolverine status review (N. Fisher letter to USFWS, May 2010). That information is still valid; much of our previous information is reiterated in these comments.

Information requested:

(1) Biological, commercial trade, or other relevant data concerning any threats (or lack thereof) to this species and regulations that may be addressing those threats.

The Department disagrees with the Service's finding that, under the DPS Policy, the wolverine population within the contiguous United States meets the distinct population segment (DPS) criteria because of differences in conservation status as delimited by the Canadian-United States international governmental boundary. The Service acknowledges in the proposal that all states of concern in the Rocky Mountains provide wolverines protective status and do not allow harvest of wolverines (with the exception of Montana, which still provides regulatory mechanisms and safeguards for wolverine populations). The Service also acknowledges that regulatory mechanisms appear sufficient to maintain robust populations in Canada. Therefore, the Service's acknowledgement of these regulatory safeguards and protective status provided to wolverines is contrary to the statement in the proposal that "existing regulatory mechanisms in the contiguous United States are insufficient to protect the wolverine from threats due to its depleted conservation status."

The crux of our point is that:

- The Service has acknowledged that the States have existing protective regulations,
- The Service has further acknowledged that wolverine populations are probably the most robust they have been in Idaho and Montana in the last 100 years,
- The Service has provided no evidence that current regulatory mechanisms are insufficient to protect the wolverine from threat.

(2) Additional information concerning the historical and current status, range, distribution, and population size of this species, including the locations of any additional populations of this species.

The Department has provided the Service with wolverine information concerning status, range, distribution, and population size, including locations, during a previous review. Historical data are equivocal regarding general Idaho population trend, but available evidence suggest a *potential* decline during the early 1900s and subsequent recovery during the 1960s through the 1980s (see, e.g., Groves 1988). The Department has no information to suggest any recent shrinkage in the Idaho distribution of the wolverine.

The wolverine was first documented to occur in Idaho during the late 1800s in a report from an early biological survey (Merriam 1891). This report included mention of the first specimen of a wolverine, a carcass encountered on August 19, 1890 in the Lemhi Range, as well as records of occurrence in the Sawtooth and Blackfoot mountains. Davis (1939) characterized distribution as: "Probably extinct in Idaho; if not, restricted to the more inaccessible mountainous central portion of the state." He also remarked: "Trappers in the Sawtooth and Salmon River mountains claim that none has been seen or reported in those areas in the last twenty years." Even by mid-20th century, the wolverine was regarded as an exceptionally rare species in the state (Pengelley 1951). Groves (1988) summarized wolverine distribution in the state based on reported sightings. He demonstrated that the number of reported sightings increased in the 1960s through the 1980s, but suggested that this pattern could be attributed to increasing human access to backcountry areas inhabited by wolverine, as well as a lack of thorough accounting of historical sightings, which went largely unreported.

Ongoing surveys since 2010 in the Department's Panhandle Region have documented occurrence of wolverine in the Selkirk Mountains of Idaho during 2011 and 2012 (Michael Lucid, IDFG). Based on DNA data, one individual has been documented to also occur in adjacent British Columbia, Canada, demonstrating trans-boundary movements (Kortello and Hausleitner 2012).

The Department does have 25 new observations since 2010. These observations overlap entirely with data points in our 2010 summary, with the exception of the two records noted previously in the Selkirk Mountains. We believe these to be the first confirmation of occurrence in the Selkirk's since the 1970s, further supporting our belief that wolverine populations are likely robust and widespread in Idaho.

See Appendix A for maps of wolverine observations and documentation through 2010.

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(3) Any information on the biological or ecological requirements of the species, and ongoing conservation measures for the species and its habitat.

The Department is currently drafting an Idaho Wolverine Conservation Plan. This document will help identify, prioritize, and coordinate activities directed at wolverine conservation and management in Idaho. The resulting plan will serve as a guidance document to establish management direction, advance communication and coordination within the resource management community, and identify and prioritize information needs and future research. Components will include recommendations for a monitoring framework to facilitate adaptive management, recommendations for forest managers, land-use and transportation planners, and entities engaged in private lands conservation. This document would enable tangible wolverine conservation actions through the planning process itself, which would open lines of communication within the conservation community, and through the establishment of consensus priorities. Compliance with guidelines and recommendations within the plan would be voluntary (for those actions not regulated by the Department) and we expect the plan to create opportunities for public-private partnerships and advance public endorsement and engagement in conservation activities.

