

From: [Jodi Bush](#)
To: [Grizzle, Betty](#)
Subject: Re: Research Questions and References
Date: Tuesday, May 23, 2017 8:02:06 AM

So they got ahold of you. Jon never called me back but I'm glad Jeff responded. JB

Sent from my iPhone

On May 23, 2017, at 9:39 AM, Grizzle, Betty <betty_grizzle@fws.gov> wrote:

FYI - See message from Jeff Olsen (AK). I suggest we try to talk about this today while I am at Regional Office before I reply to Jeff and John..

----- Forwarded message -----

From: **Olsen, Jeffrey** <jeffrey_olsen@fws.gov>
Date: Mon, May 22, 2017 at 5:28 PM
Subject: Re: Research Questions and References
To: "Grizzle, Betty" <betty_grizzle@fws.gov>
Cc: John Wenburg <john_wenburg@fws.gov>

Hi Betty,

John and I have taken a quick look at the papers describing and evaluating genetic diversity in wolverines. It is not clear to us that the genetic evidence alone supports a lower 48 DPS given phylogenetic assessment (e.g., Zigouris et al. 2013; McKelvey et al. 2014). It appears the L48 population(s) are descendant (perhaps recently) from northern populations. John is out of town until Thursday. Would you have time to talk this week (Thursday or Friday)?

Jeff

On Wed, May 3, 2017 at 1:00 PM, Grizzle, Betty <betty_grizzle@fws.gov> wrote:

Hi John and Jeff - I put together a list of questions (see below) to give you a better idea of what we are trying to sort through for North American wolverines, which includes addressing DPS criteria.

I am also attaching selected published references --- some are relatively recent (e.g., 2014, McKelvey et al.), some are not so recent (two papers by Kyle and Strobeck), and some are in-between --- that have evaluated genetic diversity of wolverines in North America. [There are similar studies from Russia and Scandinavia] I also have a master's thesis (Frances 2008) and a PhD dissertation (Zigouris 2014). Let me know if you are interested in those.

Thank you for your time, and please let me know your thoughts as to how we can move forward.

(1a) Do genetic studies indicate that there is a loss of connectivity between wolverines in the

northern Rocky Mountains (or the Cascades region) and Canada?

(1b) Relatedly, how does immigration of wolverines from Canada influence the genetic diversity of wolverines in the contiguous United States?

(2a) Based on the genetic information you have, does the contiguous U.S. population of wolverines exhibit a reduction in genetic diversity?

(2b) Relatedly, is there evidence of genetic drift in wolverines in the contiguous US population? What might this mean to long term persistence of wolverines in the US?

(2c) If either (2a) or (2b) are true, have there been consequences to breeding, reproduction, or fitness of wolverine populations in the contiguous US?

(3) What is the "effective population size" of wolverines in contiguous United States, AND across it's entire North American range?

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