From:	Smith, David
To:	Parkin, Mary
Cc:	Zelenak, Jim; Cummings, Jonathan; Heather Bell; Jennifer Szymanski
Subject:	Re: draft guidance on organizing an EE workshop for SSA
Date:	Wednesday, July 22, 2015 1:22:14 PM

Yes, that works for me.

There is a piece that I would like to add to these draft guidelines in the long run, but not before distributing to the Core team. I would like to add a template for a post-workshop report with some technical guidelines on summarizing expert judgment. Again, not for right now cause I don't have the time immediately, but as a placeholder for the future.

Cheers,
Dave

David R. Smith
USGS - Leetown Science Center
11649 Leetown Road
Kearneysville, WV 25430
drsmith@usgs.gov
304-724-4467
https://profile.usgs.gov/drsmith
ResearchGate profile

On Wed, Jul 22, 2015 at 3:16 PM, Parkin, Mary <mary_parkin@fws.gov> wrote:

> Good point, Dave. Perhaps we can just say something like, "Number of participants, which may include some observers, will necessarily be limited. Experts and observers will have distinct and mutually exclusive roles at the meeting." Does this work?
>
> On Wed, Jul 22, 2015 at 2:46 PM, Smith, David <drsmith@usgs.gov> wrote:
>
> > Mary,
> >
> > I like your suggested path forward. Your comments look good. The only one that I question is at the bottom of page 1 where you strike mention of 'experts and observers'. I think it is important to distinguish between the types of participants and prepare folks for the possibility that the number of observers will be limited.
> >
> > Dave
> >
> > David R. Smith
> > USGS - Leetown Science Center
> > 11649 Leetown Road
> > Kearneysville, WV 25430
> > drsmith@usgs.gov
> > 304-724-4467
> > https://profile.usgs.gov/drsmith
> > ResearchGate profile

On Wed, Jul 22, 2015 at 2:29 PM, Parkin, Mary <mary_parkin@fws.gov> wrote:

Hi all,

After a belated look at this advice, here's my two-cents' --

Great document overall! This will be extremely helpful for us. Dave, your pain (with the GSG) is our gain.

I've made some edits and comments; see attached. Generally, I'd suggest:

(1) providing the overall document, with its templates, to the lynx core team and FWS managers;

(2) customizing the selection criteria and ground rules for the lynx and sending these to the states and other partners (and core team, of course); and

(3) when experts are selected, sending them the meeting agenda and ground rules and asking them to confirm their willingness to participate given these sideboards.

I know we need to get this out to the core team and states ASAP, preferably before the calls next week. I'm sorry to have been late to the table, but if you could take a look at my comments, Dave and Jim, and accept as you see fit, we could get it out to the core team this week. Then it shouldn't take much to make sure the selection criteria and ground rules are specific to the lynx and provide to the core team and state folks for next week's calls.

Thanks,
Mary

On Tue, Jul 21, 2015 at 5:16 PM, Zelenak, Jim <jim_zelenak@fws.gov> wrote:

ooops - here's the attachment.

On Tue, Jul 21, 2015 at 3:15 PM, Zelenak, Jim <jim_zelenak@fws.gov> wrote:

I've accepted all changes to this point, then found a few other things (still visible in track changes) and attempted to align all the formatting. Why does that always take longer than you think it ought to?

Let me know when it is OK to share this with lynx SSA Core Team and perhaps other FWS folks.

Also - what are your thoughts on sharing with folks external to USFWS? We got word today that Wyoming and Montana have already requested (of R6RD) that we consider "involving" their state furbearer/carnivore biologists in the SSA process.

On Fri, Jul 17, 2015 at 9:21 AM, Smith, David <drsmith@usgs.gov> wrote:

Jonathan,

Good point about the ground rules. I added the previously written ground rules as an appendix.

Dave

David R. Smith
USGS - Leetown Science Center
11649 Leetown Road
Kearneysville, WV 25430
drsmith@usgs.gov
304-724-4467
https://profile.usgs.gov/drsmith
ResearchGate profile

On Fri, Jul 17, 2015 at 10:54 AM, Cummings, Jonathan <jwcummings@usgs.gov> wrote:

> Just added a small edit about uncertainty and a comment about whether to expand the discussion of ground rules.
>
> On Fri, Jul 17, 2015 at 10:42 AM, Smith, David <drsmith@usgs.gov> wrote:
>
> > Jim,
> >
> > I added text to address your comments. Did it work?
> >
> > Dave
> >
> > David R. Smith
> > USGS - Leetown Science Center
> > 11649 Leetown Road
> > Kearneysville, WV 25430
> > drsmith@usgs.gov
> > 304-724-4467
> > https://profile.usgs.gov/drsmith
> > ResearchGate profile
> >
> > On Fri, Jul 17, 2015 at 10:01 AM, Zelenak, Jim <jim_zelenak@fws.gov> wrote:
> >
> > > Dave,
> > >
> > > I accepted all changes in TC, then had these few additional thoughts/questions.
> > >
> > > On Fri, Jul 17, 2015 at 6:54 AM, Smith, David <drsmith@usgs.gov> wrote:
> > >
> > > > Jim,
> > > >
> > > > Good edits. I added a bit to the 'agenda template'.
> > > >
> > > > Ok with me to circulate to the core team, but would feel better if others chime in first.
> > > >
> > > > Dave
> > > >
> > > > David R. Smith

USGS - Leetown Science Center
11649 Leetown Road
Kearneysville, WV 25430
drsmith@usgs.gov
304-724-4467
https://profile.usgs.gov/drsmith
ResearchGate profile

On Thu, Jul 16, 2015 at 4:15 PM, Zelenak, Jim <jim_zelenak@fws.gov> wrote:

> One more edit: change "is be best format" to "is the best format" in first sentence, p. 1.
>
> On Thu, Jul 16, 2015 at 2:09 PM, Zelenak, Jim <jim_zelenak@fws.gov> wrote:
>
> > Attached are my thoughts on the draft guidance (in TRACK CHANGES).
> >
> > On Thu, Jul 16, 2015 at 8:31 AM, Smith, David <drsmith@usgs.gov> wrote:
> >
> > > What do you all think about distributing the draft EE guidelines to the Lynx Core Team? It is draft and comments are welcome from all (of course). However, is there anything in the current draft that should be revised, edited, deleted before distribution?
> > >
> > > Dave
> > >
> > > David R. Smith
> > > USGS - Leetown Science Center
> > > 11649 Leetown Road
> > > Kearneysville, WV 25430
> > > drsmith@usgs.gov
> > > 304-724-4467
> > > https://profile.usgs.gov/drsmith
> > > ResearchGate profile
> > >
> > > On Thu, Jul 16, 2015 at 10:28 AM, Parkin, Mary <mary_parkin@fws.gov> wrote:
> > >
> > > > Great stuff -- thanks, Dave!
> > > >
> > > > BTW, I'm still going through the UTRB ms but am close. Just having to look at it "on the side" as I try to get a final rule off my desk.
> > > >
> > > > Cheers,
> > > > Mary
> > > >
> > > > On Wed, Jul 15, 2015 at 2:24 PM, Smith, David <drsmith@usgs.gov> wrote:
> > > >
> > > > > Here are draft guidelines (including some generic criteria for selecting experts and a workshop agenda template)

The source for much of this is documentation we put together for a GRSG workshop. I revised the guidance to be generic.

Pls comment and make suggestions. Seems like something along these lines will be helpful for the lynx workshop and other future workshops.

Dave

David R. Smith
USGS - Leetown Science Center
11649 Leetown Road
Kearneysville, WV 25430
drsmith@usgs.gov
304-724-4467
https://profile.usgs.gov/drsmith
ResearchGate profile

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Mary Parkin
Endangered Species Recovery Coordinator, Northeast Region
U.S. Fish and Wildlife Service, Hadley, MA
Remotely located in Escalante, Utah:
Mailing address PO Box 637, Escalante, UT 84726
Street address 145 North Center St, Escalante, UT 84726
Phone 617-417-3331
Email mary_parkin@fws.gov

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Jim Zelenak, Biologist
U.S. Fish and Wildlife Service
Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, MT 59601
(406) 449-5225 ext. 220
jim_zelenak@fws.gov

--
Jim Zelenak, Biologist
U.S. Fish and Wildlife Service
Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, MT 59601

(406) 449-5225 ext. 220
jim_zelenak@fws.gov

--
Jim Zelenak, Biologist
U.S. Fish and Wildlife Service
Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, MT 59601
(406) 449-5225 ext. 220
jim_zelenak@fws.gov

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Jonathan W. Cummings, PhD
Research Ecologist
USGS - Leetown Science Center (remotely located)
jwcummings@usgs.gov

Remote Contact Info:
802-999-8684 - cell
243 Locust St
Dover, NH 03820

--
Jim Zelenak, Biologist
U.S. Fish and Wildlife Service
Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, MT 59601
(406) 449-5225 ext. 220
jim_zelenak@fws.gov

--
Jim Zelenak, Biologist
U.S. Fish and Wildlife Service
Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, MT 59601
(406) 449-5225 ext. 220
jim_zelenak@fws.gov

--
Mary Parkin
Endangered Species Recovery Coordinator, Northeast Region
U.S. Fish and Wildlife Service, Hadley, MA
Remotely located in Escalante, Utah:
Mailing address PO Box 637, Escalante, UT 84726
Street address 145 North Center St, Escalante, UT 84726
Phone 617-417-3331
Email mary_parkin@fws.gov

--
Mary Parkin
Endangered Species Recovery Coordinator, Northeast Region
U.S. Fish and Wildlife Service, Hadley, MA
Remotely located in Escalante, Utah:
Mailing address PO Box 637, Escalante, UT 84726
Street address 145 North Center St, Escalante, UT 84726
Phone 617-417-3331
Email mary_parkin@fws.gov

From: McCollough, Mark
To: Jim Zelenak
Subject: Fwd: Lynx expert meeting
Date: Wednesday, July 22, 2015 1:48:35 PM

One more positive response for mid-Oct...I still have yet to hear from Jen. Mark
---------- Forwarded message ----------
From: **Erin Simons-Legaard** <erin.simons@maine.edu>
Date: Wed, Jul 22, 2015 at 1:46 PM
Subject: Re: Lynx expert meeting
To: "McCollough, Mark" <mark_mccollough@fws.gov>

Hi Mark,

Oct 13-16 would be fine with me. I currently have little on my schedule mid-Oct to mid-Nov.

Thanks,
Erin

Erin Simons-Legaard
Research Assistant Professor
School of Forest Resources
5755 Nutting Hall
University of Maine
Orono, ME 04469-5755
erin.simons@maine.edu

On Wed, Jul 22, 2015 at 1:17 PM, McCollough, Mark <mark_mccollough@fws.gov> wrote:

> Jen and Erin: I have not heard back from either of your concerning your availability in mid-Oct to mid-Nov to participate in the Service's lynx expert meeting in Minnesota. I hope you are interested and available. There seems to be considerable interest in Oct 13-16 dates just prior to the national TWS meeting. Please let me know of your interest and availability from mid-Oct through mid-Nov.
>
> Thanks, Mark
>
> --
> Mark McCollough, Ph.D.
> Endangered Species Specialist
> Maine Field Office
> U. S. Fish and Wildlife Service
> 17 Godfrey Drive, Suite 2
> Orono, ME 04473
> Phone 207 866-3344 x115
> Cell Phone: 207 944-5709
> mark_mccollough@fws.gov

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Mark McCollough, Ph.D.
Endangered Species Specialist
Maine Field Office
U. S. Fish and Wildlife Service
17 Godfrey Drive, Suite 2
Orono, ME 04473
Phone 207 866-3344 x115
Cell Phone: 207 944-5709
mark_mccollough@fws.gov

From: Smith, David
To: Zelenak, Jim
Subject: Re: Update on lynx expert elicitation candidates
Date: Wednesday, July 22, 2015 2:10:13 PM

Yes, make the changes and pls send me the updated version.

Thanks,
Dave

David R. Smith
USGS - Leetown Science Center
11649 Leetown Road
Kearneysville, WV 25430
drsmith@usgs.gov
304-724-4467
https://profile.usgs.gov/drsmith
ResearchGate profile

On Wed, Jul 22, 2015 at 4:08 PM, Zelenak, Jim <jim_zelenak@fws.gov> wrote:

> Thanks Dave.
>
> Shall I use the last version I sent and make the changes Mary suggested, or have you already done so on your copy?
>
> On Wed, Jul 22, 2015 at 2:00 PM, Smith, David <drsmith@usgs.gov> wrote:
>
> > Jim,
> >
> > Let's get the guidance circulated as soon as you feel comfortable. I'm good with yours and Mary's recent comments, and the document is labeled draft so folks will know that it is subject to revision. Folks are thinking about who to invite and I think those guidelines will help set the context and identify the considerations for arriving at a good selection.
> >
> > As for numbers, there is no hard and fast rule, but keep in mind that first and foremost you want an adequate representation of the expert judgement within the scientific community and adequate representation of affiliations, specialty, and geography. Secondarily, to foster a good discussion, the meeting can't get too large. Personally, I prefer 12 or so, but realize it can get a bit larger in order to meet the previous considerations. (I will send this to all, but wanted to encourage you to distribute the draft guidance, if you feel comfortable doing so.)
> >
> > Dave
> >
> > David R. Smith
> > USGS - Leetown Science Center
> > 11649 Leetown Road
> > Kearneysville, WV 25430
> > drsmith@usgs.gov
> > 304-724-4467

https://profile.usgs.gov/drsmith
ResearchGate profile

On Wed, Jul 22, 2015 at 3:40 PM, Zelenak, Jim <jim_zelenak@fws.gov> wrote:

> Thanks Bryon,
>
> I should have noted in my previous that the footnotes for our potential Canadian participants was just in case we (and SSA FIT folks) think we are pushing the bounds of acceptable number of experts from whom to elicit information. I also think the others - Karen Hodges (especially given her previous experience with hare pops in the lower 48) and Jeff Bowman and/or Dennis Murray - cold contribute substantially to the discussion/elicitation, not just as presenters.
>
> Heather, Mary, Dave, Jonathan, and Jennifer - your thoughts? how many are too many....
>
> Recognize, though, that some candidates may drop out once we land on dates with certainty. I think we might realistically have a dozen give or take a few who will actually be able to attend.
>
> On Wed, Jul 22, 2015 at 12:50 PM, Holt, Bryon <bryon_holt@fws.gov> wrote:
>
> > Jim,
> >
> > I've been meaning to let you know that I spoke with Clayton this past Monday, and he confirmed that he is interested in participating in the meeting. However, as with Gary Koehler, Clayton is an independent researcher, and thus we would need to fund his travel. Also, I noticed that your table (which actually jogged my memory to send this email) identified Clayton as a presenter only. I would offer that, dependent on the importance of lynx immigration from Canada at sustaining/supporting lynx populations in lower 48, Clayton may be able to contribute to the expert panel discussion as well, given his knowledge of lynx populations in Canada and what he thinks they may be in future.
> >
> > Bryon
> >
> > On Wed, Jul 22, 2015 at 10:10 AM, Zelenak, Jim <jim_zelenak@fws.gov> wrote:
> >
> > > Because of the tight time line for lining up the expert meeting, the Core Team has been reaching out informally to potential expert candidates and/or presenters.
> > >
> > > We've had lots of interest and, fortunately, most are potentially available for the mid-Oct. - mid Nov. time frame.
> > >
> > > The attached document summarizes outreach and responses thus far. Also downloaded to the SSA Google Drive (2015 07 22 Lynx SSA Expert Workshop Candidates), where Core Team may update as additional responses come in or with recommendations for the highlighted areas.
> > >
> > > Let me know if you have questions.
> > >
> > > --
> > > Jim Zelenak, Biologist
> > > U.S. Fish and Wildlife Service
> > > Montana Ecological Services Office
> > > 585 Shepard Way, Suite 1
> > > Helena, MT 59601
> > > (406) 449-5225 ext. 220

> > > jim_zelenak@fws.gov
>
> --
> **********
> Bryon Holt
> U.S. Fish and Wildlife Service
> Northern Idaho Field Office, Spokane, WA
> Telephone: (509) 893-8014
> Fax: (509) 891-6748
> email: bryon_holt@fws.gov
>
> **********
>
> --
> Jim Zelenak, Biologist
> U.S. Fish and Wildlife Service
> Montana Ecological Services Office
> 585 Shepard Way, Suite 1
> Helena, MT 59601
> (406) 449-5225 ext. 220
> jim_zelenak@fws.gov

--
Jim Zelenak, Biologist
U.S. Fish and Wildlife Service
Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, MT 59601
(406) 449-5225 ext. 220
jim_zelenak@fws.gov

U.S. Fish and Wildlife Service
Region 5 Endangered Species Act Update
July 20, 2015

General

1) **Initiatives to increase regulatory predictability, increase stakeholder engagement, and improve science and transparency** (All States) – On May 18, 2015, the U.S. Fish and Wildlife Service (Service) and National Marine Fisheries Service (NMFS) announced a suite of actions to improve the effectiveness of the Endangered Species Act (ESA) and demonstrate its flexibility.
   - Revisions to the Regulations for Listing Petitions: We propose to improve the content of petitions and enhance the efficiency of processing petitions to better support species conservation. Our proposed changes would require petitioners to seek and incorporate information from the State fish and wildlife agencies prior to submitting a petition to us. The proposed revised regulation can be found at http://www.fws.gov/home/feature/2015/proposed-revised-petition-regulations.pdf
   - Improve science and increase transparency: We propose to adopt more rigorous peer review procedures and post on line the science on which we are basing our decisions.
   - Incentivize voluntary conservation efforts: We propose to simplify the standards of voluntary conservation agreements (Safe Harbor Agreements/Candidate Conservation Agreements with Assurances) and promote conservation banking and advance mitigation tools.
   - Focus resources to achieve more successes: We propose to streamline ESA section 7 consultation procedures for projects that provide a net benefit to listed species, and revise the Habitat Conservation Planning Handbook to promote more timely and efficient processing of incidental take permits.
   - Engaging the States: We propose to update our policy regarding the role of state agencies to reflect advancements in collaboration between the Services and the states.

   The news release for these initiatives can be found at http://interior.gov/news/pressreleases/us-fish-and-wildlife-service-and-noaa-propose-actions-to-build-on-successes-of-endangered-species-act.cfm

Recovery Planning and Implementation

1) **White-Nose Syndrome** (All States) – As of April 10, 2015, WNS has been confirmed in 25 states and 5 Canadian provinces. Numerous counties were newly confirmed with WNS or the causative fungus (*Pd)* this winter in preciously contaminated states, including Michigan, Wisconsin, Kentucky, Illinois, Missouri, Arkansas, and Georgia. Analyses of samples collected for disease surveillance in winter 2014-15 is ongoing and we anticipate additional positive WNS and *Pd* findings in the coming months. For updated maps and other information, visit *www.whitenosesyndrome.org*.
   - In 2015, the Service will provide approximately $3.5 million for WNS research and state response through four funding opportunities. The Service opened a funding opportunity

for the WNS grants to states programs on March 27 and accepted proposals through May 26, 2015 (www.grants.gov Funding Opportunity Number F15AS00155). Over $2 million will be awarded through three competitive research grant opportunities to Federal and non-Federal researchers. These funding opportunities are expected to open for proposals this month.

- The Diagnostics Working Group (under the national WNS response plan) has revised the case definitions for WNS to include new categories for reporting the detection of *Pseudogymnoascus destructans* (the causative fungus). According to revised case definitions, confirmation of WNS now requires the identification of *Pd* by PCR in addition to the identification of the characteristic lesions through histology. See: *https://www.whitenosesyndrome.org/resource/revised-case-definitions-white-nose-syndrome-11252014*
- The Service continues to host two monthly WNS conference calls, held on the first and third Thursdays of each month, to discuss WNS-related topics with state, Federal, tribal, and nongovernmental partners in the United States and Canada. Please contact Jeremy Coleman, National WNS Coordinator (jeremy_coleman@fws.gov), with requests to be added to the email list.

2) **Imperiled Aquatic Species Conservation Strategy for the Upper Tennessee River Basin: Building a Network for Implementation** (VA) – Implementation of the recently finalized Strategy is underway. To coordinate efforts and share information with partners across several states in the Northeast and Southeast regions, the Service is hosting quarterly Webinars. Additionally, the Appalachian Landscape Conservation Cooperative is hosting a Web portal to support communications work flow and tool delivery and exchange of information and alignment across partner programs. Access the portal at *http://applcc.org/projects/trb/resources/imperiled-aquatic-species-conservation-strategy*.

3) **Atlantic Salmon Recovery Plan** (ME) – The Service and NOAA-Fisheries are preparing a Draft Revised Recovery Plan for the expanded Gulf of Maine Distinct Population Segment of Atlantic Salmon. We expect to publish a Notice of Availability in the Federal Register soliciting public comment later this summer.

4) **Canada Lynx Status Assessment and Recovery Plan** (ME, NH, VT) – On June 14, 2014, the U.S. District Court for the District of Montana ordered the Service to complete a recovery plan for the Canada lynx by January 15, 2018, unless the Service finds that such a plan will not promote the conservation of the lynx. Prior to initiation of the recovery planning process, we will complete a species status assessment as part of a 5-year review, which will determine whether the status of the Canada lynx lower 48 distinct population segment has changed since the time of its listing. We expect to complete the 5-year review in late 2015. Detailed information about the Canada lynx may be found at *http://bit.ly/CanadaLynxUSFWS*.

Section 7 Interagency Cooperation

1) **Incidental Take Statements Final Rule** (All States) – On May 11, 2015, the Service published in the Federal Register a final rule amending the incidental take statement

provisions of the implementing regulations for section 7 of the ESA. The two primary purposes of the amendments are to address the use of surrogates to express the amount or extent of anticipated incidental take and to refine the basis for development of incidental take statements for programmatic actions. These changes are intended to improve the clarity and effectiveness of incidental take statements. The final rule can be found at *http://www.gpo.gov/fdsys/pkg/FR-2015-05-11/pdf/2015-10612.pdf*

Section 10 Incidental Take Permits - Habitat Conservation Plans (HCPs)

1) **The Town of Orleans, Massachusetts HCP** (MA) – On April 16, 2015, the Service issued an incidental take permit to the Town of Orleans for the take of up to four piping plover chicks per year over 3 years (for a total of 12 chicks) by self-escorted, over-sand vehicles at Nauset Beach. The Town's HCP describes avoidance, minimization, and mitigation measures, including annual contributions to a conservation fund administered by the MDIFW for offsite predator management and a predator management education campaign. The permit, final HCP, and supporting documents can be found at http://www.fws.gov/newengland

2) **Pennsylvania Forestry HCP** (PA) – The Pennsylvania Game Commission (PGC) and the Department of Conservation and Natural Resources (DCNR) are developing an HCP for Indiana and northern long-eared bats to support a section 10 permit application for forest management-related activities on 1.4 million acres of PGC State Game Lands, 2.2 million acres of DCNR State Forests, and 295,000 acres of DCNR State Parks. The PGC and DCNR were recently awarded a section 6 grant to fund continued work on the HCP.

3) **Massachusetts Programmatic Plover HCP** (MA) – The Massachusetts Division of Fisheries and Wildlife (MADFW) is preparing a programmatic HCP to support a section 10 permit application for take of piping plovers associated with beach management activities. The MADFW was awarded a section 6 grant to fund work on the HCP.

4) **Duke Energy North Alleghany Wind HCP** (PA) -- The Service is working with North Allegheny Wind, LLC, a wholly owned subsidiary of Duke Energy Generating Services (or Duke Energy Renewables), on a habitat conservation plan for operations of their wind facility. The HCP will incorporate avoidance, minimization, mitigation, monitoring, and reporting measures aimed at addressing the impact of the covered activities to Indiana bats and northern long-eared bats. On November 18, 2014, the Service published in the Federal Register an early scoping notice for the HCP and the Service's NEPA document. Comments can be viewed at *http://www.regulations.gov* under docket # FWS-R5-ES-2014-0047.

Classification – Candidate Assessment, Petition Finding, Listing, Delisting, Reclassification

1) **Candidate Notice of Review (CNOR)** (CT, DC, MA, ME, MD, NH, NJ, NY, RI, VA) – On December 5, 2014, the Service published in the Federal Register its fiscal year (FY) 2014 annual CNOR. For the Service's Northeast Region, Kenk's amphipod, Hirst Brothers' panic

grass, and the New England cottontail remain on the candidate list. A candidate species is one for which the Service has enough information to indicate listing it under the ESA is warranted, but we are precluded from moving forward with a proposed rulemaking due to other higher priority listing workload. The complete CNOR notice and list of proposed and candidate species as published in the Federal Register can be found at the following link: *http://www.gpo.gov/fdsys/pkg/FR-2014-12-05/pdf/2014-28536.pdf.*

The FY 2014 CNOR publication identifies the rufa red knot as a species proposed for listing because the Service's final rule listing this species was not published until after the CNOR was published. As part of the multi-district litigation settlement agreement, listing determinations for our candidate species will no longer be precluded by specified time frames: the New England cottontail by September 2015, Kenk's amphipod by September 2016, and Hirst Brothers' panic grass by September 2016. This means that if listing is still warranted by these dates, we will publish a proposed listing rule for the species and also propose to designate critical habitat, if it is prudent and determinable to do so.

If you have any questions regarding the Northeast Region's candidate species or have information to share with us regarding the species' distribution, population estimates or trends, or threats, please contact the lead field office identified below:

New England cottontail: Tom Chapman, Supervisor, New England Field Office *tom_chapman@fws.gov*.

Kenk's amphipod: Genevieve LaRouche, Supervisor, Chesapeake Bay Field Office *genevieve_larouche@fws.gov*.

Hirsts Brothers' panic grass: Eric Schrading, Supervisor, New Jersey Field Office *eric_schrading@fws.gov*.

2) **Critical Habitat Proposed Regulations** (All States) – On May 12, 2014, the Service published in the Federal Register three proposed critical habitat rules/policy that include updates to our critical habitat regulations, a policy on critical habitat exclusions under section 4(b)(2) of the ESA, and a revised definition of destruction or adverse modification of critical habitat. On June 26, 2014, the Service extended the public comment period on the proposed rules/policy until October 9, 2014. A date for publication of a final regulation has not been set. The proposed rules are posted on the Service's Improving ESA Implementation Web site: *http://www.fws.gov/endangered/improving_ESA/index.html*

3) **Rufa red knot proposed critical habitat determination** (All States) – On January 12, 2015, the Service's final rule to list the rufa red knot as a threatened species throughout its range became effective. The range includes: Argentina, Aruba, Bahamas, Barbados, Belize, Brazil, British Virgin Islands, Canada, Cayman Islands, Chile, Colombia, Costa Rica, Cuba, Dominican Republic, El Salvador, France (Guadeloupe, French Guiana), Guatemala, Guyana, Haiti, Jamaica, Mexico, Panama, Paraguay, Suriname, Trinidad and Tobago, Uruguay, Venezuela, and the United States (AL, AR, CT, CO, DE, FL, GA, IA, IL, IN, KS, KY, LA, MA, MD, ME, MI, MN, MO, MS, MT, NE, NC, ND, NH, NJ, NY, OH, OK, PA,

RI, SC, SD, TN, TX, VA, VT, WI, WV, WY, Puerto Rico, U.S. Virgin Islands). Interior states are included in the range because rufa red knots have been documented in those states during migration. Documents pertaining to the listing rulemaking can be found at the following link: *http://www.fws.gov/northeast/redknot/*. The Service is developing a critical habitat determination for the red knot; a publication date for this determination has not been set.

4) **Northern long-eared bat listing/critical habitat** (All States) – On April 2, 2015, the Service published a final rule to list the northern long-eared bat as threatened and an interim 4(d) rule. The final listing and implementation of the interim 4(d) rule became effective on May 4, 2015. The interim 4(d) rule is very similar to the proposed 4(d) rule published on January 16, 2015, with clarification to some terminology. Because the interim 4(d) rule is not a final action, the Federal Register rule also opened a public comment period until July 1, 2015. A final decision on the interim 4(d) rule is anticipated by the end of 2015.