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(4) Current or planned activities in the areas occupied by the species and possible impacts of these activities on this species.

The Department discusses research and our current regulatory framework of activities elsewhere in these comments.

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(5) The reasons why we should or should not designate habitat as ‘‘critical habitat’’ under section 4 of the Act (16 U.S.C. 1531 et seq.) including whether and how the wolverine may benefit from such a designation; whether there are threats to the species from human activity, the degree to which it can be expected to increase due to a critical habitat designation, and whether that increase in threat outweighs the benefit of critical habitat may not be prudent.

The Department thinks that further evaluation of climate change models and potential threats to wolverines from human activity should be made before any listing of wolverines and designation of "critical habitat" is made.

The Department sees no benefit to designating critical habitat based on current distribution of wolverines if indeed climate change is going to potentially change "where" wolverine habitat is going to naturally exist in the future. Designating certain geographic areas as critical to wolverines based on present climate is futile if weather patterns and climate 35-75 years from now would render these geographical areas as uninhabitable for wolverines. Instead, since there is no immediate threat to wolverines, the Service should use some of the latest climate change models and further wolverine monitoring to determine which areas would be critical in the future (35-75 years) for persistence of wolverines if climate continues to change.

The Department does not have technical information specific to whether winter recreation activities impact wolverines negatively or positively. From a technical perspective, the Department believes that the Service opinion that human disturbance has no impact positively or negatively has not been sufficiently founded by the available documentation . For example, the Service states numerous times in their proposal that information is lacking to determine how wolverines respond to human presence and disturbance (e.g., *'Little is known about the behavioral responses of individual wolverines to human presence, or about the species' ability to tolerate and adapt to repeated human disturbance.' 'How or whether effects of disturbance extend from individuals to characteristics of subpopulations and populations, such as vital rates (e.g., reproduction, survival, emigration, and immigration) and gene flow, and ultimately to wolverine population or metapopulation persistence, remains unknown at this time.' 'No rigorous assessments of anthropogenic disturbance on wolverine den fidelity, food provisioning, or offspring survival have been conducted.'*) and we fully agree with these statements; thus we offer that information is not sufficient to draw any conclusion at this time. The Service essentially equated 'no data' or equivocal data (as in the case of den abandonment) with 'no effect.' The Department recommends that the Service recognize human disturbance from winter recreation as an element with as yet undetermined effects to populations. A listing will not promote the continued comprehensive evaluation necessary for any conclusion regarding winter recreation.

The Department is a partner in the Central Idaho Winter Recreation/Wolverine Study and we are concerned about how data from this study was interpreted in assessing effects of recreation in the proposal. Initiated in 2010, the research is ongoing. The questions the study hopes to address require robust sample sizes from multiple study areas over multiple years. The data available in 2012 were preliminary, and any conclusions drawn from this incomplete data set are premature. The only certain fact is that wolverines occur in landscapes of various levels of winter recreation, including a heavily-recreated landscape. To assume this demonstrates no effect to wolverine population parameters is simplistic and not an appropriate use of the study. Additional data are needed before conclusions can be made.

(6) Specific information on the amount and distribution of wolverine habitat.

Please see the Departments previous comments regarding designating critical habitat on topic (5) and Appendix A.

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(7) Information on the projected and reasonably likely impacts of climate change on the wolverine and its habitat.

The Department has reviewed the climate change material and models the Service based their decision on to propose listing of wolverines. We provide the following summary and a more comprehensive set of comments in Appendix B.

Available information demonstrates that Idaho's climate is changing. The Service's Proposed Rule does an adequate job of summarizing the current scientific literature regarding broadscale climatic trends. However, as written, it fails to adequately consider and incorporate the range of uncertainty associated with that science and how that uncertainty may influence estimated and projected effects to wolverine habitat, particularly in a topographically diverse area such as central Idaho.

The Service's Proposed Rule relies on a sample size of one (McKelvey et al. 2011) to relate proposed climate change to wolverine habitat. Therefore, the Service's decisions are subject to the limitations and caveats of the data openly discussed throughout that paper, including uncertainty due to scale, model error, and topographic complexity. Each of these limitations, and more (discussed in Appendix B), may result in over- or under-estimation of potential impacts to wolverine habitat.

