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To: [Betty Grizzle](#); [John Guinotte](#); [Justin Shoemaker](#); [Jodi Bush](#)
Subject: Updated Genetics Option Paper
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Attachments: [Talking Points for Wolverine Genetic Discussion2.docx](#)

Here is a slightly updated version of genetics option paper. Please review.

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Talking Points – Funding Request for Wolverine Genetic Analyses

Background

In the U.S. District Court decision (April 4, 2016), the court remanded our withdrawal of the wolverine proposed rule for further consideration based on two primary issues: 1) ignoring best available science in dismissing the threat to wolverine from climate change and 2) ignoring best available science by dismissing the **threat to wolverine from genetic isolation and small population size**. Specifically, the court said that, in our 2014 withdrawal, we failed to articulate how our statements regarding the following did not constitute adverse effects to wolverine:

- Apparent loss of connectivity between Rocky Mountains and Canada prevented influx of genetic material needed to maintain or increase the genetic diversity in contiguous U.S.
- Effective population size is too low to support the subpopulations in contiguous U.S.
- Genetic drift has already occurred in subpopulations in contiguous U.S. as compared to Canada, and a continued loss of genetic diversity may lead to inbreeding depression and inability of wolverines in contiguous U.S. to persist

Thus, we need to evaluate our statements that there is “good evidence” that genetic diversity is lower in wolverines in the contiguous U.S. as compared to Canada and Alaska. We also need to determine whether there is a threat for inbreeding depression based on small population.

The following talking points provide potential pathways for addressing the court’s remand.

Microsatellite analysis

- Provide funding to USFS genomics lab (Missoula) to prepare mitochondrial DNA and microsatellite loci analyses using existing samples provided to this lab (by western States) to examine current genetic structure of wolverines in contiguous U.S. Costs are estimated at \$60,000 based approximately 300 samples collected already submitted, at \$200/sample. However, if only microsatellite loci analyses is conducted, which is the approach needed to evaluate population genetics, costs will only decline slightly reducing the overall cost by approximately \$500.
- Provide funding to independent lab (e.g., Wildlife Genetics International (WGI), British Columbia) for this analysis. This will require that the USFS lab release collected samples. WGI has previously run genetic analyses for wolverines. However, because the USFS has already processed these samples, these samples will likely be degraded in quality and therefore may not provide useful results.
- Provide funding to FWS Conservation Genetics Laboratory in Alaska. This would also require that samples be retrieved from USFS lab. Cost estimated at \$100/sample and several months (estimate) to complete. However, the costs may, in the long run, be similar to USFS as they have not previously run any genetic testing for wolverine and therefore would require several weeks of lead time and acquisition of materials.
- Provide funding to an independent genetics group, assess current wolverine genetic data and publications and provide FWS with an overview of the state of knowledge and a critical assessment of wolverine genetics. No outreach has occurred for this option, therefore no cost estimate can be provided at this time. We are still assessing potential reviewers for this option.

If the microsatellite analysis is funded, conduct independent review of USFS results

- Provide funding to FWS Alaska lab to obtain from the USFS lab approximately 20 samples and analyze this subsample to verify USFS lab results. Cost likely to be \$100/sample.
- Provide funding to independent lab (e.g., WGI, who have analyzed 1000s of wolverine samples) to prepare a review and interpretation of the results of the USFS analysis to assess current genetic structure of populations of wolverines across North America (not just the contiguous U.S.) using results from other studies, including data obtained from wolverine specimens in Alaska and Canada.

Effective population size analysis (if funds available)

- Provide funding for independent assessment of minimum viable population size following methods from Koskela (Finland) using results from USFS lab.

DPS

Preliminary interpretation by the FWS Alaska lab of recent genetic studies indicate that wolverines in the contiguous U.S. are likely decedents of wolverines that migrated from Canada years ago to repopulate the area after persecution of predators ceased. As such, wolverine populations in the contiguous U.S. may not represent a distinct genetic structure (no unique alleles) as it may apply to discreteness in our DPS policy. Genetically speaking, recent studies also show nothing significant in the contiguous U.S., as it may apply to the DPS policy. Additional knowledge gained through a more thorough and complete comparison of the genetic structure of wolverine population in the contiguous U.S. as well as Alaska and Canada would provide a more legally and scientifically robust basis on which to base our DPS determination.