   Documents pertaining to the rulemaking can be found at the following links:

   April 2, 2015, final listing rule/interim 4(d) rule:
   http://www.fws.gov/midwest/endangered/mammals/nlba/pdf/FRnlebFinalListing02April2015.pdf
   January 16, 2015, proposed section 4(d) rule:
   http://www.fws.gov/midwest/endangered/mammals/nlba/pdf/FRnlebProposed4dRule16Jan2015.pdf
   October 13, 2013, proposed listing rule:
   http://www.gpo.gov/fdsys/pkg/FR-2013-10-02/pdf/2013-23753.pdf.
   Additional information:
   http://www.fws.gov/midwest/endangered/mammals/nlba/index.html

   When a species is listed as threatened or endangered, the Service is required to consider whether areas essential to the species' conservation should be designated as critical habitat. A publication date for this determination has not been set.

5) **Wolf** (MA, ME, NH, NY, VT) – On June 13, 2013, the Service published in the Federal Register a proposed rule to list the Mexican wolf as an endangered subspecies in the Southwest and to delist gray wolves elsewhere. The rule also recognizes the eastern wolf as a separate species, *Canis lycaon,* rather than as a subspecies of the gray wolf. Under this proposal, wolves would not be protected under the ESA in the Northeast, as they have been under the gray wolf listing. The Service obtained independent peer review of the scientific basis for the proposal and received a report from the peer review panel; the peer review panel focused on the taxonomy of the eastern wolf and concluded that it was premature for the Service to recognize the eastern wolf as a separate species. The Service then re-opened the public comment period from February 10 to March 27, 2014. The Service is now reviewing the public comments and has set a tentative target date of the end of the calendar year for publishing a final determination in the Federal Register. Documents pertaining to this rulemaking can be found at the following links:

   Proposed rule:
   http://www.gpo.gov/fdsys/pkg/FR-2013-06-13/pdf/2013-13982.pdf
   Notice reopening comment period:

http://www.gpo.gov/fdsys/pkg/FR-2014-02-10/pdf/2014-02817.pdf
Peer review
report: *http://www.fws.gov/home/wolfrecovery/pdf/Final_Review_of_Proposed_rule_regarding_wolves2014.pdf*

Also, on December 19, 2014, the United States District Court for the District of Columbia ruled that the Service's December 28, 2011, final rule delisting the Western Great Lakes (WGL) distinct population segment (DPS) of the gray wolf was arbitrary and capricious. The court vacated the final delisting rule and reinstated the rule previously in effect. The effect of the court's decision is that gray wolves in MN are again listed as threatened and gray wolves in the remaining eight states of the WGL DPS are again considered part of the larger gray wolf listed entity within the lower 48 states, which is listed as endangered. Also, critical habitat designation is reinstated in MN and MI.

6) **Neosho mucket and rabbitsfoot final listing and critical habitat designation rules** (PA and WV) – On September 17, 2013, the Service published in the Federal Register the final rule for the listing of the Neosho mucket as endangered and the rabbitsfoot mussel as threatened. Of the two, only the rabbitsfoot currently occurs in Pennsylvania; it is considered extirpated from West Virginia, but the final rule lists the mussels throughout their historical range. The listing final rule can be found at *http://www.gpo.gov/fdsys/pkg/FR-2013-09-17/pdf/2013-22245.pdf.*

   On April 30, 2015, the Service published a final rule to designate critical habitat for the Neosho mucket and rabbitsfoot mussel, which became effective on June 1, 2015. However, this rule affects only Pennsylvania because the rabbitsfoot mussel is considered extirpated in West Virginia and the Neosho mucket does not occur in the Northeast Region. The final rule designates approximately 138 river miles (rmi) of critical habitat for the rabbitsfoot in Crawford, Erie, Mercer, and Venango Counties in Pennsylvania. The proposed designation includes 74.8 rmi in French Creek, 35.6 rmi in the Allegheny River, 12.5 rmi in Muddy Creek, and 15.4 rmi in the Shenango River. The final rule can be found at http://www.gpo.gov/fdsys/pkg/FR-2015-04-30/pdf/2015-09200.pdf.

7) **American eel** (All States) – On April 24, 2013, the U.S. District Court for the District of Columbia approved a Settlement Agreement between the Service and the Council on Environmental Science Accuracy and Reliability (CESAR) (formerly the Council on Endangered Species Act Reliability) regarding the Service's failure to complete a 12-month petition finding as to whether listing the American eel as endangered or threatened is warranted. The Settlement Agreement requires the Service to submit a 12-month finding to the Federal Register by September 30, 2015.

8) **Eastern cougar proposed delisting rule** (All States) – On June 17, 2015, the Service published in the Federal Register a proposed rule to delist the eastern cougar. The proposal is based on the 5-year review issued on March 2, 2011, which concluded that the eastern cougar is extinct and recommended the subspecies be delisted. The public comment period closes on August 17, 2015. The proposed rule can be found at *http://www.gpo.gov/fdsys/pkg/FR-2015-06-17/pdf/2015-14931.pdf*.

9) **Delmarva Peninsula fox squirrel proposed delisting rule** (DE, MD, VA) – On September 23, 2014, the Service published in the Federal Register a proposed rule to delist the species on the basis of recovery. The public comment period closed on November 24, 2014. A final listing determination is due by September 23, 2015. Documents pertaining to the rulemaking can be found at *http://www.gpo.gov/fdsys/pkg/FR-2014-09-23/pdf/2014-22063.pdf.*

10) **Bicknell's thrush 12-month finding** (ME, VT, NH, NY, MA) – On September 23, 2013, the U.S. District Court in the District of Columbia approved a settlement agreement between the Center for Biological Diversity (CBD) and the Service on CBD's complaint that the Service failed to complete the 12-month finding on CBD's petition to list the Bicknell's thrush and seven other species within the statutory timeline. The settlement agreement specifies that the Service will complete the 12-month finding by September 30, 2017. The Service will accept new information until completion of the status review.

11) **Chittenango ovate amber snail petition** (NY) – The Service received a petition dated January 6, 2012, to designate critical habitat for the Chittenango ovate amber snail; adopt a rule to prohibit hydraulic fracturing and related activities within 3,000 feet of the boundaries of critical habitat designated for any federally threatened or endangered species; and adopt a rule requiring any state to consult with the Service prior to issuing any permits for activities that might adversely impact the ecosystem upon which critical habitat is directly dependent for any listed species. These actions are petitionable under the Administrative Procedure Act but not the ESA. On November 9, 2012, we sent a letter to the petitioner stating that we have determined that critical habitat designation would not provide significant conservation benefit to the snail and that, therefore, we will not designate critical habitat for the species. We have not yet responded to the petitioner's second and third rulemaking requests.

12) **Tri-colored bat** (All States) – The Service initiated an internal status review of the tri-colored bat. Coordination, data collection, and information gathering continues. We will continue to accept information until the review is complete. We will be requesting updated information on this species from field offices and states this fall. Any new information or questions can be sent to Jonathan Reichard and Christina Kocer in the Regional Office at *jonathan_reichard@fws.gov* and *christina_kocer@fws.gov*.

13) **New England cottontail (NEC)** (CT, MA, ME, NH, NY, RI) – As part of the multi-district litigation settlement agreement, the Service must make a final listing determination for the NEC by September 30, 2015. The listing determination will be either the species no longer warrants listing and will be removed from the candidate list, or the species warrants listing and we will publish a proposed rule with proposed critical habitat, if designating critical habitat is found to be prudent and determinable.

14) **Big Sandy crayfish and Guyandotte River crayfish** (VA, WV, KY) – On April 7, 2015, the Service made a warranted 12-month finding on a petition to list the Big Sandy crayfish, and proposed to list the Big Sandy crayfish (*Cambarus callainus*) and the Guyandotte River crayfish (*C. veteranus*) as endangered. The proposed rule opened a 60-day peer review and public comment period that closed on June 8, 2015. The Big Sandy crayfish is currently

known from a total of four isolated populations in the upper Big Sandy watershed of Kentucky, Virginia, and West Virginia. The Guyandotte River crayfish is currently known from a single site in Pinnacle Creek, West Virginia.

Up until recently, these two crayfishes were thought to be a single species, known as the "Big Sandy crayfish (*C. veteranus*)." Based on genetics, morphological characteristics, and geography, a December 2014 peer-reviewed taxonomic paper in Zootaxa split the single species into two separate species: the Big Sandy crayfish and the Guyandotte River crayfish. Questions regarding the proposed rule can be directed to Keith Hastie in the Regional Office at *keith_hastie@fws.gov*.

Documents pertaining to the rulemaking can be found at the following links:
Proposed Rule: http://www.gpo.gov/fdsys/pkg/FR-2015-04-07/pdf/2015-07625.pdf
Supporting documentation and comment
Link: http://www.regulations.gov/#!documentDetail;D=FWS-R5-ES-2015-0015-0001

Big Sandy and Guyandotte River Crayfish website:
http://www.fws.gov/northeast/crayfish/

The Service will evaluate information from the peer review and public comment process and make a final decision (withdraw the proposed rule, finalize as endangered, or finalize as threatened) by the spring of 2016. If either or both of these species are listed, the Service is required to consider whether areas essential to the species' conservation should be designated as critical habitat.

15) **Cave Beetle Assessments to Inform 12-month Petition Findings** (VA) – The Virginia Ecological Services Field Office has entered into a cooperative agreement with the Virginia Department of Conservation and Recreation, Division of Natural Heritage to assess populations of 17 globally rare cave beetle species and the threats these organism face. These baseline data are being collected to aid in development of status reviews and 12-month petition findings for these species to fulfill, in part, the Multi-District Litigation (MDL) Stipulated Settlement Agreement between WildEarth Guardians and the Department of the Interior.

16) **Eastern Massasauga (rattlesnake) status review and listing determination** (NY, PA) – As part of the multi-district litigation settlement agreement, the Service must make a final listing determination for the eastern massasauga rattlesnake by September 30, 2015. The listing determination will be either the species no longer warrants listing and will be removed from the candidate list, or the species warrants listing and we will publish a proposed rule with proposed critical habitat, if designating critical habitat is found to be prudent and determinable. The eastern massasauga has been a Federal candidate species since 2005. The species' candidate assessment form can be found at http://ecos.fws.gov/docs/candidate/assessments/2013/r3/C03P_V01.pdf.

17) **Spotted turtle, Blanding's turtle, green salamander, and Weller's salamander 90-day petition finding** (All States) **–** On July 1, 2015, the Service published 90-day findings for 31

species, including 1 not substantial finding and 3 substantial findings for species that occur in the Service's Northeast Region and were petitioned for listing in 2012 by the Center for Biological Diversity. A not substantial finding means that the Service will take no further action for the species under the 2012 petition. A substantial finding means the Service is initiating a status review and is seeking the best scientific and commercial data available from all sources. See the table below for which Northeast Region species are included in this Federal Register notice and a link for each finding's supporting documentation and, for the substantial findings, where to submit new information.

Species	Range	Finding	Link to supporting documentation and to submit new information
Spotted turtle (*Clemmys guttata*)	CT, DE, FL, GA, IL, ME, MD, MA, MI, PA, NH, NJ, NY, NC, OH, SC, VT, VA, WV	Substantial	http://www.regulations.gov/#!docketDetail;D=FWS-R5-ES-2015-0064
Blanding's turtle (*Emydoidea blandingii*)	IL, IA, IN, NH, NY, ME, MA, MI, MN, MO, NE, OH, PA, SD, WI; Ontario, Quebec, and Nova Scotia, Canada.	Substantial	http://www.regulations.gov/#!docketDetail;D=FWS-R3-ES-2015-0041
Green salamander (*Aneides aeneus*)	AL, GA, IN, MD, MI, OH, PA, NC, SC, VA, WV	Substantial	http://www.regulations.gov/#!docketDetail;D=FWS-R4-ES-2015-0052
Weller's salamander (*Plethodon welleri*)	NC, TN,VA	Not substantial	http://www.regulations.gov/#!docketDetail;D=FWS-R4-ES-2015-0065

From:	Miller, Martin
To:	FW5 ES Field Office Supervisors; Andy Moser; Anne Hecht; Anthony Tur; Barbara Douglas; Bonnie Crosby; Brett Hillman; Brian Evans; Brian Scofield; Cherry Keller; Christina Kocer; Christopher Allen; Craig Koppie; Cynthia Maynard; David Stilwell; Deb Carter; Dennis Hamlin; Devin Ray; Diane Lynch; Elizabeth Stout; Glenn S Smith; Jeremy Coleman; jeremy_markuson; John Warner; Jonathan Reichard; Julie Thompson; Keith Hastie; Kimberly Smith; Krishna Gifford; Laury Zicari; Lowell Whitney; Mark McCollough; Martin Miller; Mary Parkin; Melinda Turner; Mike Drummond; Noelle Rayman; Pamela shellenberger; Patricia Cole; Robert M Anderson; Roberta Hylton; Robyn Niver; Ron Popowski; Sandra Doran; Shane Hanlon; Steve Papa; Steve Sinkevich; Sumalee Hoskin; Susi vonOettingen; Thomas Davidowicz; Tiernan Lennon; Tom Chapman; Trevor Clark; Troy Anderson; Wende Mahaney; Wendy Walsh
Subject:	Fwd: Federal ESA Update #14
Date:	Wednesday, July 22, 2015 2:51:53 PM
Attachments:	20150720_ESA Update #14.docx

PLs - please forward this update to your Federal agencies partners. Paul has sent it to the State Directors, Tribal leaders, and RDT. You may want to send it to your staff contacts at these agencies/programs. Thanks, Marty

---------- Forwarded message ----------
From: **Phifer, Paul** <paul_phifer@fws.gov>
Date: Wed, Jul 22, 2015 at 4:11 PM
Subject: Federal ESA Update #14
To: Paul Phifer <Paul_Phifer@fws.gov>

Hi folks - here is the latest Federal Endangered Species Act update.

We send this update quarterly to the State Directors and Tribal leaders in our region (Maine to Virginia). Please feel free to distribute it to anyone you think might be interested. I add the addresses in the "bcc" category because it's a long list. If you'd like to see the full list of addressees, let me know.

Paul

_____
Paul Phifer, PhD
Assistant Regional Director - Ecological Services
Northeast Region
Dept of the Interior
US Fish and Wildlife Service
413.253.8698 work
413.687.4764 cell

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Martin Miller, Chief, Division of Endangered Species, Northeast Region, U.S. Fish and Wildlife Service, 300 Westgate Center Drive, Hadley, MA 01035, 413-253-8615

From: McCollough, Mark
To: Zelenak, Jim
Subject: Re: Update on lynx expert elicitation candidates
Date: Wednesday, July 22, 2015 2:55:41 PM

Yes, in lieu of Dave's comments about keeping the group small, I think the core team can do some pre-meeting reconnaissance to better understand lynx status across the border. Perhaps we could discuss a list of information needs that each of us would want to obtain, if possible, from our Canadian contacts. Mark

On Wed, Jul 22, 2015 at 4:06 PM, Zelenak, Jim <jim_zelenak@fws.gov> wrote:

> I'm going to contact him today (now). He's in the same shop/lab as Jeff Bowman, who I emailed after talking with Erin Koen last week - I think we may have to decide either Jeff or Dennis, and I can see how Dennis' recent publications and work with state and provincial folks might tip the scales in his favor. I'll let you know what I hear.
>
> Based on your earlier message, I've leaned away from having you contact Cade or Serge - are you in agreement with that?
>
> I think if we have Apps, Hodges, and Jeff or Dennis, we should have the lynx/hare/habitat issues for southern Canada well-covered. Your thoughts? Do you think we also need to look at Canadian climate modelers and/or boreal forest disturbance-regime specialists/modelers?
>
> On Wed, Jul 22, 2015 at 1:58 PM, McCollough, Mark <mark_mccollough@fws.gov> wrote:
>
> > Jim - has anyone contacted Dennis Murray. Given the amount that he has recently published, I believe he would add signficantly to the discussion. Also, he has organized a continent-wide survey of snowshoe hares and seems to have made many contacts with state and provincial agencies. Mark
> >
> > On Wed, Jul 22, 2015 at 3:40 PM, Zelenak, Jim <jim_zelenak@fws.gov> wrote:
> >
> > > Thanks Bryon,
> > >
> > > I should have noted in my previous that the footnotes for our potential Canadian participants was just in case we (and SSA FIT folks) think we are pushing the bounds of acceptable number of experts from whom to elicit information. I also think the others - Karen Hodges (especially given her previous experience with hare pops in the lower 48) and Jeff Bowman and/or Dennis Murray - cold contribute substantially to the discussion/elicitation, not just as presenters.
> > >
> > > Heather, Mary, Dave, Jonathan, and Jennifer - your thoughts? how many are too many....
> > >
> > > Recognize, though, that some candidates may drop out once we land on dates with certainty. I think we might realistically have a dozen give or take a few who will actually be able to attend.
> > >
> > > On Wed, Jul 22, 2015 at 12:50 PM, Holt, Bryon <bryon_holt@fws.gov> wrote:
> > >
> > > > Jim,
> > > >
> > > > I've been meaning to let you know that I spoke with Clayton this past Monday, and he confirmed that he is interested in participating in the meeting. However, as with Gary Koehler, Clayton is an independent researcher, and thus we would need to fund his travel. Also, I noticed that your table (which actually jogged my memory to send this email) identified Clayton as a presenter only. I would offer that, dependent on the importance of lynx immigration from Canada at sustaining/supporting lynx

populations in lower 48, Clayton may be able to contribute to the expert panel discussion as well, given his knowledge of lynx populations in Canada and what he thinks they may be in future.

Bryon

On Wed, Jul 22, 2015 at 10:10 AM, Zelenak, Jim <jim_zelenak@fws.gov> wrote:

> Because of the tight time line for lining up the expert meeting, the Core Team has been reaching out informally to potential expert candidates and/or presenters.
>
> We've had lots of interest and, fortunately, most are potentially available for the mid-Oct. - mid Nov. time frame.
>
> The attached document summarizes outreach and responses thus far. Also downloaded to the SSA Google Drive (2015 07 22 Lynx SSA Expert Workshop Candidates), where Core Team may update as additional responses come in or with recommendations for the highlighted areas.
>
> Let me know if you have questions.
>
> --
> Jim Zelenak, Biologist
> U.S. Fish and Wildlife Service
> Montana Ecological Services Office
> 585 Shepard Way, Suite 1
> Helena, MT 59601
> (406) 449-5225 ext. 220
> jim_zelenak@fws.gov

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Bryon Holt
U.S. Fish and Wildlife Service
Northern Idaho Field Office, Spokane, WA
Telephone: (509) 893-8014
Fax: (509) 891-6748
email: bryon_holt@fws.gov

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> Mark McCollough, Ph.D.
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> Maine Field Office
> U. S. Fish and Wildlife Service
> 17 Godfrey Drive, Suite 2
> Orono, ME 04473
> Phone 207 866-3344 x115
> Cell Phone: 207 944-5709
> mark_mccollough@fws.gov

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From:	Smith, David
To:	Zelenak, Jim
Cc:	Holt, Bryon; Mark McCollough; Tamara Smith; Kurt Broderdorp; Mary Parkin; Heather Bell; Jonathan Cummings; Jennifer Szymanski; Jodi Bush; Seth Willey
Subject:	Re: Update on lynx expert elicitation candidates
Date:	Wednesday, July 22, 2015 3:02:32 PM

As for the number to invite, there is no hard and fast rule, but keep in mind that first and foremost you want an adequate representation of the expert judgement within the scientific community and adequate representation of affiliations, specialty, and geography. Secondarily, to foster a good discussion, the meeting can't get too large. Personally, I prefer 12 or less, but realize it can get a bit larger in order to meet the previous considerations. And as you point out, Jim, there will be some drops to account for, but that shouldn't be many given the profile of the species.

Dave

David R. Smith
USGS - Leetown Science Center
11649 Leetown Road
Kearneysville, WV 25430
drsmith@usgs.gov
304-724-4467
https://profile.usgs.gov/drsmith
ResearchGate profile

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From:	Smith, David
To:	Zelenak, Jim
Cc:	Holt, Bryon; Mark McCollough; Tamara Smith; Kurt Broderdorp; Mary Parkin; Heather Bell; Jonathan Cummings; Jennifer Szymanski; Jodi Bush; Seth Willey
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Jim Zelenak, Biologist
U.S. Fish and Wildlife Service
Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, MT 59601
(406) 449-5225 ext. 220
jim_zelenak@fws.gov

From: McCollough, Mark
To: Zelenak, Jim
Subject: Re: Update on lynx expert elicitation candidates
Date: Wednesday, July 22, 2015 4:55:38 PM

Yes, in lieu of Dave's comments about keeping the group small, I think the core team can do some pre-meeting reconnaissance to better understand lynx status across the border. Perhaps we could discuss a list of information needs that each of us would want to obtain, if possible, from our Canadian contacts. Mark

On Wed, Jul 22, 2015 at 4:06 PM, Zelenak, Jim <jim_zelenak@fws.gov> wrote:

> I'm going to contact him today (now). He's in the same shop/lab as Jeff Bowman, who I emailed after talking with Erin Koen last week - I think we may have to decide either Jeff or Dennis, and I can see how Dennis' recent publications and work with state and provincial folks might tip the scales in his favor. I'll let you know what I hear.
>
> Based on your earlier message, I've leaned away from having you contact Cade or Serge - are you in agreement with that?
>
> I think if we have Apps, Hodges, and Jeff or Dennis, we should have the lynx/hare/habitat issues for southern Canada well-covered. Your thoughts? Do you think we also need to look at Canadian climate modelers and/or boreal forest disturbance-regime specialists/modelers?
>
> On Wed, Jul 22, 2015 at 1:58 PM, McCollough, Mark <mark_mccollough@fws.gov> wrote:
>
> > Jim - has anyone contacted Dennis Murray. Given the amount that he has recently published, I believe he would add signficantly to the discussion. Also, he has organized a continent-wide survey of snowshoe hares and seems to have made many contacts with state and provincial agencies. Mark
> >
> > On Wed, Jul 22, 2015 at 3:40 PM, Zelenak, Jim <jim_zelenak@fws.gov> wrote:
> >
> > > Thanks Bryon,
> > >
> > > I should have noted in my previous that the footnotes for our potential Canadian participants was just in case we (and SSA FIT folks) think we are pushing the bounds of acceptable number of experts from whom to elicit information. I also think the others - Karen Hodges (especially given her previous experience with hare pops in the lower 48) and Jeff Bowman and/or Dennis Murray - cold contribute substantially to the discussion/elicitation, not just as presenters.
> > >
> > > Heather, Mary, Dave, Jonathan, and Jennifer - your thoughts? how many are too many....
> > >
> > > Recognize, though, that some candidates may drop out once we land on dates with certainty. I think we might realistically have a dozen give or take a few who will actually be able to attend.
> > >
> > > On Wed, Jul 22, 2015 at 12:50 PM, Holt, Bryon <bryon_holt@fws.gov> wrote:
> > >
> > > > Jim,
> > > >
> > > > I've been meaning to let you know that I spoke with Clayton this past Monday, and he confirmed that he is interested in participating in the meeting. However, as with Gary Koehler, Clayton is an independent researcher, and thus we would need to fund his travel. Also, I noticed that your table (which actually jogged my memory to send this email) identified Clayton as a presenter only. I would offer that, dependent on the importance of lynx immigration from Canada at sustaining/supporting lynx

populations in lower 48, Clayton may be able to contribute to the expert panel discussion as well, given his knowledge of lynx populations in Canada and what he thinks they may be in future.

Bryon

On Wed, Jul 22, 2015 at 10:10 AM, Zelenak, Jim <jim_zelenak@fws.gov> wrote:

> Because of the tight time line for lining up the expert meeting, the Core Team has been reaching out informally to potential expert candidates and/or presenters.
>
> We've had lots of interest and, fortunately, most are potentially available for the mid-Oct. - mid Nov. time frame.
>
> The attached document summarizes outreach and responses thus far. Also downloaded to the SSA Google Drive (2015 07 22 Lynx SSA Expert Workshop Candidates), where Core Team may update as additional responses come in or with recommendations for the highlighted areas.
>
> Let me know if you have questions.
>
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> U.S. Fish and Wildlife Service
> Montana Ecological Services Office
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> Helena, MT 59601
> (406) 449-5225 ext. 220
> jim_zelenak@fws.gov

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Bryon Holt
U.S. Fish and Wildlife Service
Northern Idaho Field Office, Spokane, WA
Telephone: (509) 893-8014
Fax: (509) 891-6748
email: bryon_holt@fws.gov

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Jim Zelenak, Biologist
U.S. Fish and Wildlife Service
Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, MT 59601
(406) 449-5225 ext. 220

> > jim_zelenak@fws.gov
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> --
> Mark McCollough, Ph.D.
> Endangered Species Specialist
> Maine Field Office
> U. S. Fish and Wildlife Service
> 17 Godfrey Drive, Suite 2
> Orono, ME 04473
> Phone 207 866-3344 x115
> Cell Phone: 207 944-5709
> mark_mccollough@fws.gov

--
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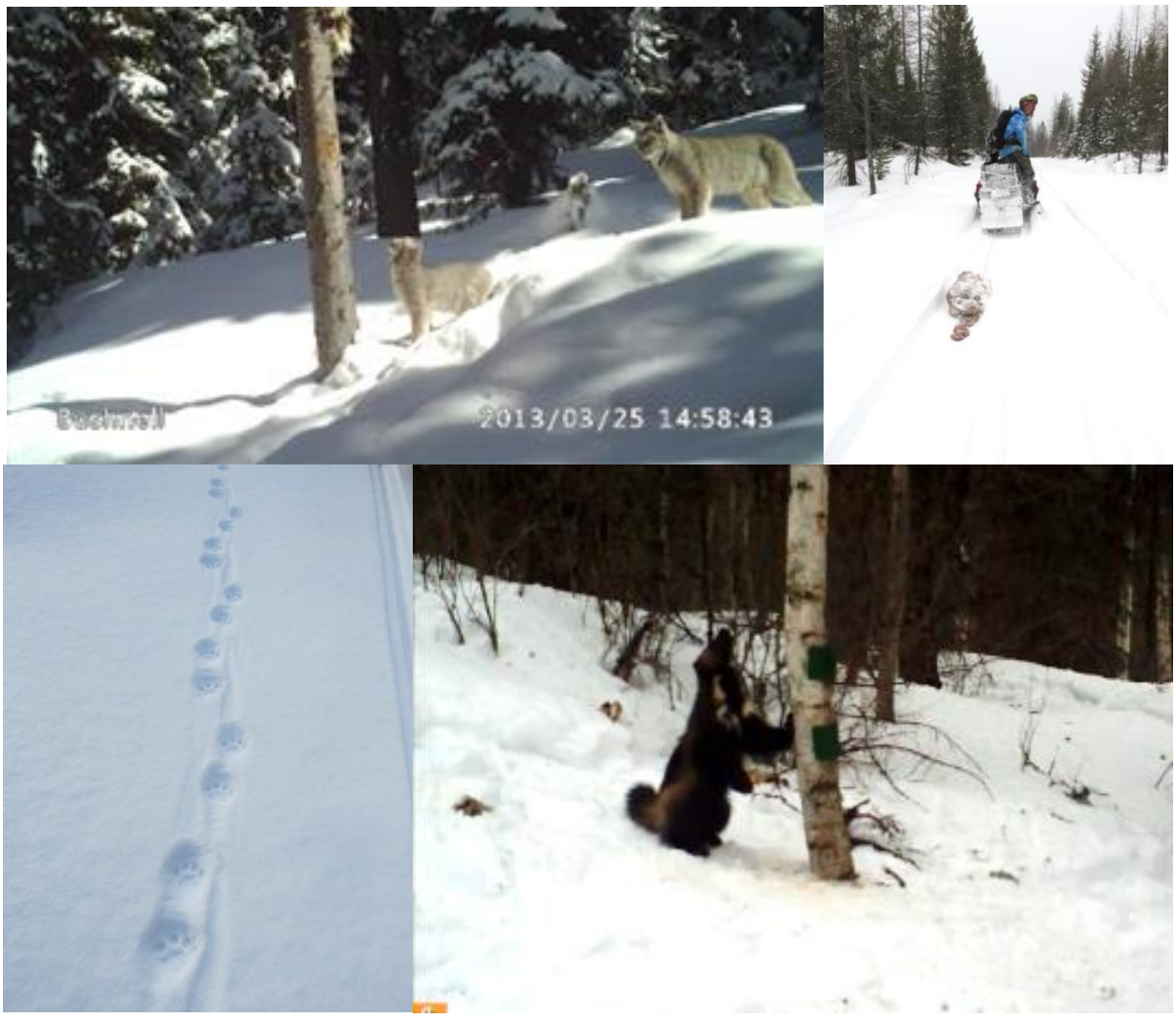
Forest Carnivore Monitoring in the Southwestern Crown of the Continent: Progress Report 2012-2014



December 19, 2014

Report Compiled by the Carnivore Monitoring Project Team:

Adam Lieberg – Northwest Connections, Condon, MT
Carly Lewis – US Forest Service, Lolo National Forest
Scott Tomson – US Forest Service, Seeley Lake District, Lolo National Forest
Mark Ruby – US Forest Service, Swan Lake District, Flathead National Forest
Pat Shanley – US Forest Service, Lincoln District, Helena National Forest
Cory Davis – University of Montana College of Forestry and Conservation
Mike Mayernik – US Forest Service, Seeley Lake District, Lolo National Forest
Luke Lamar – Swan Ecosystem Center, Condon, MT
Anne Carlson – The Wilderness Society, Bozeman, MT

Recommended Citation: Southwestern Crown Carnivore Monitoring Team. 2014. Forest Carnivore Monitoring in the Southwestern Crown of the Continent: Progress Report 2012-2014.