The Service's Proposed Rule, as written, fails to adequately and appropriately represent the breadth of uncertainty in both the climate science and the application of that science to wolverine habitat. Additional analyses using the latest climate science may not result in different conclusions regarding the direction or magnitude of changes in snow and resulting impacts on wolverine, but it would further our understanding of the range of possible futures and the level of (un)certainty associated with each.

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(8) Suitability of the proposed 4(d) rule for the conservation, recovery, and management of the DPS of the North American wolverine occurring in the contiguous United States.

See the Department's previous comments under topic (1) regarding the conflicting statements of the Service stating that States do provide protective status yet have inadequate regulatory mechanisms and thus the Service proposal for a DPS. We also reiterate the previous comments by the State of Idaho regarding a wolverine DPS (N. Fisher letter to USFWS, May 2010).

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(9) Additional information concerning whether it is appropriate to prohibit incidental take of wolverine in the course of legal trapping activities directed at other species in the proposed 4(d) rule, including any information about State management plans related to trapping regulations and any measures within those plans that may avoid or minimize the risk of wolverine mortality from incidental trapping for other species.

As noted in the Service's proposal to list wolverines, the State of Idaho provides protection to wolverine and has classified the wolverine as a protected nongame species since 2005. In Idaho, the wolverine has been protected since 1965 with no open harvest season. The Department has a mandatory furtaker harvest report which requests that all live incidental catches be reported by species. This has provided information on incidental wolverine catches in the past. Further, any wolverine catch that results in mortality is required to be reported.

The Department reemphasizes the following points:

- As noted by the Service and the Department, the trapping regulatory mechanisms and protective status provided to wolverines has not resulted in any documented impact to the wolverine population.
- As has been noted by the Service in the proposal to list wolverines, wolverine populations and distributions appear as robust in recent years as it ever has in the last 100 years with the State's trapping regulations in place and protective status.

During the previous Status Review, the Department provided records of incidentally-trapped wolverines. Since 1965, a total of 11 wolverines were incidentally trapped during the Idaho furbearer season. While the fate of all wolverines is not known, it is known that 5 catches resulted in mortality and 2 were released. Since 2010, the Department has had no further report of incidentally-caught wolverines. The Department wishes to emphasize that over the last 2 years, the number of trappers has increased and the Department has offered the opportunity to trap wolves. It has been speculated by some that wolf trapping would lead to incidentally-caught wolverines. The Department wishes to make the following points based on 2 years of experience and wolf and wolverine ecology:

- The Department requires all wolf trappers to take a Mandatory Wolf Trapper Education course; the instructors specifically instruct participants in these courses how to avoid incidentally catching wolverine and lynx, as well as other non-target species; including proper snare height, and pan-tension on foot-hold traps.
- The Department has adopted regulatory mechanisms in the last several years that benefit wolverines such as requiring stops or break-away devices on snares and encouraging the use of both.
- Wolf behavior in the winter months (Idaho's main trapping season) is to follow ungulate populations to lower elevations, whereas wolverine behavior is to use higher elevation areas; the separation in time and elevation further reduces the risk of

catching a wolverine during the main trapping season in Idaho and other Rocky Mountain States.

In summary, the Department thinks the Service was speculative when it reasoned that incidental trapping could have a confounding impact with climate change on wolverine populations. No evidence exists that documents a population impact to wolverines because of incidental trapping, which in Idaho from all available records is <0.25 wolverines caught per year, and only 5 known mortalities (1 known mortality from trapping every 9 years).

A "no take" policy under 4(d) for incidental catches of wolverine is not in the best interest of wolverine conservation and policy as it will result in less cooperation from many trappers.

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(10) Additional provisions the Service may wish to consider to conserve, recover, and manage the DPS of the North American wolverine occurring in the contiguous United States.

The Department does not believe there is technical justification at this time to list wolverines. The foundation and justification of the Service proposal is based on climate models which may or may not properly predict change. The Service has acknowledged that wolverine populations are probably the most robust they have been in Idaho and Montana in the last 100 years. Our strong recommendation is that the Service advance wolverine conservation by working with the States to develop state conservation plans with sufficient monitoring to address the many important technical uncertainties that we have highlighted.

Appendix A. Wolverine Observations Through 2010

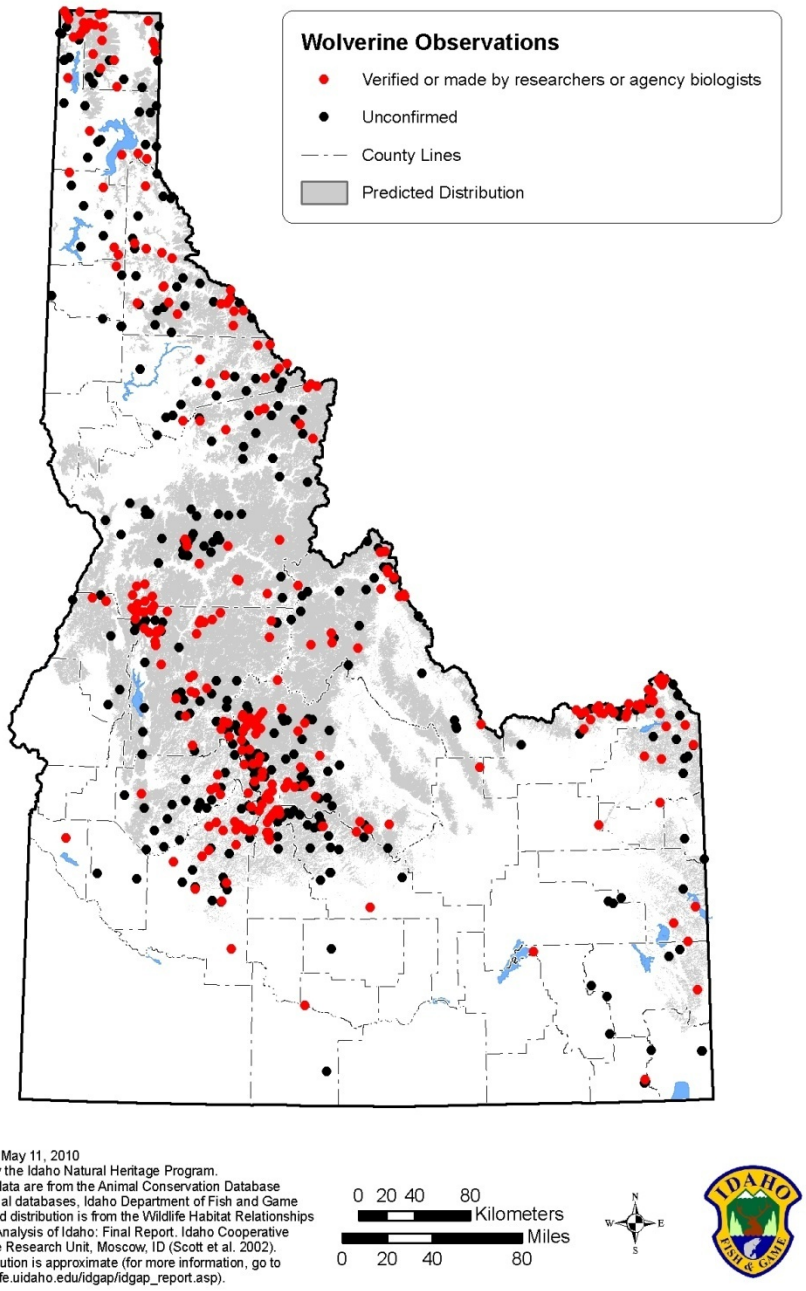
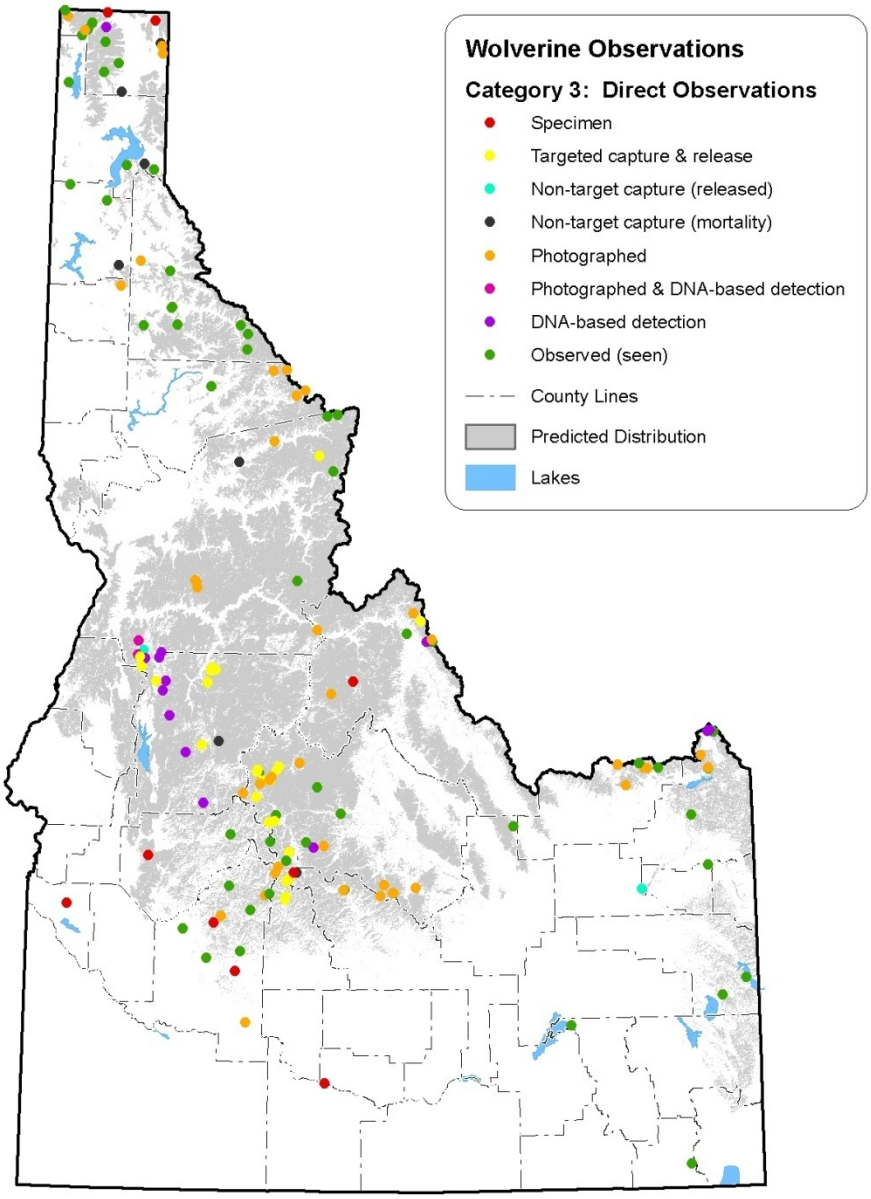