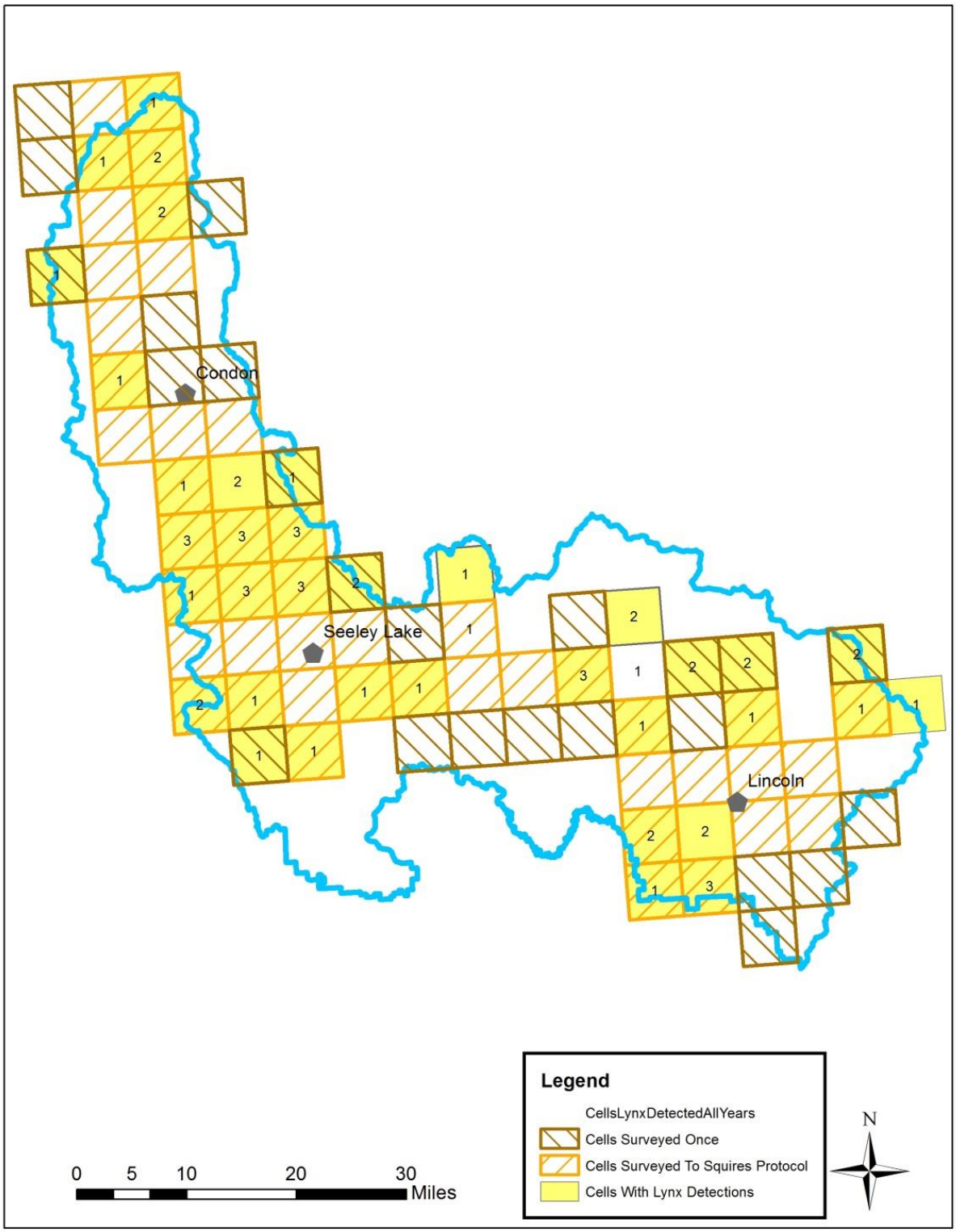
Executive Summary:

The Southwestern Crown of the Continent (SW Crown) is a mostly-forested landscape in the Rocky Mountains of western Montana. The SW Crown was chosen as one of the first ten project areas nationally awarded funding under the federal Collaborative Forest Landscape Restoration (CFLR) program. The CFLR program requires multi-party monitoring to assess the positive or negative ecological, social, and economic effects of restoration projects implemented under the program. The monitoring effort described herein was designed to systematically survey the SW Crown for forest carnivores, particularly focusing on lynx, fisher, and wolverine. Maintaining or restoring a healthy landscape that supports these three species is a primary focus of National Forest management in the SW Crown and, as listed or sensitive species, the CFLR Program. As such, forest managers consider the impacts to these species before implementing any major forest management, including building or removing roads, fuels reduction, and forest restoration projects. The initial goal of this monitoring was to obtain three consecutive years of data early in the CFLR Program and repeat the monitoring later in the 15-year program.

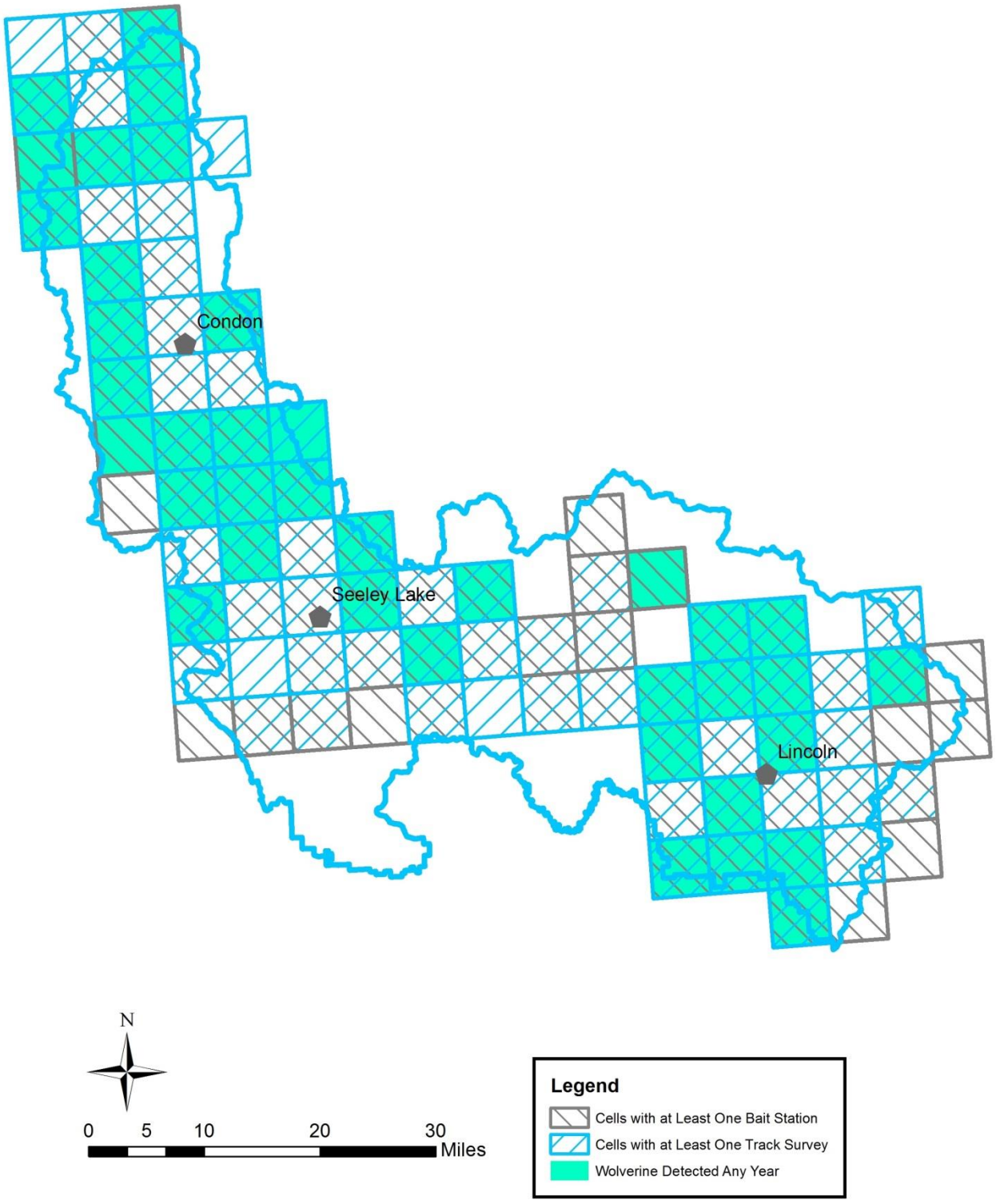
The primary objective of monitoring forest carnivores in the SW Crown of the Continent is to facilitate and coordinate the adaptive management of wolverines, Canada lynx, and fisher by agency managers across the landscape. This monitoring project was designed to provide a baseline of the current distribution of the focal species in the SW Crown and to allow for tracking changes in that distribution over time.

The SW Crown carnivore project utilizes non-invasive survey methods to maximize the ability to detect multiple species across a large landscape in an efficient and cost effective manner. We conducted snow track surveys and used DNA collection methods (hair snares and bait stations) developed by researchers with the USFS Rocky Mountain Research Station. In addition, a subset of bait stations was equipped with motion-sensor photo or video cameras to capture the activity of individuals at bait stations. In order to standardize the approach across the SW Crown, a 5 x 5 mile grid was overlaid on the entire landscape and surveys and bait stations were deployed systematically in these grid cells. Field seasons were started in the beginning of January and ran through the end of March. DNA samples were processed by the Rocky Mountain Research Station and identified to species and individual. Across all three years (2012-2014), we surveyed 82 of the 129 grid cells that at least partially fall within the SW Crown and conducted snow-track surveys on over 1,000 miles each year within those grid cells.

Across the 1.5 million acre SW Crown, lynx were detected in a total of 36 grid cells from 2012-2014 (Figure 14). DNA samples identified 18 unique Canada lynx, including 13 males and five females. Of these animals, 13 were new to regional databases. Survey work also uncovered at least one previously unknown “hotspot” for lynx within the landscape in the Lincoln Ranger District. Over the course of the survey period, wolverines were detected in a total of 38 grid cells (Figure 16) and DNA samples identified 15 unique wolverines: six males and nine females. Wolverines were detected at elevations ranging from 3,346-7,567 feet.



Survey effort and detections for lynx across the SW Crown from 2012-2014.



Survey effort and detections for wolverine across the SW Crown from 2012-2014.

Despite intense effort across the SW Crown over the course of three field seasons, the Carnivore Project Monitoring Team did not detect any fisher during 3,366 miles of track

surveys, or through the use of hair snares, bait stations, and camera traps from 2012-2014. The survey methods did, however, lead to the documentation of a suite of other wildlife species across the landscape, including marten, mink, short-tailed weasel, red fox, coyote, wolf, bobcat, mountain lion, snowshoe hare, and flying squirrel.

The three years of monitoring effort described in detail in this report have led to significant improvements in our understanding of the (1) current presence/absence and distribution of Canada lynx, wolverine, and fisher across the SW Crown; (2) most effective monitoring protocols for Canada lynx and wolverine, and (3) cost efficiencies associated with monitoring protocols that maximize the detection of Canada lynx and wolverines. We will be continuing surveys in the SW Crown in the winter of 2015 and expanding into adjacent lands as well.

The data and results summarized in this report have the potential to inform a wide variety of regional management efforts, including (but not limited to) the development of new Forest Plans under the 2012 Planning Rule; the Restoration Initiative Blackfoot and Swan (RIBS) Assessment being initiated by the SW Crown CFLR project; the development of collaborative restoration projects by the Lolo Restoration Committee, Seeley Lake Restoration Committee, and Lincoln Restoration Committee; the development and implementation of restoration projects by the SW Crown CFLR project; the evaluation of lands included in Wilderness Inventories under Chapter 70 of the 2012 Forest Planning Rule; monitoring programs for Region 1 of the U.S. Forest Service; and to inform management planning for these species by the U.S. Fish and Wildlife Service and Montana Fish, Wildlife & Parks.

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Introduction: Why Are We Doing This?

Background

The Southwestern Crown of the Continent (SW Crown) is a mostly-forested landscape in the Rocky Mountains of western Montana (Figure 1). It contains three Forest Service Ranger Districts, one each on the Flathead National Forest (FNF), Swan Lake Ranger District, the Lolo National Forest (LNF), Seeley Lake Ranger District, and the Helena National Forest (HNF) Lincoln Ranger District. The landscape forms the southern boundary of the Bob Marshall Wilderness Complex in western Montana, and encompasses forests and communities in the Blackfoot, Clearwater, and Swan River valleys.

The SW Crown was chosen as one of the first ten project areas nationally awarded funding under the federal Collaborative Forest Landscape Restoration (CFLR) program. The program objectives are to:

- Reduce the risk of uncharacteristic wildfire
- Improve fish and wildlife habitat
- Maintain or improve water quality and watershed function
- Maintain, decommission, and rehabilitate roads and trails
- Prevent or control invasions of exotic species, and
- Use woody biomass and small-diameter trees produced from restoration projects.

The Southwestern Crown Collaborative (SWCC) is a group of partners including representatives from several levels (i.e. District, Forest, Region) of the Northern Region of the Forest Service (Region 1), local non-government organizations (NGOs), private entities, and the University of Montana that came together to develop and implement restoration projects under CFLR in the SW Crown landscape.

The CFLR program requires multi-party ecological, social, and economic monitoring. As part of the CFLR Program, monitoring in the SW Crown is focused on examining the effects of forest restoration treatments at multiple spatial scales. Forest carnivore monitoring is one of over 20 monitoring projects supported with CFLR funding in the SW Crown. Because of the wide-ranging nature of forest carnivores, it is difficult to determine the effects that small-scale treatments may have on forest carnivores. However, forest carnivores could benefit from the efforts to effect landscape-scale changes, including restoring a natural balance of habitat conditions and disturbances, reducing roads, and restoring habitat for prey species. In the winter of 2012, members of the SWCC Wildlife Working Group began systematic, landscape-scale carnivore monitoring efforts within the SW Crown. This report summarizes the first three winters, 2012-2014, of those efforts.

Project Objectives

The primary objective of monitoring forest carnivores in the SW Crown of the Continent is to facilitate and coordinate the adaptive management of wolverines, Canada lynx, and fisher by agency managers across the landscape. The collection of baseline empirical information that can be used to inform management decisions and conservation strategies is a critical part of this process, while the monitoring program has also created the real-time information feedback loops needed to assess the effects of management actions on these species

through time. More specifically, by monitoring changes to carnivore populations during implementation of the CFLR Program, managers have the ability to learn more rapidly about the effectiveness of project goals for forest carnivores.

The initial objectives identified for the project were to:
Develop a better understanding of the distribution of forest carnivores, with a focus on lynx, wolverine, and fisher, across the project area.
Collect genetic material from the three focal species to establish important baseline information (individual identification and sex, sub-population genetics) and add to the existing body of knowledge of these species in the Northern Rockies.
Better understand travel routes and coarse habitat selection for these species.
Make a concerted effort to survey roadless and wilderness areas that have received very little survey effort to date.
Complement ongoing research and monitoring efforts in the region, including reporting on wolf pack activity and lynx habitat mapping efforts.
Identify "hot spots" where more intensive research could be conducted (e.g. GPS collar deployment to study specific habitat use).
Improve the cost effectiveness of surveying forest carnivores at large scales and over time.
Raise community awareness/increase support among partners and the general public for forest carnivore conservation.

Species of interest and why they were chosen for monitoring

A variety of mid-sized, forest carnivores inhabit the SW Crown's 1.5 million acre landscape, including animals in the cat family (mountain lion, Canada lynx, bobcat), the dog family (gray wolf, coyote, foxes), and the weasel family (wolverine, fisher, marten, long-tailed weasel). These forest carnivores are amongst the most wide-ranging species within the SW Crown, utilizing vast areas and a variety of habitat types. While some of these species are fairly abundant and have widespread distributions across the state, others are less common, and/or less is known about their distribution and abundance. Previous survey efforts, research, and fur trapping records have indicated the presence of multiple forest carnivores in the SW Crown; however, no landscape-wide survey efforts have been conducted to date. This monitoring effort was designed to systematically survey the SW Crown for forest carnivores, particularly focusing on lynx, fisher, and wolverine. These species were chosen because of their management importance to the US Forest Service.

- **Canada lynx** (lynx; *Lynx canadensis*) are listed as Threatened under the Endangered Species Act (ESA) and the SW Crown represents the southern-most extent of critical habitat (Figure 2) occupied by the species in the contiguous United States (US). Lynx management and recovery is currently a high profile issue for the federal land management agencies.
- **Wolverines** (*Gulo gulo*) have been a Sensitive species for the Northern Region of the Forest Service for years, and were recently proposed for federal listing as Threatened under the ESA. The proposal was withdrawn by the US Fish and

Wildlife Service (USFWS) in 2014, citing the species' recovery in recent decades and USFWS "determined that the effects of climate change are not likely to place the wolverine in danger of extinction now or in the foreseeable future". The Crown of the Continent serves as an important linkage between wolverine populations in Canada and remaining populations in the contiguous US (Cegelski et al. 2006).

- **Fisher** (*Pekania pennanti*) has been petitioned several times for listing under the ESA and is currently managed as a "Sensitive" species in the Northern Region of the Forest Service.

A primary focus of National Forest management in the SW Crown, and the CFLR Program, is maintaining or restoring a healthy landscape that supports these three species. As such, forest managers consider the impacts to these species before implementing any major forest management, including building or removing roads, fuels reduction, and forest restoration projects.

Table 1 shows the current state of knowledge within the Northern Rockies region regarding the three focal species and the management guidelines provided by relevant agencies for these species. Relative to lynx, less is known about the distribution and habitat needs of wolverine and fisher. There has been substantial research conducted on lynx in the region focusing on habitat needs and life history traits, which is reflected in guidance for the Forest Service. However, the USFWS has only recently developed a timeline for completing a recovery plan for the species. A USFWS Recovery Outline for lynx from 2005 recognized the importance of monitoring to detect population trends over time and suggested to: "Monitor lynx use in lynx analysis units or other appropriate management unit at least once every 10 years to determine distribution and occupancy within the core area." The SW Crown is within this lynx core area. Schultz et al. (2013) also recognized that indirectly estimating a species' status and trend based on spatial distribution was a less expensive and more efficient way to monitor a species compared to direct estimates of population parameters using methods such as mark-recapture.

Lynx and wolverine may also be particularly susceptible to future changes in climate because of their reliance on deep snow. Lynx inhabit boreal forest types and rely on deep snow environments where they have a competitive advantage over other carnivores. Based on Intergovernmental Panel on Climate Change (IPCC) climate projections, the area of potential lynx habitat may decrease by two-thirds in the lower 48 by the year 2100 (Gonzalez et al. 2007). Wolverine denning sites and habitat use have been shown to be highly correlated with persistent spring snow cover (Copeland et al. 2010, Aubry et al. 2007). Based on climate projections and habitat models, wolverine populations are expected to persist through the first half of the 21st century, but they may become smaller and more isolated (McKelvey et al. 2011). In contrast, fisher habitat may increase under future climate conditions, though their persistence will rely on their ability to disperse through developed landscapes and persist in smaller patches of habitat (Olson et al. 2014).

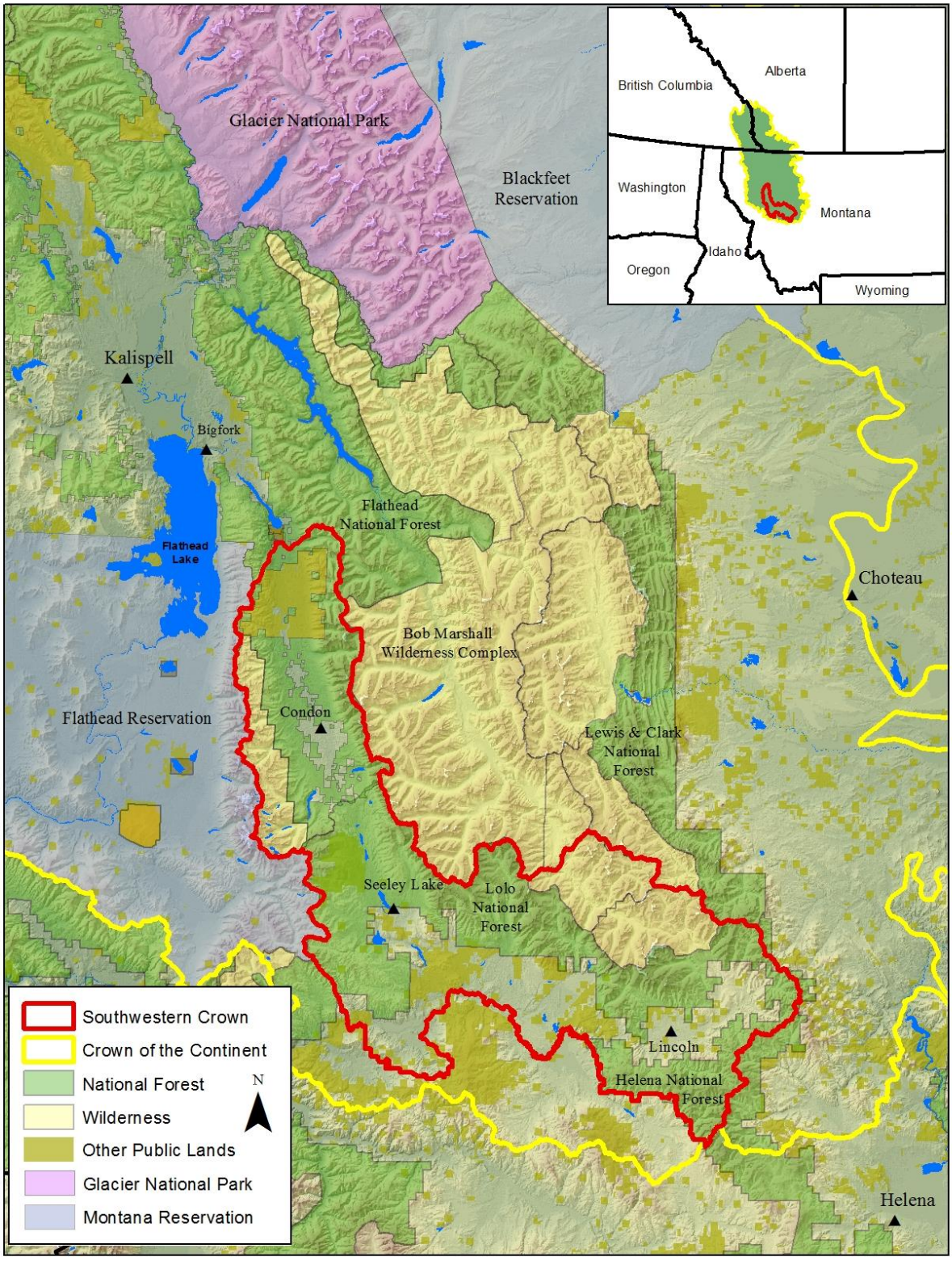

Figure 1. Location of Southwestern Crown of the Continent within the larger Crown-of-the-Continent Ecosystem. Forest Service lands and other public lands within the survey area have been highlighted with color coding. Areas not highlighted are privately-owned.

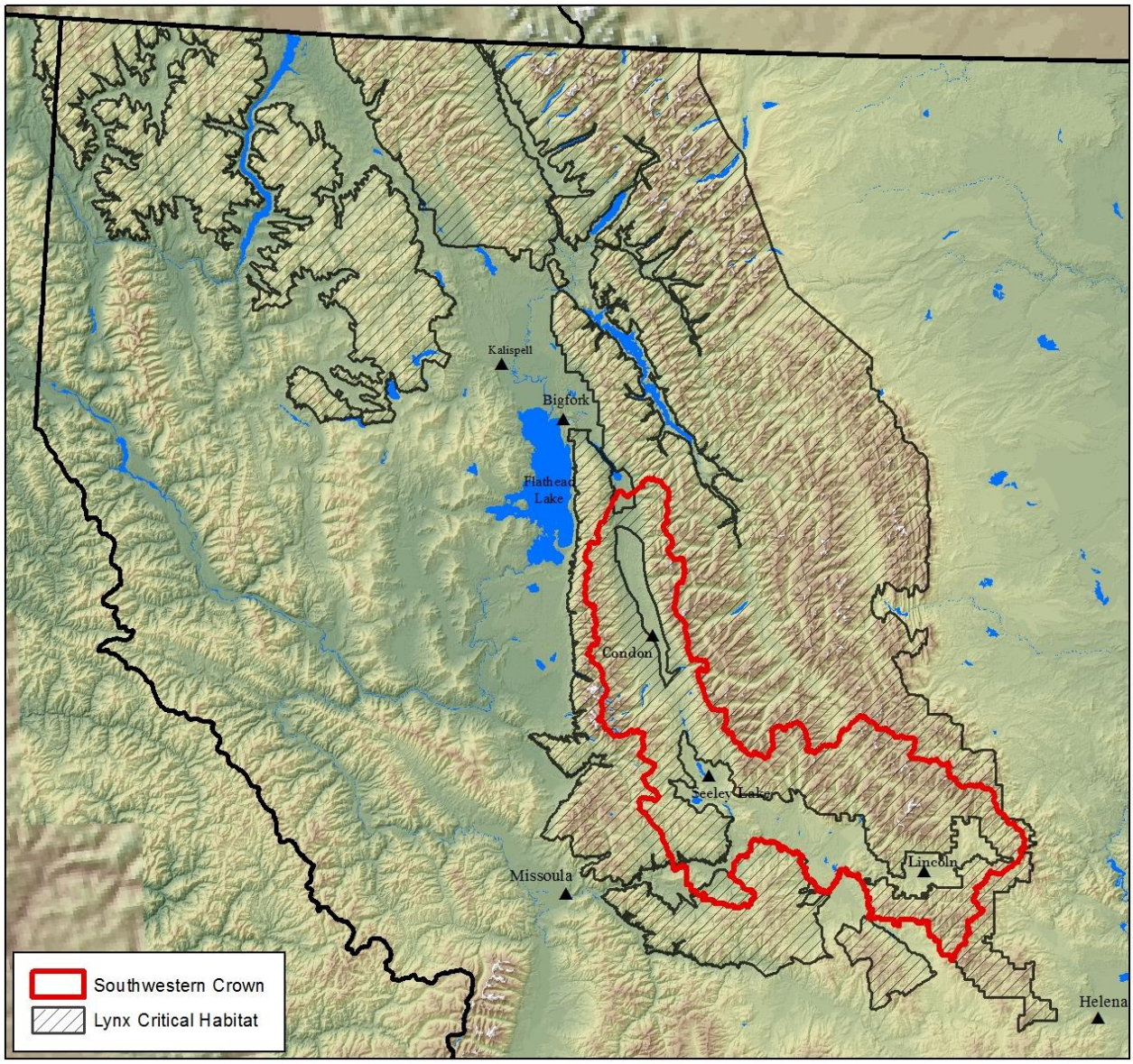

Figure 2. Canada lynx critical habitat in western Montana.