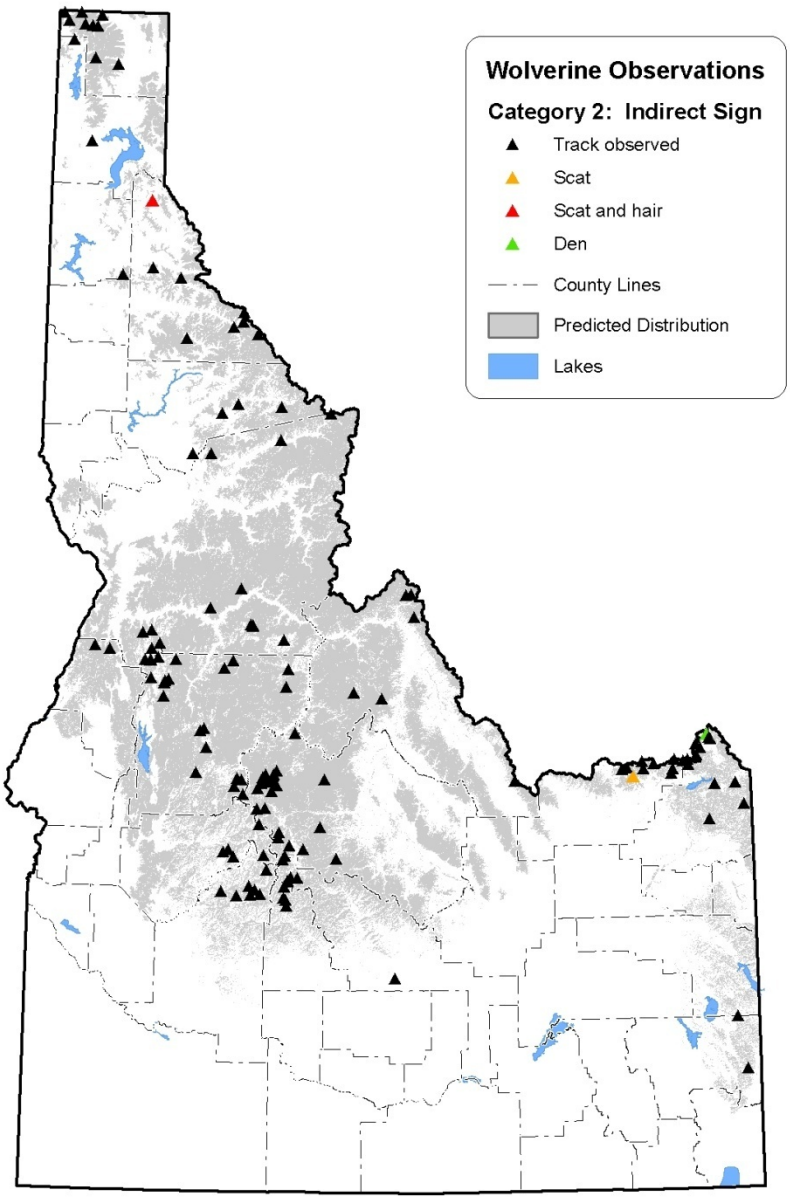
Figure 1. Range of all North American wolverine observations in Idaho and predicted distribution. Predicted distribution is from Wildlife Habitat Relationships Models (Scott, J.M., C.R. Peterson, J.W. Karl, E. Strand, L.K. Svancara, and N.M. Wright. 2002. A Gap Analysis of Idaho: Final Report. Idaho Cooperative Fish and Wildlife Research Unit. Moscow, ID.) Records displayed in red are Category 2 or 3 observations and records in black are Category 1 observations.