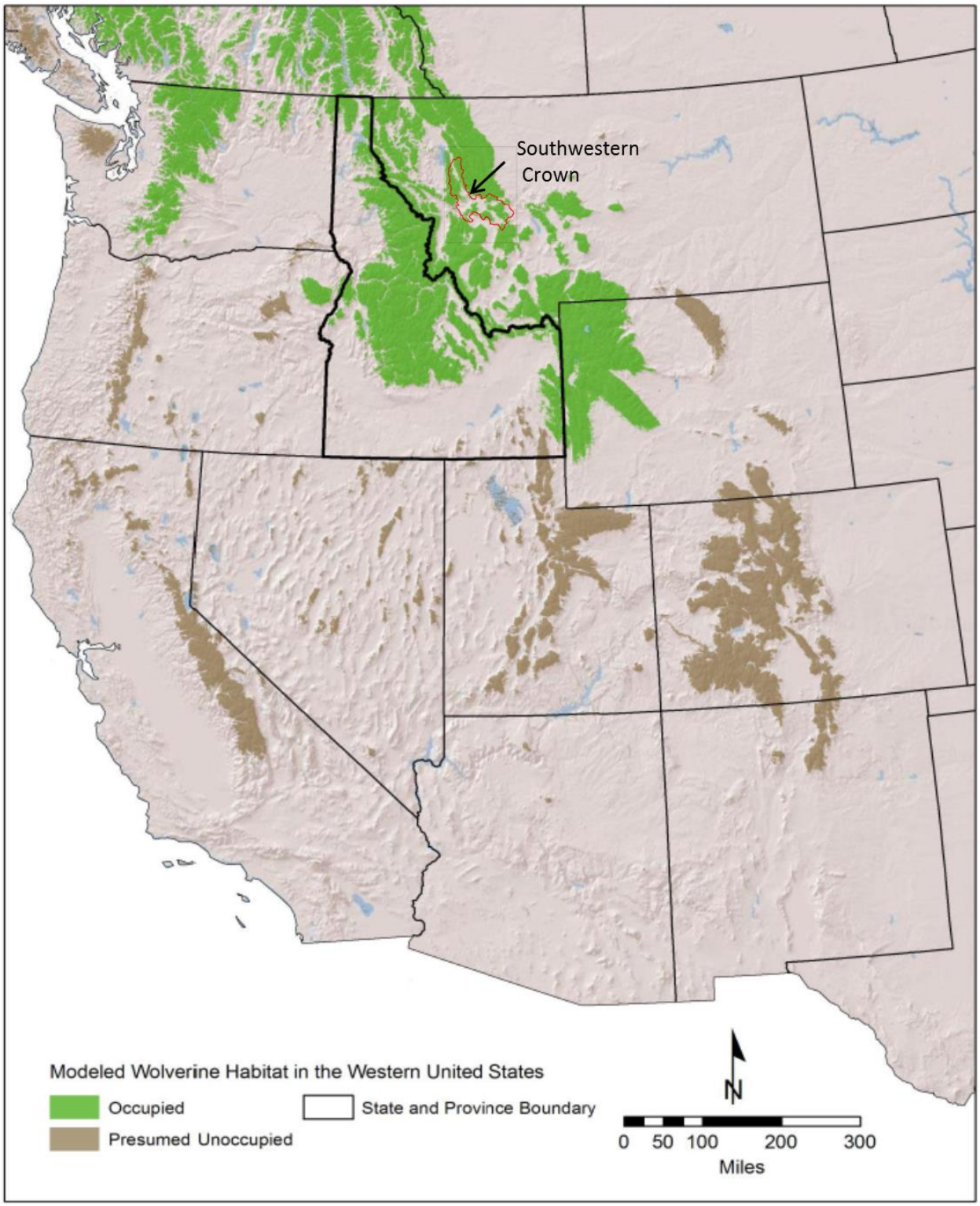

Figure 3. Modeled wolverine habitat in the western United States. Map derived by combining habitat models presented in Copeland et al. (2010) and Inman et al. (2013a, female dispersal). Occupancy status is derived from USFWS (2013). (*From* Idaho Department of Fish and Game 2014)

Figure 4. Current distribution of fisher habitat in Montana and Idaho. Map based on environmental, climate, and topographic variables as modeled by Olson et al. (2014).

Table 1. Assessment of current information regarding lynx, wolverine, and fisher in the Northern Rockies region as understood by the project team.

Color codes: Well understood/guidance provided | Somewhat understood/some guidance | Not understood/little to no guidance

Topic	Lynx	Wolverine	Fisher
Historic distribution	General historic distribution in Region 1 (R1) somewhat understood	General historic distribution in R1 somewhat understood	General historic distribution in R1 somewhat understood
Current distribution	General current distribution in R1 fairly well understood – this distribution is primarily based on where sub populations occur – not just detections of single individuals	General current distribution in R1 fairly well understood depending on whether distribution is defined by persistent sub populations of just dispersing or isolated individuals	General current distribution in R1 fairly well understood depending on whether distribution is defined by persistent sub populations of just dispersing or isolated individuals
Distribution limiting factors	Reasons for current distribution unclear (i.e. lack of habitat, inability of species to recolonize, connectivity barriers, human mortality factors)	Reasons for current distribution unclear (i.e. lack of habitat, inability of species to recolonize, connectivity barriers, human mortality factors)	Reasons for current distribution unclear (i.e. lack of habitat, inability of species to recolonize, connectivity barriers, human mortality factors)
Core areas	Core areas delineated (i.e., Critical habitat units)	No core areas delineated	No core areas delineated
General habitat needs	Moderate to good understanding of species general habitat needs based on empirical data collected within the region	Limited understanding of species habitat needs based on empirical data collected within the region	Limited to poor understanding of species habitat needs based on empirical data collected within the region
Specific habitat needs	Good understanding of species dependence on snowshoe hares and on spruce fir forests. Moderate understanding of age class/size class habitat needs and how these shift seasonally	Limited to poor understanding of specific habitat types and of associated prey needed for species persistence	Limited to poor understanding of specific habitat types and of associated prey needed for species persistence
Life history traits	Moderate understanding of life history parameters such as home range size, litter size, survival, dispersal movements based on empirical data collected within the region	Limited understanding of life history parameters such as home range size, litter size, survival, dispersal movements based on empirical data collected within the region	Limited understanding of life history parameters such as home range size, litter size, survival, dispersal movements based on empirical data collected within the region
Mortality	Moderate understanding of mortality factors impacting the species at a regional level	Poor understanding of mortality factors impacting the species at a	Poor understanding of mortality factors impacting the species at a

factors		regional level	regional level
USFS management guidance	Canada Lynx Conservation Assessment Strategy (LCAS), Northern Rockies Lynx Management Direction (NRLMD) and Critical Habitat rule all provide agency guidance in how to manage the species and species habitat	No real guidance in the region on how to manage for wolverine and no conservation strategy	No real guidance in the region on how to manage for fisher and no conservation strategy
USFWS Recovery Plan	Recovery plan being drafted	No clear picture of what recovery for this species looks like and no recovery plan being drafted	No clear picture of what recovery for this species looks like and no recovery plan being drafted
Existing monitoring strategy	No existing monitoring strategy tied to any spatial scale such as a core area	No existing monitoring strategy tied to any spatial scale such as a core area	No existing monitoring strategy tied to any spatial scale such as a core area

Detecting forest carnivores and monitoring population demography can be difficult, as carnivores are often inconspicuous, patchily distributed, and territorial. Many forest carnivores occupy large home ranges or territories (e.g. 150 km^2 and 70 km^2 for male and female lynx, respectively; Aubry 2000). Therefore, monitoring efforts must be employed across large landscapes for multiple years. The initial goal of this monitoring was to obtain three consecutive years of data early in the CFLR Program and repeat the monitoring later in the 15-year program. This will provide information on distribution and relative abundance of forest carnivores in the SW Crown, while still considering annual variations in weather and snow conditions that can substantially alter species' habitat use and distribution as well as detection probabilities.

Forest carnivore monitoring in the SW Crown combines multi-species snow track surveys with non-invasive DNA collection methods (bait stations) using protocols developed by researchers with the USFS Rocky Mountain Research Station (RMRS; Schwartz et al. 2006; Squires et al. 2004).

This work builds on existing efforts in the region that have been ongoing for several years, working with RMRS to better integrate surveys for rare carnivores in the Northern Rockies. Several forests began implementing passive hair snare surveys for fisher in 2007 (using the protocol by Schwartz et al. 2006). In 2010 the Lolo NF began implementing a multi-species carnivore approach on parts of the forest that involved using snow track surveys in conjunction with the fisher hair snare effort. These efforts were continued in 2011 with several new partners (i.e., Montana Department Natural Resources and Conservation, Great Burn Study Group, Northwest Connections) surveying additional areas and/or providing financial support. In 2012, the SWCC Wildlife Working Group, began our first year of the Southwest Crown multi-species monitoring, employing fisher hair snares and conducting snow tracking surveys within the three ranger districts of the SW Crown. In 2013 and 2014, we switched to multi-species bait stations and track surveys. The Flathead NF extended the multi-species survey methods to other areas of the forest outside of the SW Crown boundary.

Monitoring Questions

This monitoring project was designed to provide a baseline of the current distribution of the focal species in the SW Crown and to allow for tracking changes in that distribution over time. Table 2 lists the potential topics addressed through monitoring or research and which of those questions this work is focused on. We will attempt to address these topics at multiple scales including: 1) the survey grid cell (5 mi x 5 mi), 2) Lynx Analysis Unit (LAU), 3) Ranger District, and 4) the full SW Crown landscape.

Table 2. General monitoring and research questions identified by participants at a January 2014 Forest Carnivore Monitoring and Information Sharing Workshop in Seeley Lake, MT. Questions this project is attempting to address are identified.

Topic	Question	Are we addressing?
Presence	Is the species present in a given area (i.e. grid cell, district, entire SW Crown)?	Yes
Distribution	Where within a given area (i.e. district, SW Crown) is it found and how does it change over time?	Yes
Relative abundance	How common is the species in a given area (i.e. grid cell, district, entire SW Crown) and how does that change over time?	Yes
Population trend	Is the population increasing/decreasing within a given area (i.e. SW Crown) through time?	No, but possibly could in future
Population estimate	How many individuals are there within a given area (i.e. SW Crown)?	No, but getting minimum number
Habitat use/ relationships	What habitat components are consistently associated with the presence of the species?	Yes, at a coarse scale
Population viability	Can the species persist in a given area (i.e. SW Crown) over time given current and future projected conditions?	No

Methods: What Are We Doing?

Forest ecosystems of the SW Crown are biologically diverse relative to other forested regions in the Rocky Mountains. This diversity is the result of the convergence of maritime and continental climatic influences as well as topographic complexity and steep elevation gradients. Elevation range is 927 – 2859 m (3,041-9,380 ft) and average annual precipitation ranges from approximately 38-66 cm (15 - 26 in). The current distributions of tree species and forest types in this region depend on topographic, edaphic, and climatic factors, as well as on past land use and natural disturbance. In the SW Crown, mid- and upper-elevation forests are dominated by cool and cold subalpine fir forest types. Douglas fir, western larch, ponderosa pine, and lodgepole pine type forests dominate lower elevations, with a relative abundance and size distribution of species driven by water availability, soil types, past harvesting methods, and fire.

The SW Crown carnivore project utilizes multiple non-invasive survey methods to maximize our ability to detect multiple species across a large landscape in an efficient and cost effective manner. In order to standardize the approach across the SW Crown, a 5 x 5 mile grid (roughly 8 km x 8 km), which represents an area slightly smaller than an average female lynx home range (Aubrey et al. 2000), was overlaid on the entire landscape. There are 129 grid cells that at least partially intersect the SW Crown landscape (see Figure 4), and about 80 of those are fully or mostly in the SW Crown boundary. Those grid cells were targeted to conduct snow track surveys and deploy hair snare bait stations to monitor target carnivore species and meet the project objectives.

Snow track surveys and bait stations were prioritized in areas of upcoming forest management projects, particularly in portions of project areas where lynx,

wolverine, or fisher habitat models suggested potential habitat exists, or where biologists have received recent reports and/or historic reports of species occurrence. However, as much of the SW Crown landscape was surveyed as possible for a more complete landscape-level picture of carnivore distribution.

Field seasons were started in the beginning of January and ran through the end of March. Field work was coordinated and conducted by a collaborative group within the SWCC Wildlife Working Group; including, Forest Service biologists on the Lolo, Flathead, and Helena National Forests, and Northwest Connections, a non-profit conservation and education organization based in the Swan Valley. Genetic analyses were conducted by RMRS.

Snow tracking is an effective way to detect lynx (Squires et al. 2004), and the addition of backtracking to obtain genetic samples (hair or scat) along tracks can provide important information about demographics of the species (e.g. gender, individual, etc.). Because fisher spend a lot of time in trees or under the snow, it is less likely that they will leave tracks that can be observed in snow track surveys. In addition, fisher tracks vary from marten tracks only in their size. Sexual dimorphism in both species means that it can be difficult to discern a large male marten from a small female fisher. Thus, hair snares at strategically placed bait stations are used to collect genetic samples that can provide proof of their presence in the area and give information regarding demographics. Bait stations have also been shown to be effective in attracting wolverine. In addition, motion-sensor cameras were mounted at some bait stations to help with species verification and monitor effectiveness of survey methods.

Multi-species Snow Track Surveys

Snow track surveys are based on methods developed by John Squires of the Rocky Mountain Research Station to detect forest carnivores across a large landscape (Squires et al. 2004). The goal is to cover as much ground as efficiently as possible, in a manner that allows us to determine if forest carnivores are present (or not detected) in the area.

Technicians surveyed primarily along roads in addition to some trail and off trail travel within each grid cell, and recorded any carnivore tracks that were observed. In order to increase the detection probabilities of target species, field technicians used the following general protocols, largely based on work developed by Squires et al. (2004) for determining lynx distribution. However, technicians also targeted fisher and wolverine with these protocols and deployed bait stations. Survey routes were traced on a map then digitized in Global Information Systems (GIS). The full field protocols and an example datasheet can be found in Appendix A.

- Minimum survey distance of 10 km (6.2 miles) per grid cell
- Conduct at least two track surveys per grid (often done while deploying or surveying bait stations)
- Preference given to routes that traverse forested habitats with high horizontal cover and mature stands
- Conduct surveys all winter with the understanding that days with optimal tracking conditions (i.e. 3-7 days after snowfall [Figure 5]) increase detection probabilities,

but are limited in occurrence. More common are days with less optimal tracking conditions that still allow opportunities to detect carnivore presence.

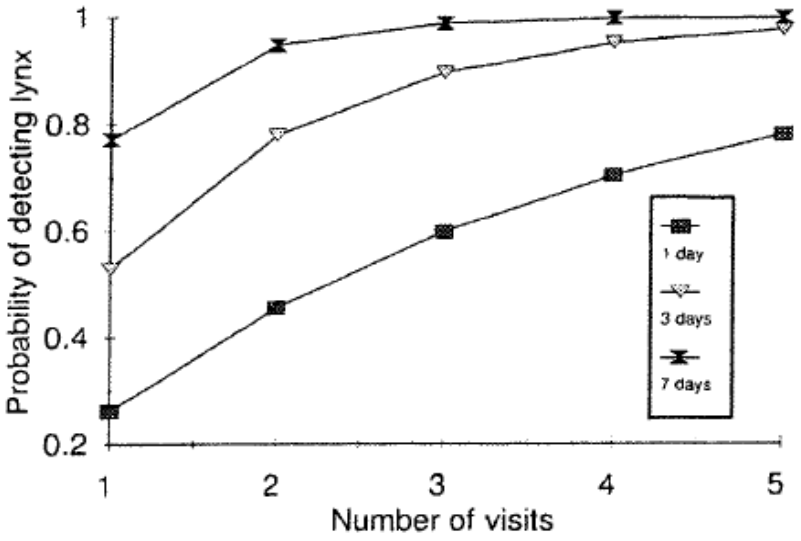

Figure 5. Lynx detection probabilities and the number of visits. Computer-modeled relationship between the probability of detecting lynx and the number of visits to an 8 km survey transect pixel relative to the number of days since last snow. Detection probabilities are relatively high with 2-3 visits when conducted several days after a snowstorm. From Squires et al. (2004).

Technicians recorded tracks of all suspected target species (lynx, wolverine, fisher) as well as secondary target carnivore species (marten, mountain lion, wolf, and bobcat). Only the first documented secondary carnivore species tracks are recorded for each grid. Technicians also measured tracks (i.e. stride, straddle, length, width, depth; Halfpenny et al. 1995) and recorded GPS coordinates.

When a suspected target carnivore species track was detected, field technicians followed the trail (i.e. backtrack) to collect genetic samples (i.e. hair, scat). Hair samples were often found in tracks and/or at rest locations such as day beds or on vegetation the animal passed through while traveling. Hair samples were stored in vials with desiccant and scat samples were dried and stored in paper bags. All genetic samples are sent to the RMRS Wildlife Genetics Laboratory in Missoula, Montana for DNA extraction and analysis. Depending on the quality, samples can be amplified to verify species and individual DNA signatures.

Bait Stations and Hair Snares

In 2012, methods described by Schwartz et al. (2006) were followed for conducting fisher hair snaring. Within each grid cell, a minimum of four snares were placed along roads or trails at approximately 0.5 mile intervals, with preference given to areas

with likely fisher habitat. Snares consisted of a triangular-shaped plastic tube in which a piece of raw chicken was hung in the center (Figure 6). Wire gun cleaning brushes were placed at various angles on either side of the chicken, so that when an animal entered the snare to get the chicken, hair was snagged in the gun brushes. Hair snares were left in place in the field for approximately 21 days. Technicians then returned and collected any hair samples, which were sent to RMRS for DNA extraction and analysis.

This method, in which at least four snares are placed per grid cell, had a 97.7% probability of detecting fisher in a sampling unit in an area with a known fisher population (Schwartz et al. 2006). Schwartz et al. suggest that placing more snares per unit might be appropriate in areas with fewer fishers, and recognize the limitations of these methods for detecting individual fisher or small populations.

Figure 6. Fisher hair snare used in 2012.

After detecting no fishers during the 2012 field season, fisher hair snare stations were changed to a multispecies bait station that has been successful in detecting multiple carnivore species, including fisher, lynx, and wolverine (M. Lucid, Idaho Fish and Game, personal communication). The new methodology uses a bait pole (i.e. a tree with bait attached six feet up) with gun brushes under the bait to collect hairs of any carnivores that climb the tree to get the bait (Figure 7). Lynx may be more hesitant to climb the tree than other species (M. Lucid, personal communication), and thus the methodology was modified to include the use of lynx hair pads, similar to the National Lynx Survey Protocol (McKelvey et al. 1999). Flashy attractants such as compact discs or pie tins were hung in nearby trees to help catch the attention of lynx, which often rely more on visual cues than olfactory cues to identify prey. We attempted to check, and re-bait or remove, bait stations every 21-30 days.

Figure 7. Multi-species bait station used in 2013.

Finally, a subset of bait stations was equipped with motion-sensor photo or video cameras to capture the activity of individuals at bait stations (Figure 8). We used Bushnell Natureview HD Max trail cameras at opportunistically selected bait stations. We affixed cameras to trees about 4.5 - 5 feet off the ground and about 30 feet from the bait station. We formatted our cameras to take one-minute videos when triggered by motion and heat. Some camera performance issues experienced during the study were probably related to cold temperatures as the cameras are not rated to work properly below -5° F.

Figure 8. Wolverine and lynx images captured by motion activated camera traps at bait stations in 2014.

Genetic Analyses

DNA extractions were performed using standard protocols for non-invasive samples. Two DNA extractions were performed for any samples that looked to have morphologically different types of hair. Conversely, maximizing amplification success rates, while keeping costs down, was a concern for samples containing very few hairs. Therefore, some samples were combined into a single extraction tube when they were collected from the same grid cell/station/date if the hair looked morphologically identical.

Genomic DNA was extracted from hair samples using the QIAGEN Dneasy Blood and Tissue kit according to manufacturer's instructions for tissue and using modifications for hair samples from Mills et al. (2000). Genomic DNA from scat samples was extracted using the QIAGEN QIAamp Stool Kit following manufacturer's protocols. Samples were processed in a satellite laboratory dedicated to non-invasive samples. Samples were tested for species identification using 344 base pairs from the control region of mitochondrial DNA (mtDNA). The quality and quantity of template DNA were determined by 1.6% agarose gel electrophoresis. DNA sequence data was obtained using the Big Dye kit and the 3700 DNA Analyzer (ABI; High Throughput Genomics Unit, Seattle, WA). DNA sequence data were viewed and aligned with Sequencher (Gene Codes Corp. MI) and compared to reference databases to identify species.

DNA from wolverine samples was amplified for individual using a panel of microsatellite loci used previously on wolverine (Schwartz et al. 2009). The samples were also tested using an SRX/SRY analysis to determine sex (Hedmark et al. 2004). DNA from lynx samples was analyzed using a panel of microsatellites for lynx (Carmichael et al. 2001) and a sex test (Pilgrim et al. 2005). The resultant products were visualized on a LI-COR DNA analyzer (LI-COR Biotechnology). All non-invasive samples were amplified using the multi-tube approach (Eggert et al. 2003, Schwartz et al. 2004) and data was error checked using program Dropout (McKelvey and Schwartz 2005).

Results and Interpretation: What Did We Find?

Monitoring Effort

Across all three years (2012-2014), we surveyed 82 of the 129 grid cells that at least partially fall within the SW Crown (Figure 9). We conducted snow-track surveys on over 1,000 miles each year (including revisits) within those grid cells (Table 3, Figure 10). Surveys were done during an average of 48 field days each year between January 3 and April 14. Generally, we had three teams of two individuals working five days a week.

We focused primarily in areas accessible by snowmobile and areas where forest management activities are likely. The number of miles surveyed within a grid cell is largely dependent on the presence of accessible roads in that cell. Cells with minimal roads make access more difficult, time consuming, and costly. Since track surveys are often conducted while traveling to and from bait stations (i.e. combining multiple objectives), they are slightly different from other track surveys.

Table 3. Snow-track survey effort from 2012-2014 for all target species.

Year	Number of survey days	Number of grid cells[a] surveyed at least once	Total miles surveyed[b]	Average miles/grid cell/survey[c] (range)
2012	41	65	1115	3.2 (1.0 - 9.6)
2013	51	73	1011	3.6 (1.0 - 10.0)
2014	52	62	1240	4.0 (1.0 - 10.0)

[a] There are 129 grid cells that at least partially intersect the SW Crown landscape (see Figure 4), and 87 of those have their majority in the SW Crown boundary.
[b] Includes revisits to the same survey route.
[c] The average value used here is based on the number of miles covered on snowmobile or foot in each grid cell per survey effort, including revisits to the same grid cell (see Methods section).

In 2012, 368 fisher hair snares were deployed across 62 grid cells. In 2013 and 2014, multi-species bait stations were used, instead of hair snares, and deployed across 81 unique grid cells (Figure 10). Bait stations take considerably more effort and materials to set-up than fisher hair snares, which accounts for some of the difference between years in number of stations/snares deployed. In 2014, we targeted higher elevation cells, instead of lower elevation marginal habitat, which took more time to reach and reduced the number of bait stations. In addition, the length of deployment was longer for most bait stations in 2014 (Table 4).

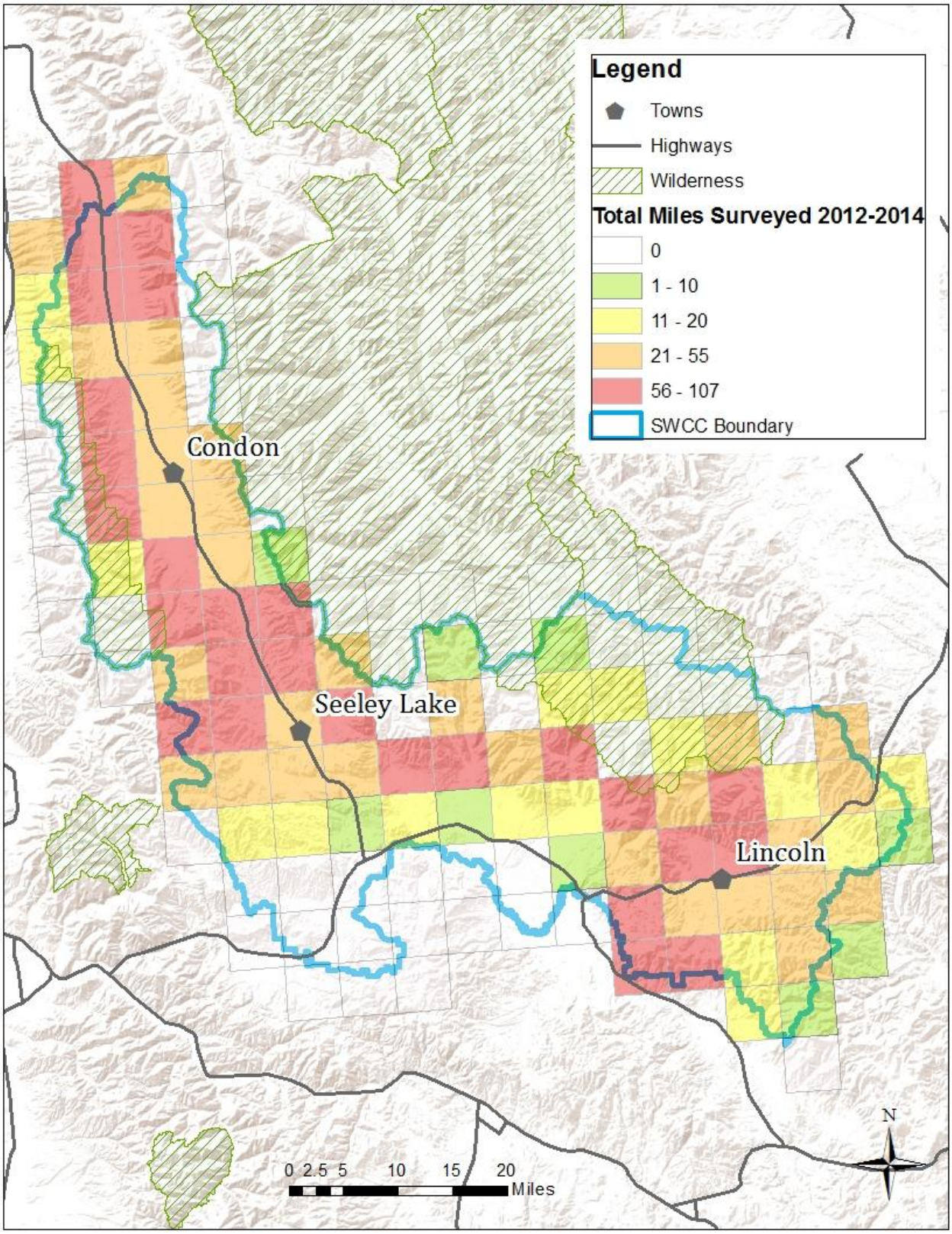

Figure 9. Total miles of track surveys by grid cell 2012-2014.