Map created on May 11, 2010
and prepared by the Idaho Natural Heritage Program.
Sources: Point data are from the Animal Conservation Database and other regional databases, Idaho Department of Fish and Game (2010). Predicted distribution is from the Wildlife Habitat Relationships Models, A Gap Analysis of Idaho: Final Report. Idaho Cooperative Fish and Wildlife Research Unit, Moscow, ID (Scott et al. 2002). Predicted distribution is approximate (for more information, go to http://www.wildlife.uidaho.edu/idgap/idgap_report.asp).

0 20 40 80 Kilometers
0 20 40 80 Miles

Figure 2. Category 3 records of direct observations of North American wolverine in Idaho.



Map created on May 11, 2010
and prepared by the Idaho Natural Heritage Program.
Sources: Point data are from the Animal Conservation Database and other regional databases, Idaho Department of Fish and Game (2010). Predicted distribution is from the Wildlife Habitat Relationships Models, A Gap Analysis of Idaho: Final Report. Idaho Cooperative Fish and Wildlife Research Unit, Moscow, ID (Scott et al. 2002). Predicted distribution is approximate (for more information, go to http:/www.wildlife.uidaho.edu/idgap/idgap_report.asp).

0 20 40 80 Kilometers
0 20 40 80 Miles

Figure 3. Category 2 records of indirect evidence of North American wolverine in Idaho.

Appendix B. Idaho Department of Fish and Game Specific Comments Regarding Climate Change and the Service's Proposed Listing of Wolverines.

Climate science and the application of that science to wildlife management are emerging fields. As such, the best available information for assessing the impacts of climate change on wildlife is continually changing. Based on the current state of knowledge for the Pacific Northwest, and Idaho in particular, it is our scientific opinion that:

- Idaho's climate has changed and continues to do so. The Service does an adequate job of summarizing the current scientific literature regarding broadscale trends in temperature, precipitation, and snowmelt in the region (pages 51-52).

- Although much research has been done in the realm of climate science in the last decade, comparatively little of that has been applied to address on-the-ground impacts to wildlife and the habitats on which they depend. Only 5 analyses directly relate climate change to wolverines (cited by the Service, page 49), and the Service recognizes only one (McKelvey et al. 2011) as the "best scientific information available" (page 50). A more appropriate statement would be that this is the *only* scientific information available, and it only addresses one (reduced snowpack) of the three primary mechanisms analyzed by the Service (page 51). The other two mechanisms (increased summer temperatures and ecosystem changes) are not adequately supported. With regard to ecosystem changes, the Service clearly states that wolverines are not dependent on any particular ecosystem or vegetation type (page 52, 54) yet concludes that movement of the alpine ecosystem (treeline) up or down slope will result in a similar change in wolverine distribution (page 53, 54). While there is evidence to support the movement of treeline, there is no empirical evidence to support the conclusion that wolverine will/or have followed suit.