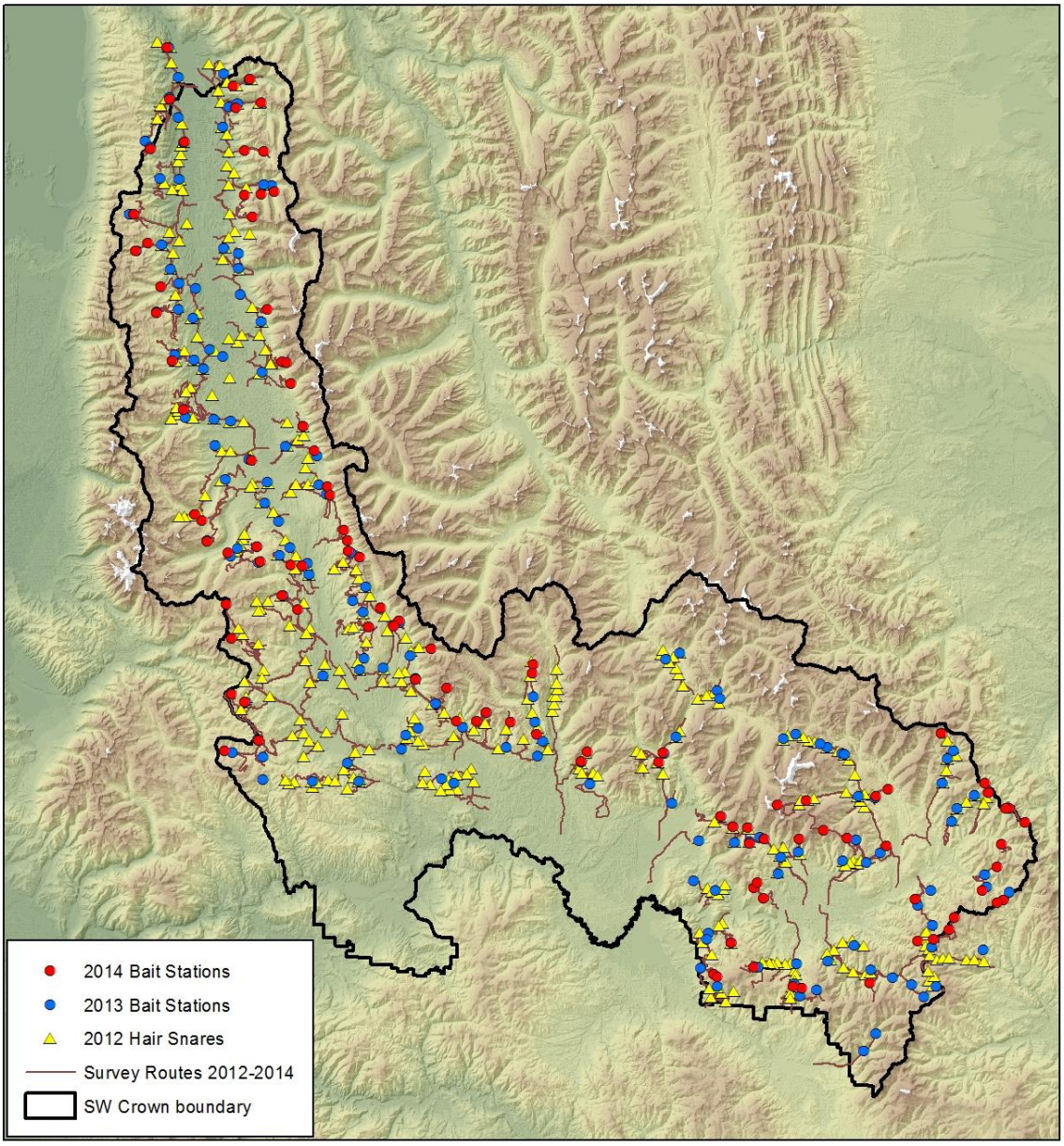

Figure 10. Locations of track survey routes, hair snares, and bait stations in the SW Crown 2012-2014.

We analyzed the 2013 bait station data for all species to look for trends in DNA sample collection. Of the stations, 28 had no hair samples to analyze. Another 18 stations had hairs that were analyzed, but were not able to be amplified to identify species. The average time these stations were out was 44 days. The remaining 116 stations had hairs that were able to be amplified to identify species, and amplification rates ranged from 16% to 100%. There was no substantial correlation between the number of days a bait station was deployed and the percent of samples that were amplified (Figure 11). There was, however, a weak positive relationship between the number of days a station was deployed and the number of samples that were collected (Figure 12).

Table 4. Summary of bait stations and hair snares deployed from 2012-2014.

Year	Number of bait stations or hair snares	Number of grid cells[a] with at least one bait station or hair snare	Avg. number of bait stations/grid cell	Avg. bait station elevation in feet (range)	Avg number of days of bait station deployment (range)[b]
2012	368 hair snares	62	5.9 hair snares	4849 (3113-7400)	25.5 (18-46)
2013	162 bait stations	77	2.2 bait stations	4967 (3123-7095)	44 (19-121)
2014	107 bait stations	51	2.1 bait stations	5515 (3185-7849)	47 (13-87)
2013-2014	274 bait stations	81	2.15 bait stations	3123-7849	45.5

[a] There are 129 grid cells that at least partially intersect the SW Crown landscape (see Figure 4), and 87 of those have their majority in the SW Crown boundary.

[b] Fisher hair snares were used in 2012. Some of these stations were re-baited during the deployment period. In 2013, a few sets were placed in the backcountry and could not be revisited until summer; hence, the long deployment period.

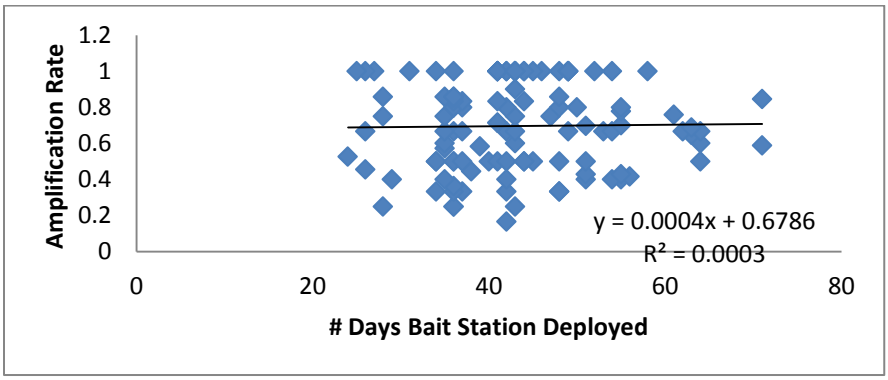

Figure 11. Relationship between amplification rate of genetic samples and number of days a bait station was deployed in 2013.

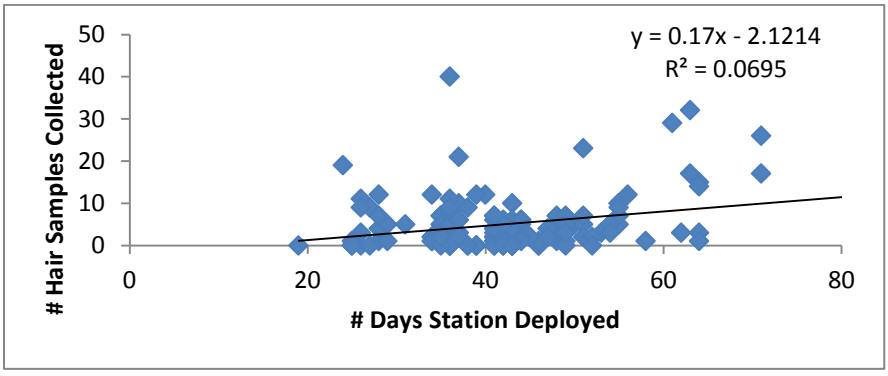

Figure 12. Relationship between number of hair samples collected and number of days a bait station was deployed in 2013.

We also analyzed the 2013 data for effectiveness of gun brushes and hair pads (Table 5). Hair pads were effective at detecting lynx and bobcat at stations where they otherwise would not have been detected. For additional information on non-target species detected see Appendix C.

Table 5. Species detected at bait stations in the Southwestern Crown of the Continent in 2013. Table displays the number of samples (not individuals) from each hair collection method (gun brushes attached six feet up a tree vs. carpet pads with nails 18 inches from ground level) and the total number of bait stations and grid cells at which the species were detected.

	Gun Brush		Hair Pad		Combined Methods		
Species	# Samples	# Bait stations detected	# Samples	# Bait stations detected	Total # samples	# Bait stations detected	# Grid cells detected
Lynx	**28**	**6**	**6**	**5**	**34**	**8**	**5**
Wolverine	**117**	**12**	**0**	**0**	**117**	**12**	**9**
Fisher	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Mountain lion	6	4	1	1	7	4	4
Marten	113	34	1	1	114	34	27
Bobcat	41	15	5	5	46	17	13
Mink	7	2	0	0	7	0	2
Ermine	21	12	0	0	21	12	10
Long-tailed Weasel	10	7	0	0	10	7	5
Red fox	9	4	1	1	9	4	4
Striped Skunk	0	0	1	1	1	1	1
Incidental non-carnivore species							
Snowshoe Hare	*7*	*4*	*0*	*0*	*7*	*4*	*3*
Flying Squirrel	*8*	*7*	*0*	*0*	*8*	*7*	*6*
Beaver	*3*	*1*	*0*	*0*	*3*	*1*	*1*
Red Squirrel	*11*	*8*	*0*	*0*	*11*	*8*	*8*
Deer Mouse	*3*	*3*	*0*	*0*	*3*	*3*	*2*

Lynx

Across all three years, lynx were detected in a total of 36 grid cells in the SW Crown (Figures 13 and 14). The number of grid cells with lynx detections from track surveys was very similar across years and was considerably higher than cells with lynx bait station detections (Table 6). There were lynx track observations, of high confidence, from 35 of the detection cells and genetic analysis (from back-tracking or bait stations) confirmed lynx in 22 of these cells. There was only one instance, in 2013, where a lynx was detected in a cell by bait station (i.e. genetics) alone, though tracks were observed in subsequent years. Both methods consistently capture unique individuals (see Table 8). The reasons genetics did not confirm lynx presence in all

of the track detection cells include: samples on backtracks may not have been found, lynx in a grid cell may not have visited a bait station, or the DNA samples were of too low of quality to amplify to species. Lynx were not detected, nor targeted, using the fisher hair snares in 2012.

The number of grid cells with detections by bait stations doubled between 2013 and 2014 (Table 6). We started using lynx pads in 2013 and modified them in 2014 to include gun brushes, which may have increased the number of samples.

Lynx tracks were detected within an elevation range of 3,822 – 6,821 ft (mean = 5,197 ft). All but two (<2%) of the observations were above 4,200 feet, even though we had many surveys and bait stations below this elevation. This is in agreement with Squires et al. (2010) who found lynx forage primarily above 4,166 feet in winter.

Table 6. Lynx detections in the SW Crown from 2012-2014 by detection method.

Year	Grid cells w/ track detections[a]	Number of bait station detections	Grid cells w/ bait station detections	Total number of grid cells w/ detections (both methods)	Total number of individuals[c]
2012	21	n/a[b]	n/a[b]	21	4 (3m, 1f)
2013	19	8	5	20	7 (5m, 2f)
2014	19	11	10	19	13 (10m, 3f)
Total unique	35	19	22	36	18 (13m, 5f)

[a] There are 129 grid cells that at least partially intersect the SW Crown landscape (see Figure 4).
[b] In 2012, fisher hair snares were used, which were not designed to detect lynx.
[c] See Table 8 for information on individuals.

On average, in 41.2% of the grid cells visited each year we met the full protocol described in Squires et al. (2004)(Table 7, Figure 13). The three primary criteria of the protocol are >6.2 miles per survey, surveyed at least twice, and under adequate snow tracking conditions. The greatest factor in whether the protocol was met was the presence of sufficient snowmobile-accessible roads in a cell. Snow conditions were usually sufficient for confidently identifying tracks. Those cells in which lynx were detected had an average of 21.65 miles surveyed (range: 0.94 – 49.25 miles) in the year detections occurred.

Table 7. Summary of track surveys completed to protocol described in Squires et al. (2004).

Year	Number of grid cells[a] surveyed at least once	Cells w/at least 1 survey of ≥ 6.2 miles	Cells with 2 surveys of ≥ 6.2 miles	Cells with 2 surveys of ≥ 6.2 miles, and good tracking conditions[b]	Grid cells with lynx track detections[c]
2012	65	47	36	31 (47.7%)	21
2013	73	51	29	26 (35.6%)	19
2014	62	39	26	25 (40.3%)	19

[a] There are 129 grid cells that at least partially intersect the SW Crown landscape (see Figure 4).
[b] Tracking conditions were recorded in the field as: Excellent, Good, Fair, or Poor. Here we counted Excellent, Good, and Fair conditions. (Percent of cells surveyed completed to protocol).
[c] Only those observations with "high" confidence are counted.

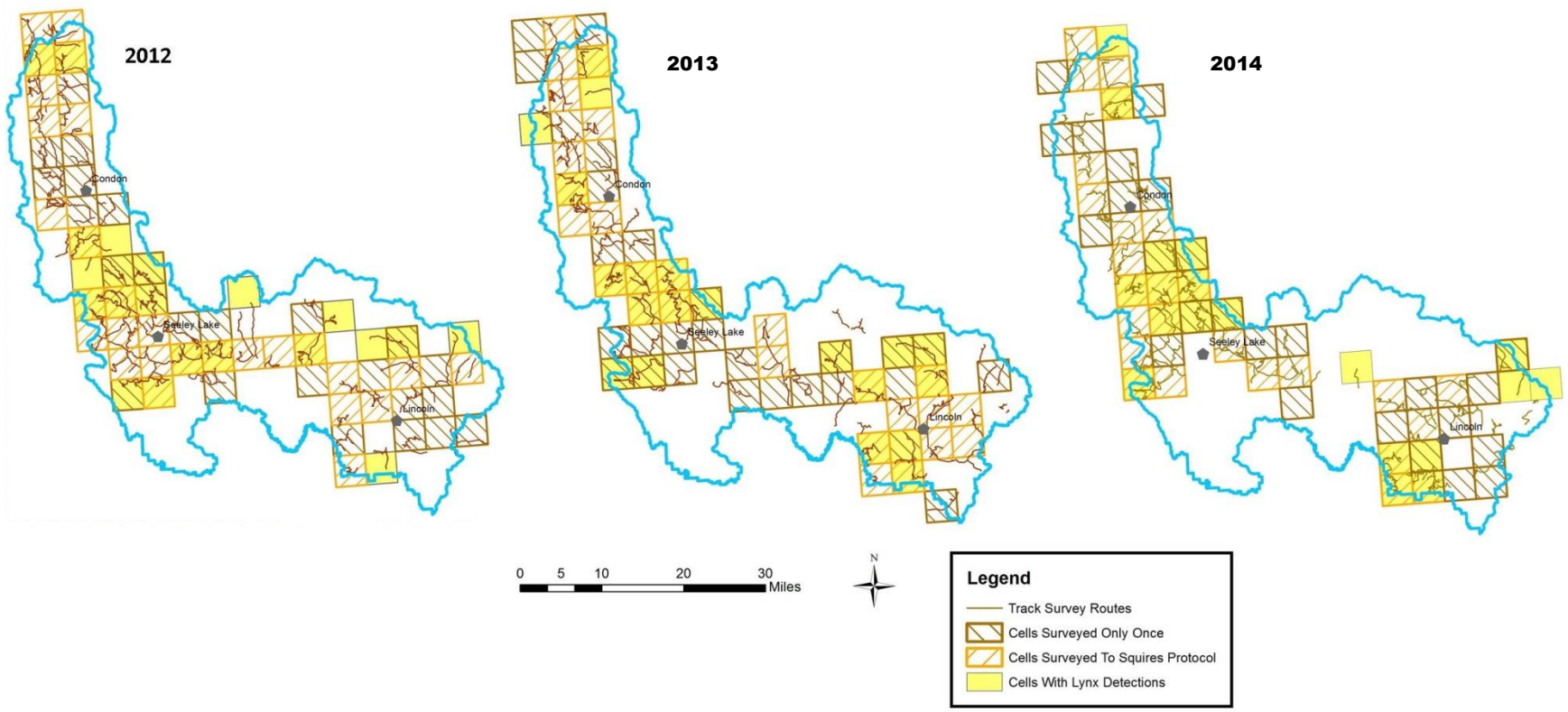

Figure 13. Survey effort and detections for lynx across the SW Crown by year, from 2012 to 2014. Yellow colored cells represent the 5x5 mi cells in which lynx were detected, either from track surveys or bait stations (or both). "To Squires Protocol" means there were two track surveys of at least 6.2 miles under fair or better snow conditions. A few cells had lynx detections despite not having a complete 6.2 miles of survey within the year.

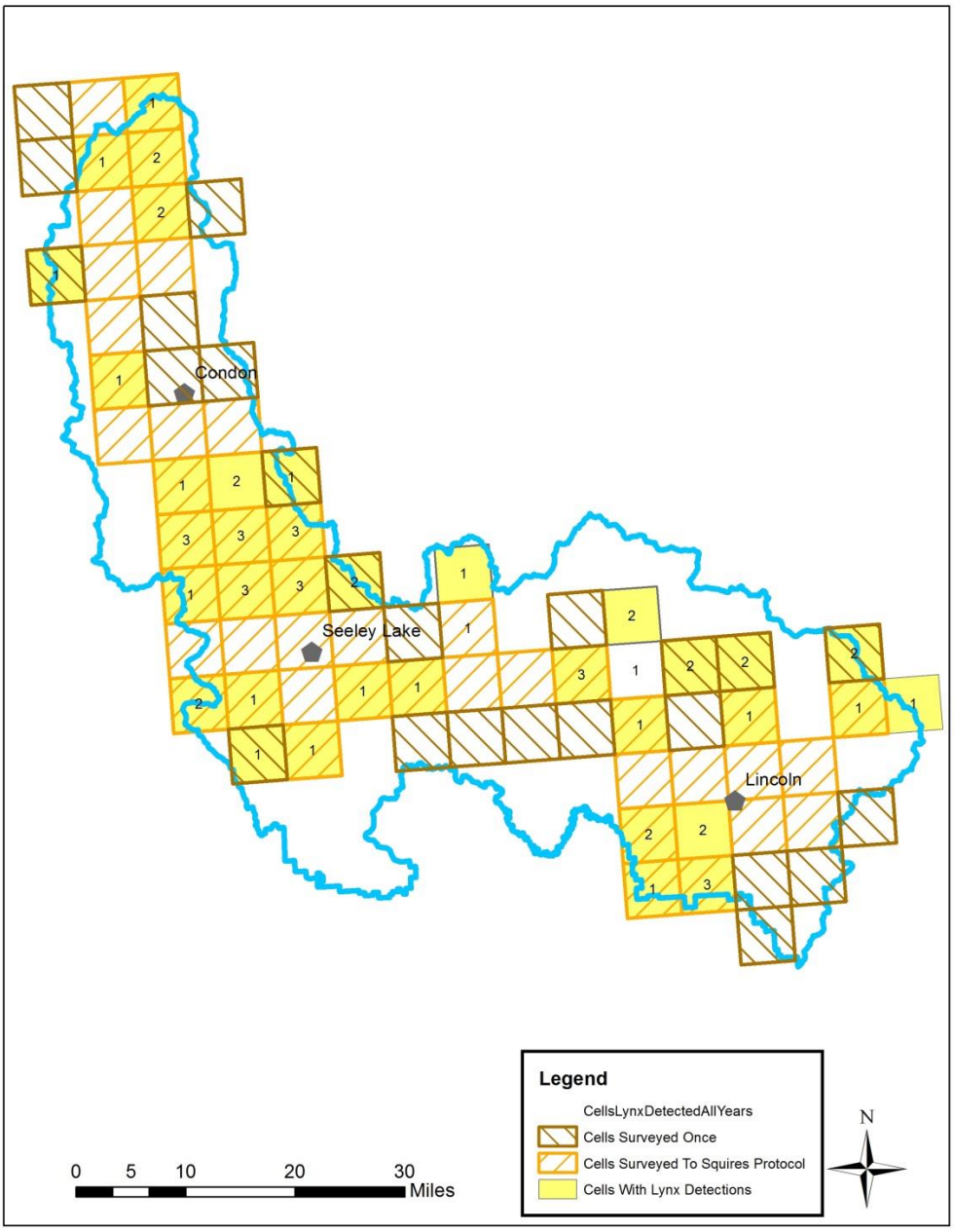

Figure 14. Survey effort and detections for lynx across the SW Crown from 2012-2014. Cells shaded yellow represent those with lynx detections in at least one year. Detections are from track surveys and/or bait stations. The number inside the cell indicates the number of years lynx were detected in the cell (out of a maximum of 3). Hash marks indicate whether the cell, in at least one of the 3 years, had at least two surveys of at least 6.2 miles under fair or better snow conditions. Other cells were surveyed "Only once in 3 years" meaning only one survey of 6.2 miles in the three year period. A few cells had detections despite not ever having a complete 6.2 mile survey. Individuals could not be identified in all cells due to: samples from backtracking may not have been found, lynx in a grid cell may not have visited a bait station, or the DNA samples were of too low of quality.

We identified 18 individual lynx, 13 males and 5 females, through genetic analysis of backtracking and bait station samples (Table 8). Five of these had previously been identified through work done by the Rocky Mountain Research Station. We identified more individuals in 2014 than in other years, possibly due to improved efficiency in collecting, handling, and analyzing samples.

Table 8. Sex, Forest Service District, initial detection study, and method of detection of individual lynx identified through track surveys and bait stations 2012-2014.

					2012		2013		2014	
Lynx ID	Sex	Grid cell	District	Study First Identified	Snow track	Bait Station	Snow track	Bait Station	Snow track	Bait Station
SWCC_12_LynxM01	Male	2106	Swan	SWCC	y					
SWCC_12_LynxM02	Male	2446	Seeley	SWCC	y					
SWCC_12_LynxM03	Male	2595, 2687	Lincoln	SWCC	y				y	
SWCC_12_LynxF04	Female	2104	Seeley	SWCC	y					
SWCC_13_LynxM05	Male	2546	Lincoln	SWCC			y			
SWCC_13_LynxF06	Female	2164	Seeley	SWCC			y			y
SWCC_13_LynxF07	Female	2055	Swan	SWCC			y			
SWCC_13_LynxM08	Male	2164	Seeley	SWCC			y			y
SWCC_14_LynxF09	Female	2045	Seeley	SWCC					y	y
SWCC_14_LynxF10	Female	2164	Seeley	SWCC						y
SWCC_14_LynxM11	Male	2163	Seeley	SWCC						y
SWCC_14_LynxM12	Male	2686, 2687	Lincoln	SWCC						y
SWCC_14_LynxM13	Male	2106	Seeley	SWCC						y
M059	Male	2163	Seeley	RMRS				y		y
M080	Male	2048, 2105	Swan, Seeley	RMRS				y	y	y
M147	Male	2104	Seeley	RMRS				y	y	y
M163	Male	2542	Lincoln	RMRS					y	y
M092_M174	Male	2045	Seeley	RMRS						y

Wolverine

Across the years, wolverines were detected in a total of 38 grid cells (Table 9 and Figures 15 and 16). The number of grid cells with wolverine detections from track surveys increased each year and was usually more than those detected from bait stations (Table 9). In 2014, we targeted higher elevation cells, instead of lower elevation marginal habitat, which partly explains why our detections increased considerably in that year. Unlike lynx, wolverines were detected each year in some grid cells solely by bait stations and not tracks. A total of 15 unique wolverines (6 male, 9 female) were identified from genetics (Table 10). Wolverines were detected within the elevation range of 3,346 – 7,567 ft (mean = 5,315 ft).

Table 9. Summary of wolverine detections using both track surveys and bait stations.

Year	Grid cells w/ track detections[a]	Number of bait station detections[b]	Grid cells w/ bait station detections	Number of grid cells w/ detections (both methods)	Number of individuals[c] (males, females)
2012	8	2	2	9	1 (1f)
2013	11	12	9	15	10 (4m,6f)
2014	29	19	14	32	9 (3m, 6f)
Unique	34	na	21	38	15 (6m, 9f)

[a] There are 129 grid cells that at least partially intersect the SW Crown landscape (see Figure 4).
[b] In 2012, fisher hair snares were used not multi-species bait stations.
[c] See Table 10 for information on individuals.

Table 10. Sex, Forest Service District, initial detection study, and method of detection of individual wolverine identified through track surveys and bait stations 2012-2014.

Wolverine ID	Sex	Grid cell	District	Study First Identified[a]	2012		2013		2014	
					Snow track	Bait Station	Snow track	Bait Station	Snow track	Bait Station
SWCC_13_GuloM01	Male	2590	Lincoln	SWCC				y		
SWCC_13_GuloF02	Female	1994	Swan	SWCC				y		
SWCC_13_GuloF03	Female	1996, 2048, 2104	Seeley, Swan	SWCC			y	y	y	y
SWCC_13_GuloF04	Female	1996, 1997	Swan	SWCC			y	y		
SWCC_13_GuloF05	Female	2221, 2222, 2545	Seeley	SWCC		y		y	y	y
SWCC_13_GuloF06	Female	1945	Swan	SWCC			y	y	y	
SWCC_13_GuloM07	Male	2046	Seeley	SWCC				y		
SWCC_13_GuloM08	Male	1994, 2048, 2105	Swan, Seeley	SWCC				y		y
SWCC_13_GuloM09	Male	1947	Swan	SWCC				y		
SWCC_13_GuloF10	Female	2164	Seeley	SWCC				y		
SWCC_14_GuloF11	Female	2054, 2056	Swan	SWCC					y	y
SWCC_14_GuloF12	Female	1994	Swan	SWCC						y
HFW10-M3	Male	2492	Lincoln	WTU					y	
BDF10-M6	Male	2542, 2495	Lincoln	WTU					y	y
HFW12-F7	Female	2492, 2542	Lincoln	WTU					y	y

[a] WTU is Wild Things Unlimited.

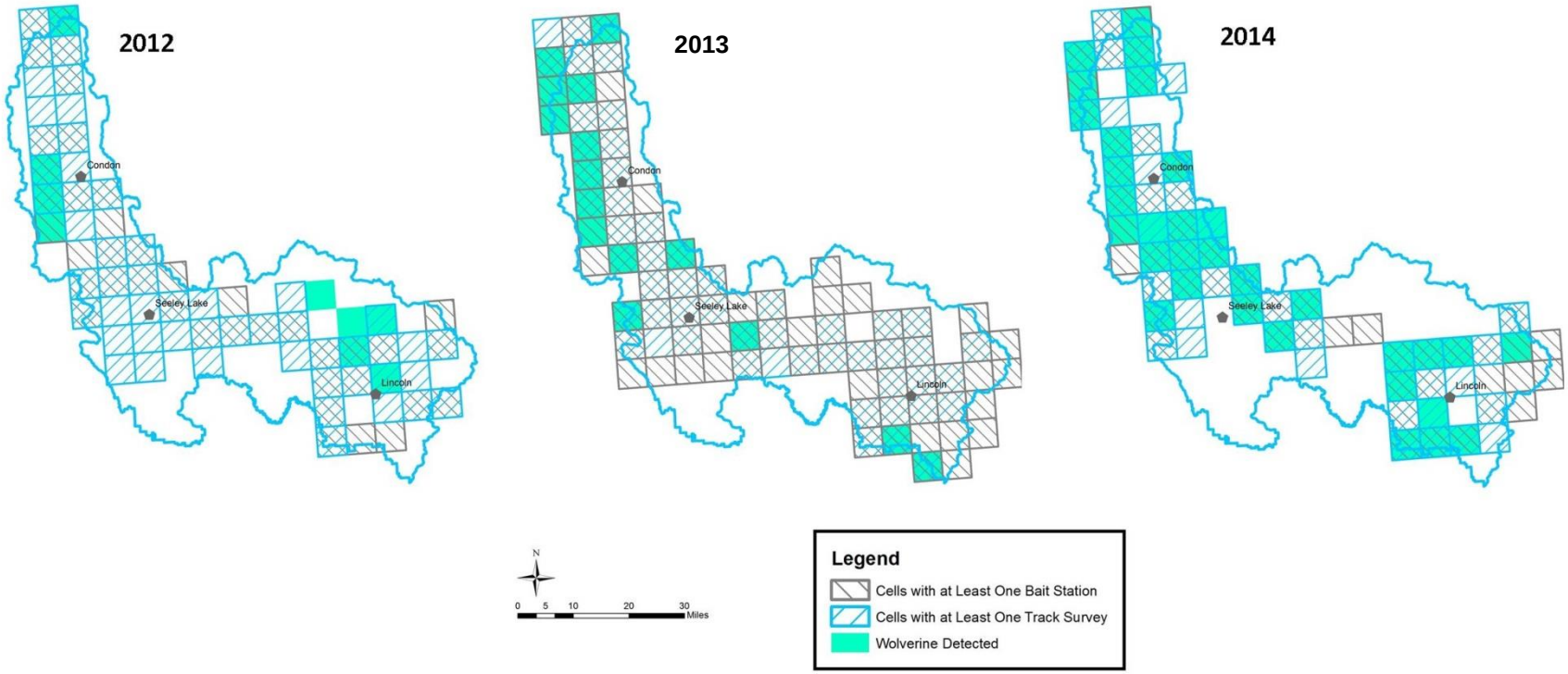

Figure 15. Survey effort and detections for wolverine across the Southwestern Crown by year, from 2012 to 2014. Blue colored cells represent the 5x5 mi cells in which wolverine were detected, either from track surveys or bait stations (or both). Hatch marks represent whether the cell was surveyed using snowtracking (at least one survey of at least 6.2 miles in fair or better snow conditions), whether it had at least one bait station, or both.

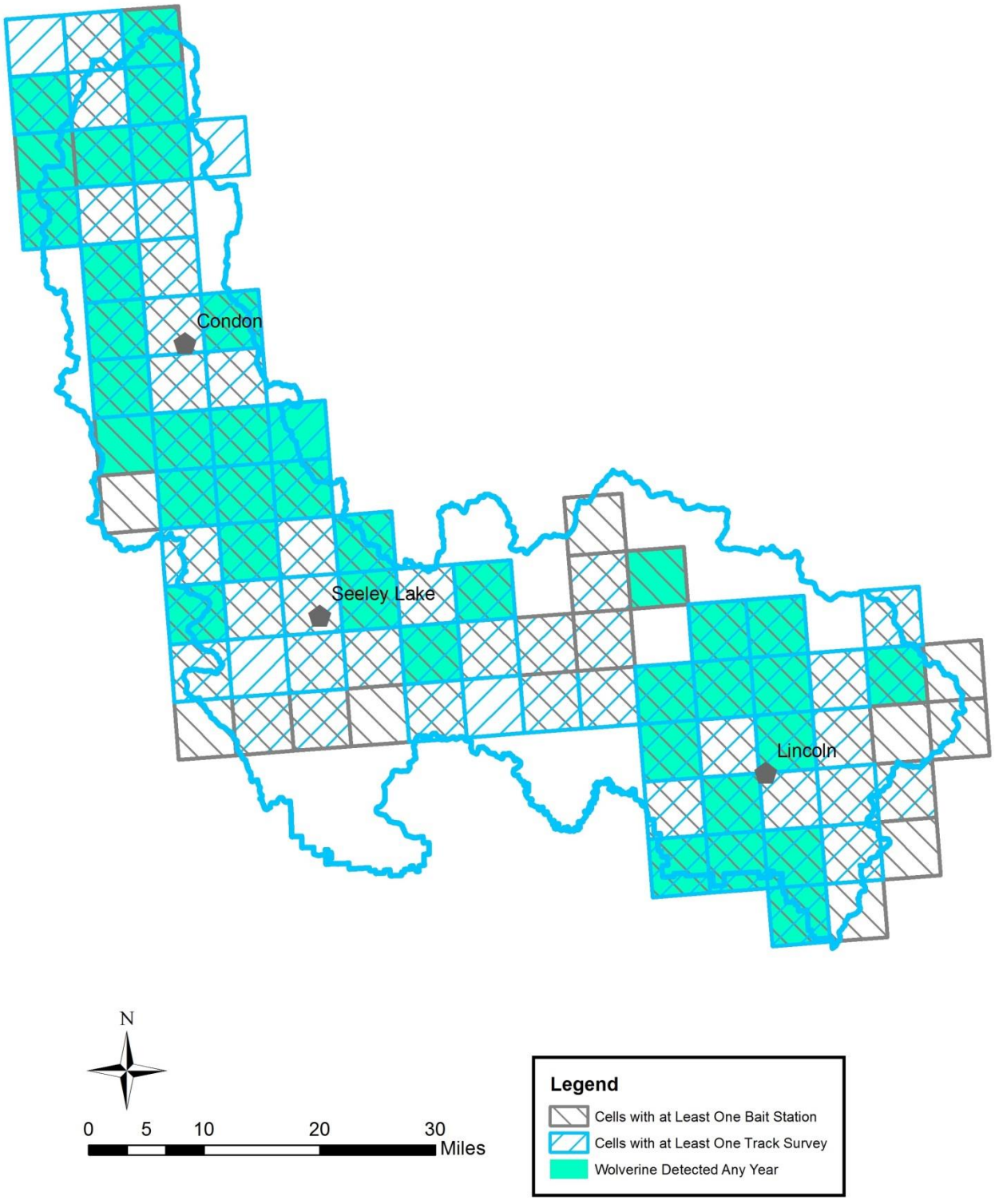

Figure 16. Survey effort and detections for wolverine in the Southwestern Crown 2012 to 2014. Blue shaded cells represent the 5x5 mi cells in which wolverine were detected, either from track surveys or bait stations (or both). Hatch marks represent whether the cell was surveyed using snowtracking (at least one survey of at least 6.2 miles in fair or better snow conditions), whether it had at least one bait station, or both.

Fisher

We have not detected any fisher in the SW Crown project area through any of our methods over the course of three years, despite intensive efforts across the SW Crown. This included hair snares directed specifically at fisher in 2012 and bait stations in potential fisher habitat and a wide range of elevations. We did detect many other species, including marten and bobcat, data for which are summarized in Appendix C.

Discussion: What have we learned?

Abundance and Distribution

One of the primary objectives of this monitoring project has been to establish a baseline understanding of the relative abundance and distribution of forest carnivores throughout the SW Crown, so that we can track changes over time.

Multiple factors can influence carnivore populations, and our monitoring is not designed to determine the causal factors for any changes, but can at least point towards areas where more attention is needed. With the emphasis on restoration of vegetative communities throughout the SW Crown associated with CFLRP activities, especially those that benefit prey species for forest carnivores, populations could see a positive increase in numbers and/or distribution, being able to inhabit areas that have previously not provided suitable habitat. This may be the case in parts of the SW Crown that were involved in the Montana Legacy Project, as these former timber lands are now being managed for multiple ecosystem benefits, rather than solely managed for timber production. Although, not all treatments will, at least initially, benefit carnivores or their prey. In addition to the vegetation restoration, efforts to reduce road densities and increase security habitat for wildlife species could allow for both an expansion in distribution and/or an expansion in population numbers for these species. At the same time, climate change could be affecting distribution, in terms of which areas continue to provide suitable habitat, and population numbers. If vegetation communities become drier and warmer, the subalpine fir/spruce forests that lynx rely upon could be reduced, shrinking habitat and thus changing the distribution and/or abundance of lynx. Similarly if warming trends decrease the amount or distribution of areas with persistent spring snow, we could begin to see changes in the distribution or abundance of wolverines. Again, this monitoring project is not intended to determine the causes of change, but rather to monitor the distribution and abundance over time so that we can look deeper into any changes that may be observed.

There are multiple ways to measure relative abundance of a species. One metric is the number of individuals detected each year (i.e. minimum number alive). However, since many genetic samples are not of adequate quality to identify to individual, this is likely an underestimate of actual abundance. The number of grid cells in which the species was detected can be used to monitor relative abundance across years, though probably not as an estimate of the actual abundance. The number of grid cells

in which the species was detected is also a metric of distribution. The difference is that when looking at distribution, the spatial element is a part of the story, and that is more descriptive or qualitative.

Abundance and Distribution of Lynx

Considering both methods of detection (i.e. snowtrack surveys and bait stations), lynx were detected in roughly the same number of grid cells from 2012-2014 (21, 20, and 19, respectively). Although the areas surveyed varied somewhat from year to year, wherein some cells were surveyed one or two of the years but not all three years, the number of cells in which we conducted surveys remained relatively stable (64, 71, 59 grid cells respectively), and the amount of effort in terms of miles of track surveys conducted was relatively similar (1126, 1021, 1243 miles respectively). So given a fairly consistent amount of survey effort and consistent results, we can be fairly confident in saying that the relative abundance of lynx, as indexed by the number of cells in which they were detected, remained roughly the same over the three years of survey. This sets a great baseline for future monitoring, knowing that for this 3-year snapshot in time, with the amount of effort exerted, we found lynx in roughly 20 of the cells each year. For future monitoring, if the effort remains the same and the number of cells in which we detect lynx either increases or decreases, we can begin to infer some changes are occurring in the distribution and/or the population that may warrant more investigation.

Across the three years, the number of unique cells in which lynx were detected (n=36) was much higher than the number of cells in which there were detections annually (avg. n= 20). This is due, in part, to the fact that our surveys were not completely consistent in terms of which cells were surveyed each year. For example, in 2012 and 2013 we made trips into the Webb Lake area on the Lincoln District, which requires at least a 3 day backpacking trip. We detected lynx in the cells associated with that survey both years, but in 2014 we did not go into that area, and did not have detections for those cells. Thus, we can look at the lynx detection rate by grid cell, which is the number of years in which lynx were detected, divided by the number of years we surveyed in that cell, to better assess the consistency of detecting lynx in a particular cell. Those cells that only had lynx detections in, for example, one out of the three years in which we surveyed, may be areas that lynx are traveling through or using periodically, but not regularly inhabiting. However, cells where we consistently detected lynx every year, such as on Rice Ridge on the Seeley District, are areas that we can assume are regularly inhabited by lynx. Monitoring the consistency of inhabitation over time can help to indicate whether lynx are expanding or retracting their ranges, or moving to adapt to environmental changes. In an ideal scenario, we would be consistently surveying the same exact cells every year, with consistent effort each year, in order to assess changes in distribution or relative abundance. However, given the uncertainty of tracking conditions, and limited capacity and funding for covering the entire landscape each year, we need to use metrics that fit well with our survey abilities.

While lynx were detected throughout the SW Crown, detections did not occur in every grid cell. Rather, there seem to be areas of concentration, or “hot spots”

where lynx were consistently detected and other areas where lynx were either not detected, or were only sporadically detected. The area just north of Seeley Lake was decidedly a "hot spot," which is not surprising given information from past research on lynx in that area (by J. Squires, RMRS, since the late 1990's). Lynx detections were less common throughout much of the Swan Valley, with the exception of the north-eastern portion of the Swan, where lynx were detected multiple years, which is consistent with what Squires and crews observed in the late 1990s/early 2000s.

Because of the logistics of winter surveys, we were not able to survey each and every grid cell "to protocol" each year, and so for several of the grid cells, we cannot confidently draw conclusions that lynx were not present. Given that we did have multiple cells that were not surveyed "to protocol," but where we detected lynx anyways, we can discuss where lynx DO occur, just not where they DO NOT occur. However, many of the cells that we surveyed were done to protocol, and we did not detect lynx in those cells. We cannot say with 100% certainty that lynx do not inhabit those cells, but with multiple years of survey and no detections, we become more confident that, for whatever reason, those cells are not used by lynx at this time. Several cells in the Swan fit this description, where despite multiple surveys over multiple years, lynx were not detected. The same is true for areas directly east and west of Seeley Lake (much of which burned in the Jocko Fire of 2007), parts of the Lincoln District, and the cells at and around Monture and Dunham Creeks.

In the three years, we observed 18 individual lynx, with the number of individuals detected rising each year as we improved our detection methods (i.e. using bait stations instead of fisher hair snares in 2013, and then adding lynx hair pads to the base of the bait station trees in 2013 and 2014). It is not surprising that more males were detected than females, given the propensity for female lynx to be more trap-weary than males (observations from Squires' research). Also, males tend to travel around more during the mating season in search of females (late Feb and March), which could increase our chances of detecting them.

A few of the lynx detected thru this monitoring were individuals that were previously identified by Squires thru his research. Many of the lynx we have detected, however, have been "new" individuals that have not previously been identified. Information on their genetics, including individual genotypes, has been made available to complement the ongoing research on lynx in Montana.

Abundance and Distribution of Wolverine

Considering both methods of detection, wolverine detections appeared to increase each year of the survey, with the number of grid cells with detections increasing over 3-fold in the three years. It is difficult to know whether this apparent increase in wolverines is due to a real increase in population, or if it is due to improvements in detection probabilities due to our survey methods. In 2012, we conducted track surveys in 65 grid cells and detected wolverines by track in 8 of those cells. That was the year we used the fisher hair snares, which consist of only a small piece of bait (a chicken wing) in a fairly enclosed tubular snare. The following years, however, we began using the bait stations, which consisted of large pieces of meat (deer

quarters) posted in open air. Wolverines are extremely olfactory, with the ability to smell carrion from miles away, and evidence from our videos indicates that once they visit a bait station, they will return on multiple occasions to eat the meat. Thus the presence of our bait stations not only increased our wolverine detections at the stations, but likely influenced our track detections, as well, since wolverines had to travel throughout the cell to visit bait stations. Another factor influencing our wolverine detections was the fact that each year we targeted more and more of the "high country," particularly in 2014, with the hopes of accessing more of the wolverine habitat in the SWCC project area.

Wolverines are distributed throughout the SW Crown, with some apparent concentrations of multiple individuals in certain areas. In particular, the area south of Lincoln has been a focus for wolverine monitoring by a non-profit, Wild Things Unlimited (WTU), for several years. We have purposely avoided duplicating efforts with WTU, so our time in that area is reduced compared to other areas. Our monitoring has detected multiple wolverine individuals in the area roughly between Dalton and Ogden Mountains. Wolverines also seem to be present in higher densities in the Mission Mountains side of the Swan Valley, where we detected eight different individuals over the past three years.

In a few instances we had multiple wolverine individuals at the same bait station at the same time (captured on video), and other bait stations had multiple wolverines visit them in one season. We also have detected individual wolverines traveling at least 30 miles between years (e.g. the individual called SWCC_13_GuloF03; see wolverine individual map). One wolverine, BDF 10-M6 was observed on both sides of Hwy 200 in the Lincoln area (see map). This individual was originally identified on the Beaverhead-Deerlodge National Forest, exemplifying the ability for these animals to travel large distances over the landscape.

Because we are using baited stations, and wolverines are strongly olfactory with an ability to travel long distances, it would be difficult to extract much more information about habitat suitability based on our detections, as our sampling methodology could be biasing their distribution. However, we have been able to detect multiple individuals, and will be able to use that metric, as well as the number of grid cells in which we detect wolverine, for tracking relative trends over time.

Abundance and Distribution of Fisher

In our three years of surveys, we have not detected any fisher in the SW Crown, indicating fairly strongly that fisher are not present, or at least not on a regular basis, within this landscape at this time. In 2012, we used the fisher hair snares that were designed by Schwartz et al. (2006) specifically to detect fishers. These snares have a 90%+ chance of detecting a fisher when at least four snares are placed within a grid cell. We followed this protocol, placing an average of 4 snares per cell in 2012, and did not detect fisher. Although no one has yet done the research to determine detection probabilities for fishers using the bait stations, anecdotal information from other study areas (the Idaho Panhandle, and the Lochsa and Selway River areas) indicates that the bait stations are effective at detecting fishers regularly (M. Lucid, IDFG, and C. Lewis, USFS field observations).

Fisher have been detected in the SW Crown in the recent past, with the last confirmed detection from a fisher hair snare east of Seeley Lake in 2011 (see Appendix D). Other fisher records date back to the early 1980's (MT FWP trapping records). However, it seems unlikely, given our level of survey effort and lack of detections, that there is a persistent population of fishers in the SW Crown at this time.

Analysis of Field Methods

Bait Stations

During the winters of 2013 and 2014 we discontinued the fisher hair snare boxes and combined snowtrack surveys with tree bole based bait stations targeting multiple species (lynx, wolverine and fisher). We made this decision for several reasons including; 1) the need to target multiple species, 2) baits in the fisher boxes were small and often were eaten quickly by small rodents, 3) fisher boxes were deployed on the ground and often became covered by deep snow, reducing chance of detection and 4) we were not successful in detecting fisher in 2012. Conversely, at bait stations we use large baits (deer or elk quarters) placed on a tree bole above the snow. These baits persist for long periods of time and, when combined with a commercial trapping lure, emit a lot of scent increasing our ability to attract a target species. While deployment of the bait stations and the subsequent collection of genetic samples (hair) at these stations takes more time, the trade-offs are well worth this time investment.

As indicated in the results section, we had considerable success in our detections of wolverine and lynx at bait stations in the 2013 and 2014 winters (see Tables 5 and 8). These results indicate that both lynx and wolverine are attracted to bait (ungulate quarters) in trees. Most individuals of both species will readily climb the trees to access bait, thus leaving behind hair on the gun brush hair snares below the baits. However, video footage taken at various bait station locations reveals that lynx are somewhat more apprehensive at climbing to baits and that some individuals do not choose to climb at all. These anecdotal observations are substantiated by the fact that we sometimes collected lynx hair at a catnip/castor scented carpet pad placed low on the tree at the bait station but did not get lynx hair on the gun brushes located under the bait higher on the tree. These results validate our original belief that using a combination of the scented carpet pads as well as gun brushes under bait increase collection success of viable genetic material.

We did not see video footage of wolverine appearing apprehensive to climb for baits nor did we detect wolverine hair on carpet pads frequently. Based on the known behavioral difference between cats and mustelids, this is not surprising. Lynx (and cats in general) are less olfactory and are more of a specialist predator relying heavily on eyesight to hunt snowshoe hares. Consequently, lynx are less likely to climb a tree and scavenge on an ungulate quarter than a wolverine - which is highly olfactory and much more of a generalist when it comes to food and habitat. This same logic can be applied to fisher and marten. Both are highly olfactory mustelids and both readily climb trees. Thus, tree based carrion baits should be effective at attracting and detecting both of these species. Our genetic results indicate this to be true for marten. A significant number of our bait stations were visited by martens across the study area

(see Table C2). We assume the same would hold true for fisher were they present within the study area. However, our lack of detections of any fisher over the three winter period leads us to believe that the study area lacks a population of fisher and the best case scenario is that fisher may infrequently disperse to/through the SW Crown.

Cameras at Bait Stations

We deployed remote cameras triggered by motion/heat opportunistically at bait stations in 2013 and 2014. The cameras were capable of shooting still photographs or video. We choose to gather video footage in most applications as it provides more information on behavior and unique pelage markings. Much of this video can be viewed on the Northwest Connections web site (http://www.northwestconnections.org/).

The information gathered from the cameras is interesting and useful in a variety of ways. It is certainly educationally valuable to show interested partners and the public footage of these rare animals and how they interact with the bait stations. In addition, we documented some interesting behaviors such as a pair of wolverines traveling together and playfully jumping off the bait tree into the snow and a pair of lynx vocalizing at a bait station. Further, the cameras were intended to help validate what animals visited the stations and whether we were successful in collecting genetics from all visiting individuals. In regard to this last objective, the cameras were only somewhat reliable due to cold temperatures or other factors. Based on our experience over two years, cameras are a nice addition to some bait stations but the resultant collection of genetic material far exceeds the capability of the cameras to provide useful and rigorous information.

Track Surveys

Our track survey methodology was fairly consistent over the three field seasons with only minor changes/improvements being employed. In general, as the project evolved we spent less time looking at and recording tracks of non-target species and focused on covering more ground to detect target species tracks and collect genetic information along backtracks of these species. Part of this change also involved our field personnel becoming better skilled at track ID and not needing to look so closely at tracks. In addition, we better defined goals of recording information on non-target species, realizing that general information about presence at the 5x5 pixel scale was probably sufficient and fit within the constraints of time and effort given our capacity.

We have struggled a bit with the protocol aspects of the track surveys. The ultimate goal is to conduct 6.2 miles of track survey two times per 5x5 pixel during periods of optimal tracking conditions. Optimal tracking conditions are defined in Squires et al. (2004) as occurring 3-7 days after a snowfall, under good or better tracking conditions (a subjective measure). Given our capacity, the large area we are attempting to cover, and varying weather and access conditions we have opted to be in the field as often as safely practicable. As such, many track survey days occur during times of suboptimal conditions. Even so, we have been quite successful in locating tracks of the 3 target species and in following these tracks and collecting viable genetic material.

Likewise, due to limitations described above and the need to balance track surveys with bait station deployment, we have not always achieved our goal of 6.2 miles per

pixel 2 times per season. This fact has been further compromised by our initial efforts to survey both roaded and unroaded pixels within the SWC landscape. In other words, we have opted to survey more pixels and more difficult pixels with less effort and intensity because we initially wanted to cover the entire landscape. At this time, we are planning to limit the scope of surveys during the winter of 2015 to the more roaded and accessible pixels. If weather conditions permit, this approach should allow us to better achieve the effort and intensity we initially defined.

Summary of Methods

Overall we feel that we are honing in on a two tiered methodology that works very well for collecting viable genetic material from wolverine, lynx, and fisher – as well as several other species including marten and bobcat. This methodology is allowing us to meet most of our initial project objectives with the primary goals being to establish baseline distribution and abundance information for lynx, wolverine, and fisher across the SW Crown landscape. Limiting factors in applying this methodology include; number of staff, training level of staff (in both winter travel, general field work and track identification), age and condition of snowmobiles, trailers and vehicles, weather conditions which relate to safety, access and track abundance and quality. We have encountered all of these limiting factors over the three years of this survey effort but feel that even with a limited staff, older equipment and some difficult winters, we have collected a great deal of very important data in a way that is repeatable and systematic. This should allow us to track changes in the distribution and relative abundance of these species over time within the SW Crown. We will continue to have discussions and look at ways to better address issues such as occupancy, more precise population estimates through mark recapture and the ability to adequately survey both roaded and unroaded portions of the landscape. We do need to bear in mind that this work is intended to be monitoring and as such there is some latitude in regard to the scientific rigor and associated qualitative versus quantitative manner in which we present our results.

What do results mean for managers?

We have developed and tested a rigorous methodology for monitoring changes in abundance and distribution over time for multiple carnivore species simultaneously. This methodology can be deployed by managers throughout these species' ranges and the results can be used at multiple scales.

At the project planning scale, lynx and wolverine detection locations can be used when deciding where management actions should occur. They can help identify areas of potential use by these species and where improvements to habitat may be appropriate. They can also be used in effects analyses for Environmental Assessments and Environmental Impact Statements conducted under the National Environmental Policy Act (NEPA).

At the landscape scale, the data and results have the potential to inform a wide variety of regional management efforts. Some of these include (but are not limited to): the development of new Forest Plans under the 2012 Planning Rule; the Restoration Initiative Blackfoot and Swan (RIBS) Assessment being conducted for the SW Crown CFLR project; the development of

collaborative restoration projects by local restoration committees; the development and implementation of restoration projects by the SW Crown CFLR project; the evaluation of lands included in Wilderness Inventories under Chapter 70 of the 2012 Forest Planning Rule; monitoring programs for Region 1 of the U.S. Forest Service; and to inform management planning for these species by the U.S. Fish and Wildlife Service and Montana Fish, Wildlife & Parks.

Finally, this project strongly shows the benefits of multi-party monitoring. Monitoring partnerships between federal agencies and outside collaborators can provide additional expertise, capacity, and funding. For example, participating team members bring at least a 20% match when receiving federal funds for this work. In addition, multi-party efforts help generate trust among the agency and the public. We will continue to pursue additional coordination opportunities with agency partners including RMRS, Montana Fish, Wildlife and Parks, the US Fish and Wildlife Service, and other partners to address all agency and public concerns about these species.

Future efforts

We will be continuing our work in the winter of 2015, and hopefully beyond. We may decide to scale back our efforts in the SW Crown for a few years, perhaps by focusing on some sentinel areas or areas planned for future management. However, we would then ramp up the efforts again for several years at the end of the CFLR program. Our methods could potentially be used at a regional scale and this is being discussed by the Forest Service.

Additional efforts have also started or may start in lands surrounding the SW Crown. The Flathead National Forest has expanded their surveys to parts of the Forest outside the SW Crown in recent years and they hope to continue those efforts. We have received funding from the Bureau of Land Management (BLM) to expand our efforts into BLM lands both inside and outside the southern portion of the SW Crown in 2015. The Nature Conservancy is also potentially interested in including some of their recently acquired lands south and west of the SW Crown in future years. Many land managers are seeing the value in our methods and in having regular data on these species that are integral to management decisions in our region.