- The Service fails to adequately consider and incorporate the range of uncertainty associated with the climate-wolverine science available. Global Climate Models (GCMs) provide credible estimates of climate variables at global and continental scales (Randall et al. 2007). This credibility relies on several lines of evidence: consistency with well-understood physical processes and laws, a demonstrated significant and increasing ability to simulate recent and past climate dynamics, and extensive model comparisons that reveal convergence of different models toward similar results (Reichler and Kim 2008). But, GCMs are still only models and, like all models, have inherent uncertainty. The additional analyses necessary to relate these models to wolverine habitat, including statistical downscaling, developing snow variables through the use of the variable infiltration capacity (VIC) hydrologic model, and application of these resulting snowpack estimates to wolverine habitat all introduce error (see following comments) and may result in over- or under-estimation of impacts to wolverine habitat. McKelvey et al. (2011) clearly identify these limitations and more (pages 2895-2896), yet the only acknowledgement of this range of uncertainty by the Service in the Proposed Rule is a

single sentence, "We recognize that there are scientific uncertainties on many aspects of climate change…" (page 49).

- Global Climate Models (GCMs) have coarse spatial resolutions in the range of 100-200km on a grid cell side – a scale at which mountain ranges are not sufficiently resolved to accurately represent the sharp gradients in temperature, precipitation, wind, and other climate variables that often occur in these areas (IPCC 2007, Kunkel et al. 2013). Thus, downscaling through either statistical or dynamic methods is necessary. While downscaling improves the ability to see impacts of topography, it also requires additional decisions, computational steps, and modeling assumptions (Daniels et al. 2012). For example, one of the primary decisions is the spatial resolution of the final downscaled data. McKelvey et al. (2011) used data downscaled to 6km on a cell side (i.e., each cell represents 36 km^2 or 8896 acres). While this spatial resolution may be appropriate for some situations, elevations in Idaho can range 2248m within each 6X6 cell. Given this topographic complexity, snow in Idaho tends to be 'naturally' highly fragmented along narrow ridges. McKelvey et al. (2011) notes the potential impact of this concluding that "the large degree of uncertainty associated with future snow conditions in Idaho may be due, at least in part, to the interaction between snow cover and spatial scale" (page 2895) and later, "… the lack of snow in areas such as Idaho, is at least partially due to these scaling issues and is unavoidable" (page 2896). In addition, the delta method of statistical downscaling, the approach used by McKelvey et al. (2011), relies on a statistically sufficient density of observation data to constrain the model estimates. Although many areas in the Pacific Northwest have an adequate distribution of observation data, such data are sparse in some regions of Idaho.

  The Service cites McKelvey et al. (2011) saying that, "…much of the wolverine habitat in central Idaho may become entirely unsuitable for wolverines within the projected level of warming…" (page 53) and, on page 57, "habitat losses are … projected to be most severe in central Idaho". However, they fail to note the model limitations McKelvey et al. (2011) openly discussed. Given that the Service limited the Proposed Rule to the results of McKelvey et al. (2011), their decisions are also subject to these limitations and caveats.

- Downscaled GCMs provide temperature and precipitation data that must be transformed into snow variables (e.g., snow depth, snow water equivalent, etc.) by other methods. McKelvey et al. (2011) used the VIC hydrologic model for this purpose (note, several other snow models are available). Although VIC is a validated, maintained, and widely used model for estimating snowpack volume, runoff, and streamflow in the Pacific Northwest, it is still a model and subject to limitations. For example, the VIC model is intended for relatively large areas, typically >10,000km^2 up to continental or global scales (Elsner et al. 2010). In addition, the current version of VIC represents snow areal extent indirectly based on vegetation type and elevation band (Andreadis and Lettenmaier 2006), thus a key model assumption is that sub-grid scale variability in vegetation, topography, soil properties, etc., can be parameterized (Elsner

et al. 2010). Again, the limitations of scale of the snow models are not addressed in the Service's Proposed Rule.

- McKelvey et al. (2011) note that their assessment likely underestimates impact to wolverine habitat, however, they also note that the validity of their analyses will ultimately depend on the validity of their model assumptions (page 2895). Given the topographic complexity of Idaho, the validity of these assumptions is uncertain. For instance, when McKelvey et al. (2011) compared their downscaled GCM projections with the satellite imagery (MODIS) derived snow cover, Idaho was the only area where the MODIS data showed more snow-covered areas than the GCMs (page 2891, figure 6) –suggesting that the downscaled GCM projections may be overestimating the loss of snow in this area. However, it is also important to remember that, although highly correlated, model-derived estimates of snow water equivalent and snow depth and imagery-derived estimates of snow cover are not exactly surrogates either for each other or for the biological needs of wolverine reviewed by the Service (page 15 – "persistent, stable snow greater than 1.5 meters…").

- The Service considered McKelvey et al. (2011) the 'best scientific information available" (page 50). Although McKelvey et al. (2011) employed what they felt were the most reliable climate models and analysis approach available at the time of their project, the climate science has continued to evolve and newer GCMs, emission scenarios (now referred to as Representative Concentration Pathways -RCPs), and analysis approaches are now available – each are briefly discussed below.

  With regard to GCMs, McKelvey et al. (2011) used a subset of models (10 of 23) from the CMIP3 family used in the IPCC 4th Assessment Report. All of these models have since been updated (and new ones developed) as part of the CMIP5 family of models used in the IPCC 5th Assessment Report (due out in September 2013, Taylor et al. 2012), although extensive comparisons between CMIP3 and CMIP5 models are only recently becoming available (Knutti and Sedlacek 2013).

  With regard to emission scenarios, McKelvey et al. (2011) used only one moderate scenario (A1B) to project climate impacts during two time periods (2030-2059 and 2070-2099). This scenario, and others from earlier IPCC assessments (IPCC 2007, Nakicenovic and Swart. 2000), have been updated (now called Representative Concentration Pathways -RCPs) to include climate change mitigation options (and other factors - Moss et al. 2010). In either case, it is customary in applied climate research to use multiple scenarios to bracket a full range of possible futures given that the likelihood of any one scenario is unknown and dependent on human behavior and societal choices (e.g., Bachelet et al. 2011, Littell et al. 2011). Three scenarios often used for such bracketing include A2 (representing heavy fossil fuel use), A1B (rapidly growing economy but with significant movement toward renewable power sources), and B1 (conservative, with substantial efforts to reduce emissions worldwide) (IPCC 2007, Nakicenovic and Swart. 2000). The practice of assessing climate impacts under multiple emission scenarios

becomes most important when projecting after mid-century due to the significant divergence of results. For example, in the Pacific Northwest, changes in average temperature differ sharply among emission scenarios after 2020 (Mote and Salathé 2010). Given that the Service is evaluating projected impacts to wolverine habitat beyond mid-century, it is our opinion that multiple emission scenarios should have been used to fully portray potential future impacts. For example, the Service reports the McKelvey et al. (2011) finding that central Idaho is projected to lose 43% and 78% of wolverine habitat for the 2045 and 2085 time periods (page 57), yet these estimates, particularly the 2085 estimate, may drastically over-estimate potential impacts if a more conservative emission scenario is used (e.g. B1) and potentially under- estimates the impact given a more consumptive scenario (e.g., A2).

With regard to analytical approaches, climate science generates a plethora of data with models sometimes producing vastly different results. Generating an ensemble mean from multiple models, as McKelvey et al. (2011) did, is a suggested approach to better represent the present-day climate than any single model (IPCC 2007, Overland et al. 2011). However, there are issues with this approach, including the fact that the 'mean' projection may not actually be the product of any of the models (Knutti 2010). For example, annual mean precipitation changes little when averaged over multiple models, but is quite variable among individual models (Mote and Salathé 2010). To more clearly incorporate model variability, Mote and Salathé (2010) recommend using a weighted average and Kunkel et al. (2013) recommend using ensemble mean values but categorizing each cell based on if the models: 1) agree on the statistical significance and the direction of changes, 2) agree that the changes are not statistically significant, or 3) agree that the changes are statistically significant but disagree on the direction of the change. Applying such an approach to wolverine conservation planning would allow for more accurate mapping of areas most likely to be affected and those areas with the greatest uncertainty about change.

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