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Appendix A: List of Acronyms

BLM: Bureau of Land Management

CFLRP: Collaborative Forest Landscape Restoration Program

DNA: Deoxyribonucleic acid

ESA: United States Endangered Species Act

FNF: Flathead National Forest

ft: feet

GIS: Geographic Information System

GPS: Global Positioning System

HNF: Helena National Forest

IPCC: Intergovernmental Panel on Climate Change

km: kilometer

LAU: Lynx Analysis Unit

LCAS: Canada Lynx Conservation Assessment Strategy

LNF: Lolo National Forest

NEPA: US National Environmental Policy Act

NGO: Non-governmental organization

NRLMD: Northern Rockies Lynx Management Direction

R1: Region 1 of the US Forest Service

RIBS: Restoration Initiative Blackfoot and Swan

RMRS: United States Forest Service Rocky Mountain Research Station

SWCC: Southwestern Crown Collaborative

SW Crown: Southwestern Crown of the Continent landscape (see Figure 1)

US: United States

USFWS: United States Fish and Wildlife Service

WTU: Wild Things Unlimited

Appendix B: Field Datasheets

Date Data Entered: _____

Field Form for Carnivore Track Surveys

** Remember to staple a field map to this form, and trace your survey route on the map*

Survey ID[1]:_____ **Date:**_____ **Estimate of distance covered:** _____ (miles / km)
Observer(s):_____ **Observer(s) Affiliation:** USFS FWP NWC GBSG Other:
Weather (circle all that apply): Sunny P.cloudy Overcast Windy Below freezing Above freezing Lt. snow Heavy snow
Days since snowfall: _____ **Tracking conditions:** Excellent Good Fair Poor **Complete Survey Conducted?:** Yes / No
Comments:

Track Observations (more space for track observations on the back of this sheet)

Track ID[2]: Genetics ID[3]:	Easting	Northing	Datum/ Zone[4]	Species (best guess)	Confidence (High Med Low)	# Individuals

Stride: Straddle:	Width: Length:	Gait ____ Walk ____ Bound ____ Lope ____ Other	Condition ____ Excellent ____ Good ____ Fair ____ Poor	Back-tracked? Yes No Backtrack ID:	Photo ID's, if taken: Other Comments:

Track ID[2]: Genetics ID[3]:	Easting	Northing	Datum/ Zone[4]	Species (best guess)	Confidence (High Med Low)	# Individuals

Stride: Straddle:	Width: Length:	Gait ____ Walk ____ Bound ____ Lope ____ Other	Condition ____ Excellent ____ Good ____ Fair ____ Poor	Back-tracked? Yes No Backtrack ID:	Photo ID's, if taken: Other Comments:

1- survey route nomenclature: PixelID_Date; for example, if you're surveying pixel 1469 on Feb 6, you'll call the route "1469_020611")
2- Track ID nomenclature: TR(Track #)_PixelID_Date; for example, the first carnivore track you encounter on your route would be "TR01_1469_020611". NOTE: If you and your partner have split up to survey the grid cell, please append your initials to the end of the track ID (e.g. "TR01_1469_020611_mm")
3- If you collect a genetics sample from the track, not from a backtrack. For example, if you see some lynx tracks going down the road and come across a scat pile right along your route. Genetics ID nomenclature: Gen(sample #)_(grid cell)_(date); e.g. "Gen01_1469_020611". See note above about adding your initials to the end if you and your partner have split up
4- If possible, record waypoints in UTMs (Zone 11 or 12, depending on where you are), NAD 83; if other than this datum, please specify the datum/zone you recorded the waypoint in

Date Data Entered: ___________

Track ID[2]: Genetics ID[3]:	Easting	Northing	Datum/ Zone[4]	Species (best guess)	Confidence (High Med Low)	# Individuals

Stride: Straddle:	Width: Length:	Gait ____ Walk ____ Bound ____ Lope ____ Other	Condition ____ Excellent ____ Good ____ Fair ____ Poor	Back-tracked? Yes No Backtrack ID:	Photo ID's, if taken: Other Comments:

Track ID[2]: Genetics ID[3]:	Easting	Northing	Datum/ Zone[4]	Species (best guess)	Confidence (High Med Low)	# Individuals

Stride: Straddle:	Width: Length:	Gait ____ Walk ____ Bound ____ Lope ____ Other	Condition ____ Excellent ____ Good ____ Fair ____ Poor	Back-tracked? Yes No Backtrack ID:	Photo ID's, if taken: Other Comments:

Track ID[2]: Genetics ID[3]:	Easting	Northing	Datum/ Zone[4]	Species (best guess)	Confidence (High Med Low)	# Individuals

Stride: Straddle:	Width: Length:	Gait ____ Walk ____ Bound ____ Lope ____ Other	Condition ____ Excellent ____ Good ____ Fair ____ Poor	Back-tracked? Yes No Backtrack ID:	Photo ID's, if taken: Other Comments:

Track ID[2]: Genetics ID[3]:	Easting	Northing	Datum/ Zone[4]	Species (best guess)	Confidence (High Med Low)	# Individuals

Stride: Straddle:	Width: Length:	Gait ____ Walk ____ Bound ____ Lope ____ Other	Condition ____ Excellent ____ Good ____ Fair ____ Poor	Back-tracked? Yes No Backtrack ID:	Photo ID's, if taken: Other Comments:

Date Data Entered: _____

Field Form for Carnivore Backtracks & Collection of Genetics Samples

Backtrack ID[1]:_____ **Associated Survey Route[2]:** _____ **Date:**_____

Observer(s) initials:_____ **Observer(s) Affiliation:** USFS FWP NWC Other:

Species (best guess): Lynx Fisher Wolverine **Confidence:** High Med Low **Distance Backtracked (mi):** ___

Weather[3]: Sunny P.cloudy Overcast Windy Below freezing Above freezing Lt. snow Heavy snow

Days since snowfall: _____ **Tracking conditions:** Excellent Good Fair Poor **Genetics found:** Yes No

Backtrack Comments:

Genetics sample ID[4]: _____ **Type:** Hair Scat Other (describe):

Location of Genetics sample: Daybed Brush Kill site Other (describe):

Waypoint[5]: _____E _____N **Datum/Zone:**_____

Genetics Sample Comments (e.g. number of hairs):

Genetics sample ID[4]: _____ **Type:** Hair Scat Other (describe):

Location of Genetics sample: Daybed Brush Kill site Other (describe):

Waypoint[5]: _____E _____N **Datum/Zone:**_____

Genetics Sample Comments:

Notes:

1- Backtrack nomenclature: BT(Backtrack #)_PixelID_Date; for example, the first backtrack you do that day in pixel 1469 on Feb 6 will be called "BT01_1469_020611"

2- This is the survey route you were working on when you came across this track; survey route nomenclature: (PixelID)_Date; for example, if you're surveying pixel 1469 on Feb 6, you'll call the route "1469_020611)

3- Circle all that apply

4- Genetics samples should be named so they're clearly associated with the backtracking effort; nomenclature: Gen(sample#)_BT(backtrack#)_PixelID_Date; for example, the second hair sample you pick up on the first backtrack in pixel 1469 on Feb 6 would be called "Gen02_BT01_1469_020611"

5- If possible, record waypoints in UTMs (Zone 11 or 12, depending on where you are), NAD 83; if other than this datum, please specify the datum/zone you recorded the waypoint in

Date Data Entered: ___________

Genetics sample ID[4]: ________________________ **Type:** Hair Scat Other (describe):

Location of Genetics sample: Daybed Brush Kill site Other (describe):

Waypoint[5]: ____________E __________________N **Datum/Zone:**______________________

Genetics Sample Comments:

Genetics sample ID[4]: ________________________ **Type:** Hair Scat Other (describe):

Location of Genetics sample: Daybed Brush Kill site Other (describe):

Waypoint[5]: ____________E __________________N **Datum/Zone:**______________________

Genetics Sample Comments:

Genetics sample ID[4]: ________________________ **Type:** Hair Scat Other (describe):

Location of Genetics sample: Daybed Brush Kill site Other (describe):

Waypoint[5]: ____________E __________________N **Datum/Zone:**______________________

Genetics Sample Comments:

Genetics sample ID[4]: ________________________ **Type:** Hair Scat Other (describe):

Location of Genetics sample: Daybed Brush Kill site Other (describe):

Waypoint[5]: ____________E __________________N **Datum/Zone:**______________________

Genetics Sample Comments:

Field Form For Carnivore Bait Stations

Location Data

Grid Cell:_____ **Bait Station ID:**_____ (i.e. Year_Grid Cell_Station Number)

Easting:_____ **Northing:**_____ **UTM Datum/Zone:**_____

Ranger District:_____ **General Area:** _____

Comments on Location (to help someone else find it in the future):

Set Up Data

Observer(s): _____ **Affiliation:** USFS NWC FWP Other:

Date Set:_____ **Bait Used:** _____ **# Dangles:**____ **# Lures:**_____

Camera Used: Y N **Camera Model:**_____ **Serial #:** _____

Distance between bait and camera trees:_____ feet

Revisit #1 Data

Observer(s): _____ **Affiliation:** USFS NWC FWP Other:

Date:_____ **Snow height on tree:** _____ feet **# lynx pads visible:**_____

Action(s) Taken (circle all that apply): station removed station re-baited station re-lured

Bait condition (circle one): untouched partially consumed skeleton all gone

 # Photos on Memory Card:_____ **Memory card replaced:** Y N **Camera batteries replaced:** Y N

Tracks observed in the area: Y N **Scat?:** Y N **Suspected species:** _____

 # Gun brushes w/ hair samples: _____ **# Lynx pads w/ hair samples:** _____

Sample IDs: (for gun brushes= StationID_GB#, for lynx pad= StationID_LP#), for scat= StationID_SC#)

_____ _____ _____

_____ _____ _____

_____ _____ _____

_____ _____ _____

Comments:

Revisit #2 Data

Observer(s): _____ **Affiliation:** USFS NWC FWP Other:

Date:_____ **Snow height on tree:** _____ feet **# lynx pads visible:**_____

Action(s) Taken (circle all that apply): station removed station re-baited station re-lured

Bait condition (circle one): untouched partially consumed skeleton all gone

 # Photos on Memory Card:_____ **Memory card replaced:** Y N **Camera batteries replaced:** Y N

Tracks observed in the area: Y N **Scat?:** Y N **Suspected species:** _____

 # Gun brushes w/ hair samples: _____ **# Lynx pads w/ hair samples:** _____

Sample IDs: (for gun brushes= StationID_GB#, for lynx pad= StationID_LP#), for scat= StationID_SC#)

_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Comments:

Bait Station Tips/Reminders:

Set-up: Pick bait tree (8-12" diameter), apart from other trees (so animal can only access bait from bottom).
Remove all 'resting' branches from bait tree. Wire bait securely to bait tree (bottom of bait 6' off ground)
Screw 12 gunbrush holders to bait tree in two concentric circles: 12" below bait, second circle 18" below bait. In each holder, place one gunbrush from above and tighten.
Nail 2 lynx hair pads onto the starting at 18" above current snow level, another pad 12" above the first one. Pads should be pre-soaked with lure and have dried catnip sprinkled on them.
Hang and flag lure sponge (≤10 meters from bait).

If using a camera: Pick camera tree 8-12' from bait tree. Attach criminal tape to bait tree, in view of camera, extending from bait to snow. Nail station name placard below bait. Confirm memory card and charged batteries are in camera. Record camera model and serial number. Lock camera to tree making sure camera is at same height as bait. 'Walktest' camera, flag camera tree

Rebaiting: If applicable: Turn off camera, Replace batteries if level is below 80%, Replace memory card. Examine each gunbrush closely for hair. Without touching hair, place each gunbrush with hair in a separate vial (1 gun brush per vial) and write Sample ID on vials with Sharpie (permanent marker. Replace gunbrushes taken as samples with clean gunbrushes, leave gunbrushes with no hair untouched. Hang new bait, refresh lure. Re-arm camera!!

Removing station: Collect and name samples as above. Place gunbrushes without hair into a Ziploc bag labeled "Clean Gunbrushes" after burning them with a lighter and letting them cool. Remove all hardware and flagging. Collect lure sponge. Remove all wire from bait carcass before discarding in woods.

Appendix C: Non-target Species

We detected several other mammal species while conducting track surveys and at the bait stations (Table C1 and Figure C1). Marten was the most prevalent species, with detections in 63 grid cells (Figure C2). Bobcats were detected in 36 grid cells (Figure C3) and mountain lions in 39 grid cells. Marten, wolf, and mountain lion tracks were recorded during Snowtrack surveys. Other small carnivores were often detected at bait stations or hair snares, including mink, short-tailed weasel, long-tailed weasel, red fox, and striped skunk. Snowshoe hares were often detected in genetic samples due to being common prey items of carnivores. We did not detect coyote or wolf at the bait stations, though hair snares in 2012 did detect a few wolves. Deer were commonly detected in DNA samples from the bait stations because deer quarters were used for bait.

For most of these species, results should not be interpreted as a representation of their distribution because bait stations and track surveys may not be the most appropriate method for detecting them. For example, many of the gun brushes had hair from multiple species in them, often a carnivore and its prey species. However, bait stations are probably an effective method for sampling marten and potentially bobcat.

Table C1. Non-target mammal species and the number of grid cells they were detected through either track surveys or bait stations from 2012-2014.

Species	2012		2013		2014		All years
	Track	Hair snare	Track	Stations	Track	Stations	Total unique
Marten	29	18	20	28	31	29	63
Deer sp.[a]		2		48		19	54
Wolf/dog	23	5	21		31		47
Mountain Lion	26		21	4	18		39
Bobcat		9		14	18	9	36
Red squirrel	1	25		8		4	34
Snowshoe hare		16		3	1		19
Striped skunk		15		1		1	17
Short-tailed weasel	1			10	1	4	15
Flying squirrel		7		6			13
Red fox		3		4	2		9
Deer mouse		6		2			8
Coyote	1				5		5
Long-tailed weasel				5			5
Beaver		1		1			2
Mink				2			2

[a] Used as bait.

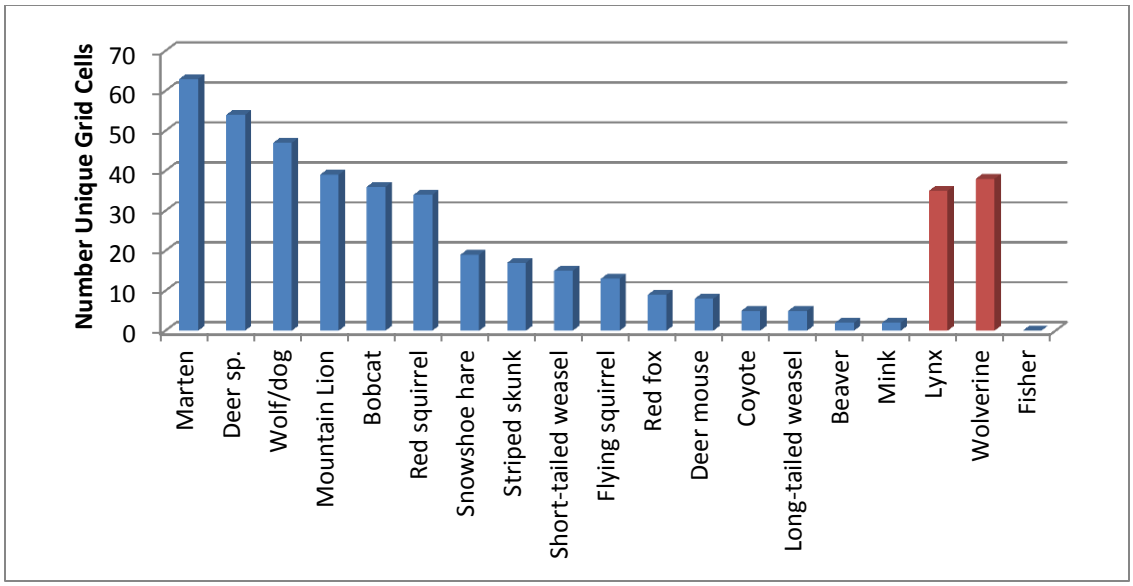

Figure C1. Number of grid cells with detections from bait stations and backtracking for all wildlife species (targeted towards lynx, wolverine, and fisher) in the Southwestern Crown of the Continent 2012-2014.

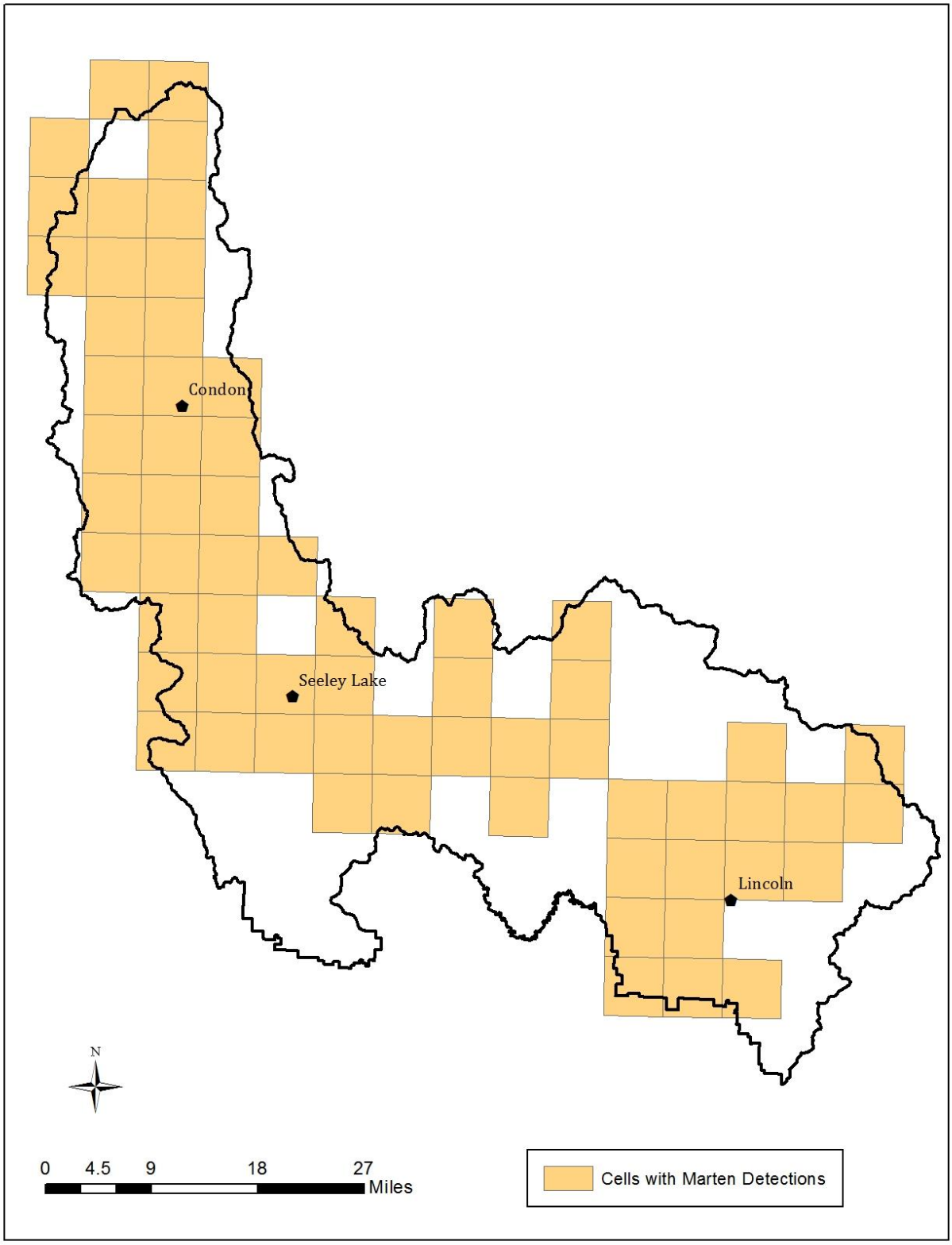

Figure C2. Grid cells in which marten were detected through snowtrack surveys or bait stations in the Southwestern Crown 2012-2014.

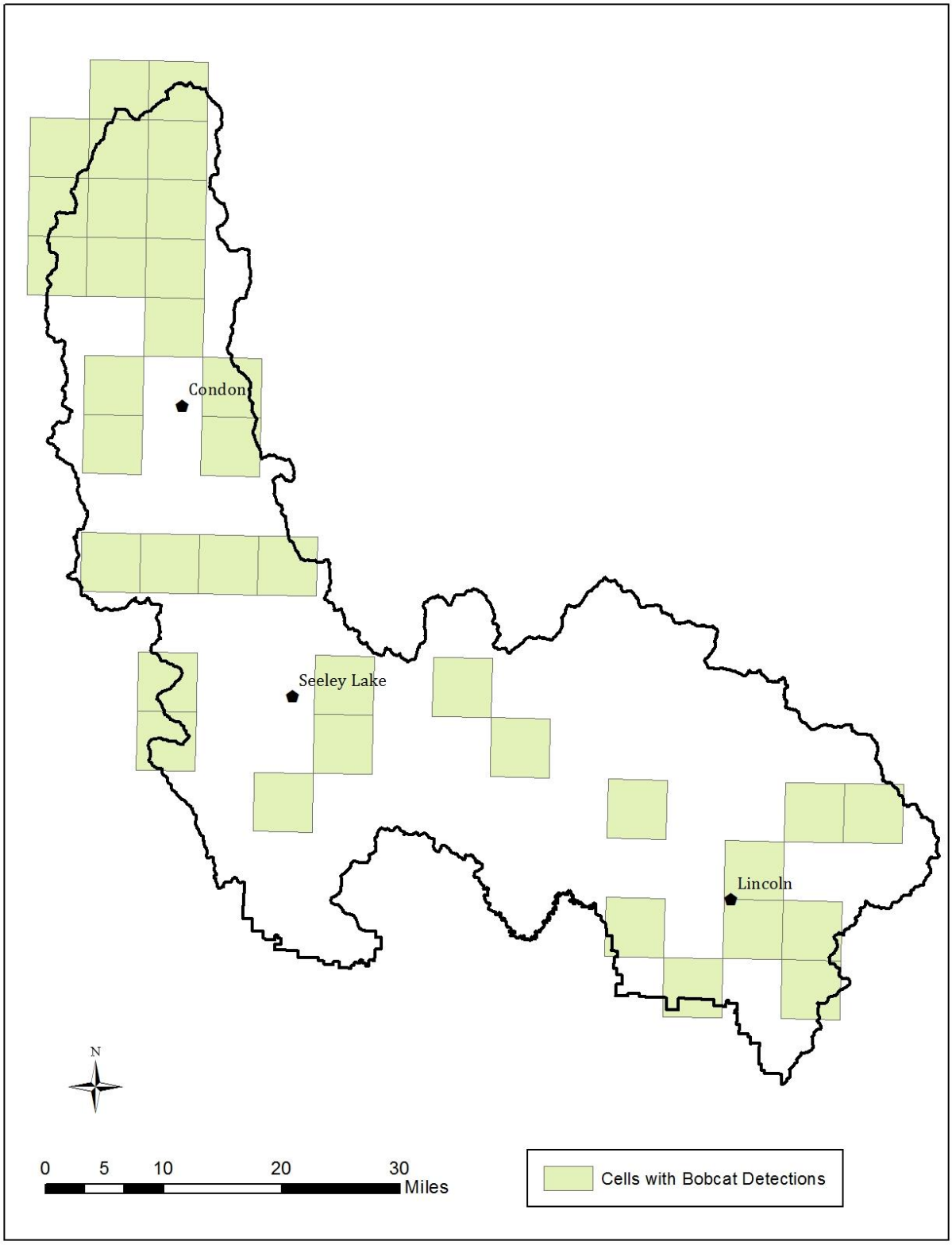

Figure C3. Grid cells in which bobcats were detected through snowtrack surveys or bait stations in the Southwestern Crown 2012-2014.

Appendix D. Fisher detections in the Southwestern Crown (1980-2012)

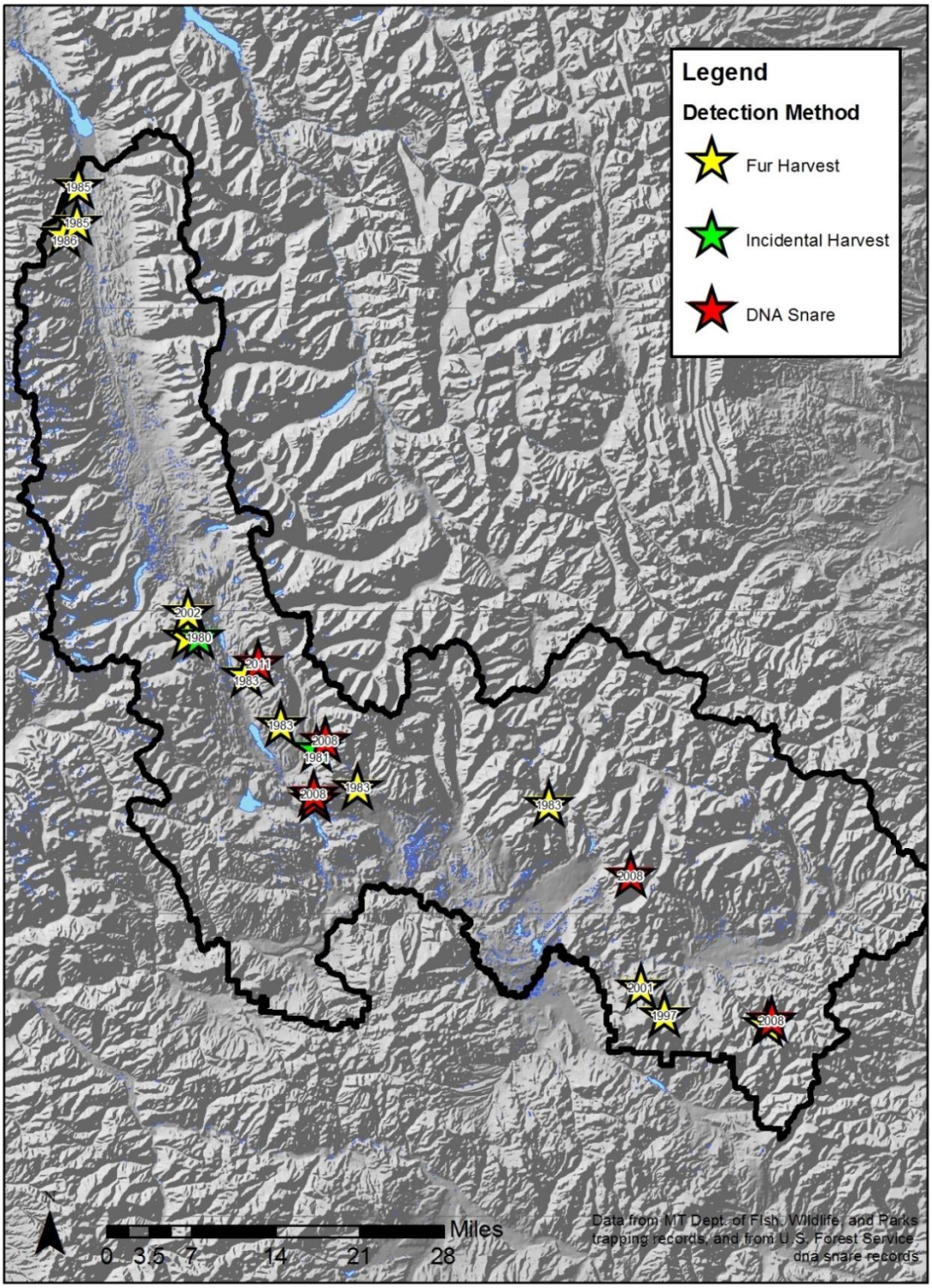

Figure D1. Locations and years of fisher detections in the Southwestern Crown (1980-2012). Data include harvest records from MT FWP and noninvasive surveys from USFS. No fisher were detected by any methods in 2012-2014.

From: Hanvey, Gary -FS
To: Belleman, Ann
Subject: RE: lynx obs
Date: Wednesday, July 22, 2015 5:52:11 PM
Attachments: image001.png
image002.png
image003.png
image004.png
2012-2014-Southwestern-Crown-of-the-Continent-Carnivore-Monitoring-Proje....pdf

---

Must be gratifying to actually see a lynx – I've never seen one in the wild!

There is certainly more lynx here in the NCDE than in the GYE, and monitoring surveys are producing positive results. I'm working on completing a mod to a C/S agreement to continue a collaborative project with Northwest Connections in the Swan for meso-carnivore monitoring/surveys in Northern portions of the Forest. The Southwest West Crown of the Continent (SWC) project (which includes portions of the Flathead/Lolo/Lewis & Clark) also has a similar agreement with NW Connections (and a large budget of about $450K) to survey meso-carnivore habitats. Southern portions of the Flathead are within the SWC project area. The SWC is one of 10 areas nationally awarded funding under the federal Collaborative Forest Landscape Restoration (CFLR) program; they are well funded, and have lots of projects ongoing, including a very robust carnivore monitoring project now in its 4th year. Attached is their 2012-2014 progress report. The meso-carnivore monitor/survey protocol is very similar to the one the BT employed last year. Survey results in the SWC project area to date are impressive; 36 of 82 cells surveyed recorded lynx presence and 18 unique individuals – 38 cells recorded wolverine presence and 15 unique individuals. This work is accomplished via a C/S agreement with NW Connections out of Condon, MT – I attached a link to their web site – lots of good info and videos of lynx and wolverine at detections stations.

http://www.northwestconnections.org/forest-carnivores/

Gary Hanvey
Wildlife Program Manager

Forest Service
Flathead National Forest - SO

p: 406-758-5255
f: 406-758-5351
ghanvey@fs.fed.us

650 Wolfpack Way
Kalispell, MT 59901, MT 59901
www.fs.fed.us

Caring for the land and serving people

From: Belleman, Ann [mailto:ann_belleman@fws.gov]
Sent: Wednesday, July 22, 2015 12:47 PM
To: Hanvey, Gary -FS
Subject: lynx obs

Just had to tell you that I saw a lynx the other evening! It was just crossing the road (the way I typically get to see lynx) about 15 miles N of Grand Marais, MN. Always exciting!

Ann Belleman
U.S. Fish and Wildlife Service
Minnesota/Wisconsin Field Office Complex
4101 American Blvd. E
Bloomington, MN 55425-1665

ann_belleman@fws.gov

307-421-5839 (work cell)
(612) 725-3548 (Bloomington, MN)

From: Zelenak, Jim
To: Bowman, Jeff (MNRF)
Subject: Re: Canada lynx status assessment
Date: Thursday, July 23, 2015 7:39:10 AM

Thanks, Jeff - don't know how I did that....

I'll re-send to Dennis.

Yes - I received your expression of interest. Great - thanks! I will forward more details as they become available (e.g., final dates).

There is a group of USFWS and USGS folks who oversee implementation of the SSA framework and who have experience in structured expert elicitation - they will send formal invitations to the final group of selected experts. Always a balance between having all the expertise we'd like to have and keeping the group small enough to be efficient/effective (or so they tell me).

Will be in touch soon. Thanks again.

Jim

On Thu, Jul 23, 2015 at 7:23 AM, Bowman, Jeff (MNRF) <Jeff.Bowman@ontario.ca> wrote:

> Hi Jim,
>
> It looks like you may have sent Dennis' request to me in error. (See below.) Dennis can be reached at <dennismurray@trentu.ca>.
>
> I assume that you have received my affirmative response to your request? I look forward to the meeting.
>
> Best regards,
>
> Jeff
>
> Jeff Bowman
>
> Research Scientist
>
> Wildlife Research & Monitoring Section
>
> Ontario Ministry of Natural Resources & Forestry

Trent University DNA Building

2140 East Bank Drive

Peterborough, ON, K9J 7B8

705-755-1555, 705-755-1559 (fax)

jeff.bowman@ontario.ca

http://people.trentu.ca/jebowman

From: Zelenak, Jim [mailto:jim_zelenak@fws.gov]
Sent: July 22, 2015 5:32 PM
To: Bowman, Jeff (MNRF)
Subject: Canada lynx status assessment

Hi Dr. Murray,

Erin Koen passed along your contact information and recommended you as a candidate for the Canada lynx expert elicitation workshop that I'm trying to arrange for mid-Oct. to mid-Nov this year. I sent a similar request to your colleague, Jeff Bowman

The U.S. Fish and Wildlife Service is undertaking a Species Status Assessment (SSA) for the lynx DPS (lower 48 lynx), which is intended to inform recovery planning and the eventual final recovery plan, which we are under court order to complete by Jan. 2018.

The SSA framework is a relatively new (and still-evolving) process intended to result in a report that forms the scientific underpinnings for all or most of the determinations and documents the Service is required to produce in accordance with the ESA. I've attached a fact sheet sheet that provides some additional background.

Given the lack of solid empirical data for many lynx population parameters (e.g., the sizes of the various DPS

subpopulations; survival, mortality, recruitment, immigration/emigration rates, etc.) we will need to rely on expert opinion regarding some factors and processes that are necessary to evaluate the likely viability and future health of the DPS.

I'm writing to inquire about your interest and availability to either present research results or participate in a structured lynx "expert elicitation" meeting, or both, that will likely occur in mid-Oct. - mid-Nov., probably in Minneapolis (geographic mid-point of the DPS).

You would contribute importantly to that meeting, where we will also invite other lynx experts from southern Canada and from specific parts of the DPS range in the lower 48, as well as climate change modelers and boreal forest ecologists.

Please let me know if you are interested and potentially available to participate in such a gathering and, if so, whether there are certain dates that absolutely would not work for you. We intend to coordinate with States and other partners throughout this process, but we will need to keep the number of participants at the expert elicitation meeting to a manageable number of folks most able to provide insight on the key variables pertinent to an assessment of the current and likely future status of lynx in the lower 48. In that regard, I welcome your thoughts/ recommendations on other lynx researchers, modelers (climate/forest processes), or managers you think also should be considered for participation at the meeting.

Thanks for considering this request. Please call if you'd like to discuss.

Cheers!

--

Jim Zelenak, Biologist

U.S. Fish and Wildlife Service

Montana Ecological Services Office

585 Shepard Way, Suite 1

Helena, MT 59601

(406) 449-5225 ext. 220

jim_zelenak@fws.gov

--
Jim Zelenak, Biologist
U.S. Fish and Wildlife Service
Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, MT 59601
(406) 449-5225 ext. 220
jim_zelenak@fws.gov

From: Zicari, Laury
To: Vashon, Jennifer
Subject: Re: Lynx expert meeting
Date: Thursday, July 23, 2015 7:46:24 AM

---

really glad you can make it -- off to Minneapolis!

On Thu, Jul 23, 2015 at 9:27 AM, Vashon, Jennifer <Jennifer.Vashon@maine.gov> wrote:

> Thanks Mark,
>
> I will be able to attend the meeting with tentative dates of Oct 13-16. If you need to look at alternate dates, the trapping season opens on Oct 18th, so dates before the 18th are best for me. Regardless of when the meeting is held, I will make every effort to attend.
>
> I'm looking forward to hearing more and receiving confirmation of meeting dates.
>
> Thanks again for the invitation!
>
> Jen
>
> **From:** McCollough, Mark [mailto:mark_mccollough@fws.gov]
> **Sent:** Wednesday, July 22, 2015 1:17 PM
> **To:** Vashon, Jennifer; Erin Simons-Legaard
> **Cc:** Laury Zicari
> **Subject:** Lynx expert meeting
>
> Jen and Erin: I have not heard back from either of your concerning your availability in mid-Oct to mid-Nov to participate in the Service's lynx expert meeting in Minnesota. I hope you are interested and available. There seems to be considerable interest in Oct 13-16 dates just prior to the national TWS meeting. Please let me know of your interest and availability from mid-Oct through mid-Nov.
>
> Thanks, Mark
>
> --
>
> Mark McCollough, Ph.D.

Endangered Species Specialist

Maine Field Office

U. S. Fish and Wildlife Service

17 Godfrey Drive, Suite 2

Orono, ME 04473

Phone 207 866-3344 x115

Cell Phone: 207 944-5709

mark_mccollough@fws.gov

From: McCollough, Mark [mailto:mark_mccollough@fws.gov]
Sent: Monday, July 20, 2015 1:49 PM
To: Vashon, Jennifer; Dan Harrison; Erin Simons-Legaard
Cc: Laury Zicari; Jim Zelenak
Subject: Lynx expert meeting

Jen, Dan, and Erin:

As you know, the USFWS has adopted a new conservation analytical approach called the Species Status Assessment Framework (SSA) to inform decisions and activities under the Endangered Species Act. We have embarked on this process to inform the 5-year review and recovery plan for the Canada lynx.

We are assembling a small group of lynx experts to solicit information on the status of lynx and their threats and project their status into the future. We are seeking the participation of scientists who can provide the best available information on lynx biology, ecology and conditions that are likely to affect the viability of the species in the future.

We consider you to be the "lynx experts" in Maine and hope that you can be involved in a 3-day meeting in Minnesota. Other experts will be invited from other lynx units within the DPS. The meeting will also involve a small, core team of Service biologists working on the 5-year review and recovery plan, and biologists from USGS and the Service who are trained in the SSA and will lead a structured process during the 3-day event.

I am reaching out to you informally to see if you would be interested in participating and if you would be available Oct. 13, 14, and 15 (travel days Oct 12 and 16) (prior to the TWS meeting in Manitoba). If not available these dates, what other dates might you be available from mid-October through mid-November?

Thanks for considering this request. This meeting will be very important to the SSA process for the lynx. I look forward to hearing back from you soon so we can schedule this meeting as soon as possible, and would be glad to answer any questions.

Sincerely, Mark

--

Mark McCollough, Ph.D.

Endangered Species Specialist

Maine Field Office

U. S. Fish and Wildlife Service

17 Godfrey Drive, Suite 2

Orono, ME 04473

Phone 207 866-3344 x115

Cell Phone: 207 944-5709

mark_mccollough@fws.gov

--

Laury Zicari
Field Supervisor
Maine Field Office
17 Godfrey Drive, Suite 2
Orono, ME 04473
207-866-3344 x 1111
Fax 866-3351
Cell 207-949-0561

From: McCollough, Mark
To: Vashon, Jennifer; Jim Zelenak; Laury Zicari
Subject: Re: Lynx expert meeting
Date: Thursday, July 23, 2015 8:16:12 AM

Excellent! I will let Jim know.

Right now, we are reaching out informally to those we believe are the "experts" on lynx biology in the various units in the DPS. This will not be a large meeting, nor a conference format, but a structured process that is focused on eliciting expert information to inform our species status assessment. We are working on objectives, agenda, and structure of the meeting with experts in the SSA process (USGS and our Service experts in this process). It should be interesting and informative. Its been awhile since a group of lynx experts has assembled.

Jim will be reaching out formally soon. But its good to know that you will be able to attend. These dates look good for Erin and Dan as well.

Thanks, Mark

On Thu, Jul 23, 2015 at 9:27 AM, Vashon, Jennifer <Jennifer.Vashon@maine.gov> wrote:

> Thanks Mark,
>
> I will be able to attend the meeting with tentative dates of Oct 13-16. If you need to look at alternate dates, the trapping season opens on Oct 18th, so dates before the 18th are best for me. Regardless of when the meeting is held, I will make every effort to attend.
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> Jen
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> **Sent:** Wednesday, July 22, 2015 1:17 PM
> **To:** Vashon, Jennifer; Erin Simons-Legaard
> **Cc:** Laury Zicari
> **Subject:** Lynx expert meeting
>
> Jen and Erin: I have not heard back from either of your concerning your availability in mid-Oct to mid-Nov to participate in the Service's lynx expert meeting in Minnesota. I hope you are interested and available. There seems to be considerable interest in Oct 13-16 dates just

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Thanks, Mark

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Mark McCollough, Ph.D.

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Phone 207 866-3344 x115

Cell Phone: 207 944-5709

mark_mccollough@fws.gov

From: McCollough, Mark [mailto:mark_mccollough@fws.gov]
Sent: Monday, July 20, 2015 1:49 PM
To: Vashon, Jennifer; Dan Harrison; Erin Simons-Legaard
Cc: Laury Zicari; Jim Zelenak
Subject: Lynx expert meeting

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scientists who can provide the best available information on lynx biology, ecology and conditions that are likely to affect the viability of the species in the future.

We consider you to be the "lynx experts" in Maine and hope that you can be involved in a 3-day meeting in Minnesota. Other experts will be invited from other lynx units within the DPS. The meeting will also involve a small, core team of Service biologists working on the 5-year review and recovery plan, and biologists from USGS and the Service who are trained in the SSA and will lead a structured process during the 3-day event.

I am reaching out to you informally to see if you would be interested in participating and if you would be available Oct. 13, 14, and 15 (travel days Oct 12 and 16) (prior to the TWS meeting in Manitoba). If not available these dates, what other dates might you be available from mid-October through mid-November?

Thanks for considering this request. This meeting will be very important to the SSA process for the lynx. I look forward to hearing back from you soon so we can schedule this meeting as soon as possible, and would be glad to answer any questions.

Sincerely, Mark

--

Mark McCollough, Ph.D.

Endangered Species Specialist

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Phone 207 866-3344 x115

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mark_mccollough@fws.gov

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Mark McCollough, Ph.D.
Endangered Species Specialist
Maine Field Office
U. S. Fish and Wildlife Service
17 Godfrey Drive, Suite 2
Orono, ME 04473
Phone 207 866-3344 x115
Cell Phone: 207 944-5709
mark_mccollough@fws.gov

From: Zelenak, Jim
To: dennis murray
Subject: Re: Canada lynx status assessment
Date: Thursday, July 23, 2015 8:26:01 AM

Great - thanks, Dennis!

I will forward more details as they become available (e.g., final dates - there is early indication that the week of Oct. 12 will work for many folks - either Tues - Thurs. or Wed. - Fri. of that week. A lot of folks going to TWS the following week).

There is a group of USFWS and USGS folks who oversee implementation of the SSA framework and who have experience in structured expert elicitation - they will send formal invitations to the final group of selected experts. Always a balance between having all the expertise we'd like to have and keeping the group small enough to be efficient/effective (or so they tell me).

Will be in touch soon. Thanks again.

Jim

On Thu, Jul 23, 2015 at 8:16 AM, dennis murray <dennismurray@trentu.ca> wrote:

> Hello Jim,
>
> I am quite interested in this opportunity. I can attend other than Oct. 18-22 and Nov. 8-15. Thanks for asking.
>
> Dennis
>
> Dennis Murray
>
> CRC, Integrative Wildlife Conservation,
> Bioinformatics, and Ecological Modeling
> Trent University
> Peterborough, ON
> K9J 7B8
>
> www.dennismurray.ca
>
> On Jul 23, 2015, at 9:41 AM, Zelenak, Jim <jim_zelenak@fws.gov> wrote:

Hi Dr. Murray,

Erin Koen passed along your contact information and recommended you as a candidate for the Canada lynx expert elicitation workshop that I'm trying to arrange for mid-Oct. to mid-Nov this year. I sent a similar request to your colleague, Jeff Bowman

The U.S. Fish and Wildlife Service is undertaking a Species Status Assessment (SSA) for the lynx DPS (lower 48 lynx), which is intended to inform recovery planning and the eventual final recovery plan, which we are under court order to complete by Jan. 2018.

The SSA framework is a relatively new (and still-evolving) process intended to result in a report that forms the scientific underpinnings for all or most of the determinations and documents the Service is required to produce in accordance with the ESA. I've attached a fact sheet sheet that provides some additional background.

Given the lack of solid empirical data for many lynx population parameters (e.g., the sizes of the various DPS subpopulations; survival, mortality, recruitment, immigration/emigration rates, etc.) we will need to rely on expert opinion regarding some factors and processes that are necessary to evaluate the likely viability and future health of the DPS.

I'm writing to inquire about your interest and availability to either present research results or participate in a structured lynx "expert elicitation" meeting, or both, that will likely occur in mid-Oct. - mid-Nov., probably in Minneapolis (geographic mid-point of the DPS).

You would contribute importantly to that meeting, where we will also invite other lynx experts from southern Canada and from specific parts of the DPS range in the lower 48, as well as climate change modelers and boreal forest ecologists.

Please let me know if you are interested and potentially available to participate in such a gathering and, if so, whether there are certain dates that absolutely would not work for you. We intend to coordinate with States and other partners throughout this process, but we will need to keep the number of participants at the expert elicitation meeting to a manageable number of folks most able to provide insight on the key variables pertinent to an assessment of the current and likely future status of lynx in the lower 48. In that regard, I welcome your thoughts/ recommendations on other lynx researchers, modelers (climate/forest processes), or managers you think also should be considered for participation at the meeting.

Thanks for considering this request. Please call if you'd like to discuss.

Cheers!

--
Jim Zelenak, Biologist
U.S. Fish and Wildlife Service
Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, MT 59601
(406) 449-5225 ext. 220
jim_zelenak@fws.gov
<SSA Fact Sheet.pdf>

--
Jim Zelenak, Biologist
U.S. Fish and Wildlife Service

Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, MT 59601
(406) 449-5225 ext. 220
jim_zelenak@fws.gov

From: Zelenak, Jim
To: Hein, Eric
Cc: Jodi Bush
Subject: Re: Lynx status assessment
Date: Thursday, July 23, 2015 9:19:12 AM

Thanks Eric!

On Thu, Jul 23, 2015 at 9:23 AM, Hein, Eric <eric_hein@fws.gov> wrote:

> Dear Director Sandoval:
>
> As you know, the U.S. Fish and Wildlife Service (Service) is conducting a status assessment for the contiguous United States distinct population segment (DPS) of the Canada lynx (*Lynx canadensis*). Over the next several months, we will be coordinating with States and other partners. We are scheduling monthly calls with your department and the wildlife management agencies from other states within the range of the DPS. Please find the attached letter and fact sheet that describes the process.
>
> We look forward to continued collaboration with your department throughout this process.
>
> Thank you.
>
> Eric
>
> --
> Eric W. Hein
> U.S. Fish and Wildlife Service
> New Mexico Ecological Services Field Office
> 2105 Osuna NE
> Albuquerque, New Mexico 87113
> 505-761-4735

--
Jim Zelenak, Biologist
U.S. Fish and Wildlife Service
Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, MT 59601
(406) 449-5225 ext. 220
jim_zelenak@fws.gov

From: Ron Moen
To: Tamara_smith@fws.gov
Subject: Fall 2015
Date: Thursday, July 23, 2015 10:12:35 AM

Hi Tam,

October 23 will be out for me too. This is end of week of TWS conference so also probably not good for others anyway.

Ron

--
Ron Moen
Center for Water and Environment, Natural Resources Research Institute
Biology Department, Swenson College of Science and Engineering
University of Minnesota Duluth
www.d.umn.edu/~rmoen, www.nrri.umn.edu/lynx, www.nrri.umn.edu/moose
Voice: 218-720-4372
Fax: 218-720-4328

From: McCollough, Mark
To: Vashon, Jennifer; Jim Zelenak; Laury Zicari
Subject: Re: Lynx expert meeting
Date: Thursday, July 23, 2015 10:15:11 AM

Excellent! I will let Jim know.

Right now, we are reaching out informally to those we believe are the "experts" on lynx biology in the various units in the DPS. This will not be a large meeting, nor a conference format, but a structured process that is focused on eliciting expert information to inform our species status assessment. We are working on objectives, agenda, and structure of the meeting with experts in the SSA process (USGS and our Service experts in this process). It should be interesting and informative. Its been awhile since a group of lynx experts has assembled.

Jim will be reaching out formally soon. But its good to know that you will be able to attend. These dates look good for Erin and Dan as well.

Thanks, Mark

On Thu, Jul 23, 2015 at 9:27 AM, Vashon, Jennifer <Jennifer.Vashon@maine.gov> wrote:

> Thanks Mark,
>
> I will be able to attend the meeting with tentative dates of Oct 13-16. If you need to look at alternate dates, the trapping season opens on Oct 18th, so dates before the 18th are best for me. Regardless of when the meeting is held, I will make every effort to attend.
>
> I'm looking forward to hearing more and receiving confirmation of meeting dates.
>
> Thanks again for the invitation!
>
> Jen
>
> **From:** McCollough, Mark [mailto:mark_mccollough@fws.gov]
> **Sent:** Wednesday, July 22, 2015 1:17 PM
> **To:** Vashon, Jennifer; Erin Simons-Legaard
> **Cc:** Laury Zicari
> **Subject:** Lynx expert meeting
>
> Jen and Erin: I have not heard back from either of your concerning your availability in mid-Oct to mid-Nov to participate in the Service's lynx expert meeting in Minnesota. I hope you are interested and available. There seems to be considerable interest in Oct 13-16 dates just

prior to the national TWS meeting. Please let me know of your interest and availability from mid-Oct through mid-Nov.

Thanks, Mark

--

Mark McCollough, Ph.D.

Endangered Species Specialist

Maine Field Office

U. S. Fish and Wildlife Service

17 Godfrey Drive, Suite 2

Orono, ME 04473

Phone 207 866-3344 x115

Cell Phone: 207 944-5709

mark_mccollough@fws.gov

From: McCollough, Mark [mailto:mark_mccollough@fws.gov]
Sent: Monday, July 20, 2015 1:49 PM
To: Vashon, Jennifer; Dan Harrison; Erin Simons-Legaard
Cc: Laury Zicari; Jim Zelenak
Subject: Lynx expert meeting

Jen, Dan, and Erin:

As you know, the USFWS has adopted a new conservation analytical approach called the Species Status Assessment Framework (SSA) to inform decisions and activities under the Endangered Species Act. We have embarked on this process to inform the 5-year review and recovery plan for the Canada lynx.

We are assembling a small group of lynx experts to solicit information on the status of lynx and their threats and project their status into the future. We are seeking the participation of

scientists who can provide the best available information on lynx biology, ecology and conditions that are likely to affect the viability of the species in the future.

We consider you to be the "lynx experts" in Maine and hope that you can be involved in a 3-day meeting in Minnesota. Other experts will be invited from other lynx units within the DPS. The meeting will also involve a small, core team of Service biologists working on the 5-year review and recovery plan, and biologists from USGS and the Service who are trained in the SSA and will lead a structured process during the 3-day event.

I am reaching out to you informally to see if you would be interested in participating and if you would be available Oct. 13, 14, and 15 (travel days Oct 12 and 16) (prior to the TWS meeting in Manitoba). If not available these dates, what other dates might you be available from mid-October through mid-November?

Thanks for considering this request. This meeting will be very important to the SSA process for the lynx. I look forward to hearing back from you soon so we can schedule this meeting as soon as possible, and would be glad to answer any questions.

Sincerely, Mark

--

Mark McCollough, Ph.D.

Endangered Species Specialist

Maine Field Office

U. S. Fish and Wildlife Service

17 Godfrey Drive, Suite 2

Orono, ME 04473

Phone 207 866-3344 x115

Cell Phone: 207 944-5709

mark_mccollough@fws.gov

--
Mark McCollough, Ph.D.
Endangered Species Specialist
Maine Field Office
U. S. Fish and Wildlife Service
17 Godfrey Drive, Suite 2
Orono, ME 04473
Phone 207 866-3344 x115
Cell Phone: 207 944-5709
mark_mccollough@fws.gov

From: Smith, Tamara
To: Zelenak, Jim
Subject: Re: MN State experts
Date: Thursday, July 23, 2015 10:17:58 AM

Ron is also unavailable October 23rd - I think that is still TWS week.

On Tue, Jul 21, 2015 at 12:15 PM, Smith, Tamara <tamara_smith@fws.gov> wrote:
> Good idea!
>
> On Tue, Jul 21, 2015 at 12:04 PM, Zelenak, Jim <jim_zelenak@fws.gov> wrote:
> > Thanks Tam.
> >
> > Sounds like everybody is going to Manitoba for TWS - maybe we all should pack our bags after the expert meeting and join them....
> >
> > On Tue, Jul 21, 2015 at 10:47 AM, Smith, Tamara <tamara_smith@fws.gov> wrote:
> > > Update from Ron - He is unavailable 10/17-10/21 because of the TWS meeting.
> > >
> > > He also has a commitment on Friday November 20th in Duluth (M.S. student seminar).
> > >
> > > On Tue, Jul 21, 2015 at 11:27 AM, Zelenak, Jim <jim_zelenak@fws.gov> wrote:
> > > > Thanks tam. Good news about Ron; potentially bad about the Cattons (if they are unavailable the most like week...). We'll see how it shakes out, I guess.
> > > >
> > > > On Tue, Jul 21, 2015 at 10:16 AM, Smith, Tamara <tamara_smith@fws.gov> wrote:
> > > > > Hi Jim - I just talked to Susan Catton. She indicated that both her and Tim would be very interested in attending the expert elicitation workshop.
> > > > >
> > > > > Susan/Tim Availability by Week:
> > > > >
> > > > > October 12 - unavailable
> > > > > October 19 - yes
> > > > > October 26 - yes
> > > > > November 1 - yes
> > > > > November 9 - Vetran's day is mid-week Wednesday Nov. 11 so may not work.
> > > > > November 16 - okay but least desirable
> > > > > November 23 - unavailable
> > > > > The Cattons are also available the first three weeks of December, if the workshop needs to be pushed out farther.
> > > > >
> > > > > I also talked with Ron Moen - he is also very interested and pretty flexible this fall - he will be teaching a class on Tuesday and Thursdays so a Tues-Wed-Thurs workshop would cause him to miss 2 classes (so it is least desirable), but he sounded like he could get grad students to teach missed classes, if need be. Ron said that any week this fall would be okay with him.
> > > > >
> > > > > Thanks!
> > > > > -Tam
> > > > >
> > > > >
> > > > >
> > > > > On Wed, Jul 15, 2015 at 4:41 PM, Smith, Tamara <tamara_smith@fws.gov> wrote:
> > > > > > Hi Jim,
> > > > > >
> > > > > > #1 - **Dr. Ron Moen**, University of Minnesota and Natural Resources Research Institute. Dr. Moen is a lynx expert. Since 2003, Dr. Moen has studied Canada lynx to understand their distribution, abundance, persistence, movement and habitat use in and near the Superior National Forest in northeastern Minnesota as well as conducting some studies in the greater Upper Great Lakes Region (WI and MI). Dr. Moen has authored numerous reports and manuscripts on his studies of lynx in MN. Dr. Moen and his graduate student also conducted studies that used pellet counts to estimate snowshoe hare numbers in MN.
> > > > > >
> > > > > > #2 – **Susan Catton or Tim Catton** (USDA, Superior National Forest)- preferred presence at the workshop depending on our questions, also could potentially substitute for R. Moen, if he is unavailable. Susan has been working as a biologist on the Superior National Forest since 2001 and is an expert on lynx biology, ecology and management on the forest. Susan has participated in surveys for the species and is very knowledgeable about lynx and their habitat on the SNF. Tim is a biologist on the SNF and has been leading, for a number of years (7-9 yrs?), a lynx tracking project to detect and monitor lynx populations across the SNF. Tim and others (e.g.. Dan Ryan, SNF) have been collecting lynx genetic material to augment an existing lynx DNA database and further the knowledge of lynx presence and persistence on the Forest and in Minnesota. Depending on our needs Tim could potentially substitute/replace Susan.
> > > > > >
> > > > > > Depending on our needs, **Dr. Peter Reich** - University of Minnesota, Forest Ecology Lab may be utilized as a participant, a subject expert presenter, or someone whom we can obtain MN climate scenario information from prior to the workshop. Dr. Reich's research focuses on the impacts of global environmental change on terrestrial ecosystems (MN and globally). This includes effects of climate change, elevated atmospheric carbon dioxide, other air pollutants, land use/management, fire and biotic invasion on health, biodiversity, and sustainability of forest and grassland ecosystems both in Minnesota and globally.

He focuses on the broad ecotone of central North America, where boreal forests, northern hardwood forests, oak woodlands/savannas, and grasslands converge and mix.

Possible substitutes for Dr. Peter Reich include:

Dr. Lee Frelich -Research Associate and Director, University of Minnesota Center for Forest Ecology. Dr. Frelich is working on a climate change adaptation planning project for Northern forest ecosystems in the Great Lakes with Dr. Moen and has co-authored a paper with Dr. Reich (http://forestecology.cfans.umn.edu/prod/groups/cfans/@pub/@cfans/@forestecology/documents/asset/fisichelliecogr2013.pdf) on temperate tree expansion and boreal spatial shifts/change in composition in response to climate change in the Great Lakes.

Dr. Rebecca Montgomery, University of Minnesota Center for Forest Ecology. Possible substitute for Frelich/Reigh - Dr. Montgomery's current research focus is the potential for projected climate change to alter tree species composition at the southern boreal-temperate forest ecotone.

It might be a good idea to contact all three (Reich, Frelich, Montgomery) and see which, if any, would be the most appropriate, once we have a better idea of the specific questions that are looking to be answered.

Greg Spoden is the MN state climatologist and might also be a good contact for MN specific climate and snow data.

Sorry, Jim, somehow, in my attempt to narrow down participants, I added more names! I think we can filter through potential participants quickly once we are more clear on our needs.

Please let me know if you need any more specific information.

Thanks!
Tam

--
Tamara Smith
U.S. Fish and Wildlife Service
Twin Cities Field Office
4101 American Boulevard East
Bloomington, MN 55425
612-725-3548 ext. 2219
612-600-1599 cell

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612-725-3548 ext. 2219
612-600-1599 cell

--
Jim Zelenak, Biologist
U.S. Fish and Wildlife Service
Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, MT 59601
(406) 449-5225 ext. 220
jim_zelenak@fws.gov

--
Tamara Smith

> > U.S. Fish and Wildlife Service
> > Twin Cities Field Office
> > 4101 American Boulevard East
> > Bloomington, MN 55425
> > 612-725-3548 ext. 2219
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> --
> Jim Zelenak, Biologist
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Tamara Smith
U.S. Fish and Wildlife Service
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612-725-3548 ext. 2219
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Bloomington, MN 55425
612-725-3548 ext. 2219
612-600-1599 cell

From: Zelenak, Jim
To: McCollough, Mark
Subject: Re: Draft Expert Elicitation Guidance and Criteria
Date: Thursday, July 23, 2015 3:33:09 PM

Thanks for giving it a look Mark. Mostly David's work. Both FACA and APA are spelled out earlier in the doc - couple paragraphs above.

I spoke with Karen Hodges and Jake Ivan today - both are very interested and likely available for the expert meeting. Also have emails that the same is true for both Jeff Bowman and Dennis Murray from Trent U.

Saw your messages, too. really beginning to look like Oct. 12/13 - 15/16 will work for most candidates.

Talk to you next Tues. have a great weekend.

On Thu, Jul 23, 2015 at 2:08 PM, McCollough, Mark <mark_mccollough@fws.gov> wrote:

> Jim - a lot of thought went into this document, so I have little to add. My only comment is to spell out FACA and APA the first times they are used (if they haven't been already).
> thanks, Mark
>
> On Thu, Jul 23, 2015 at 12:56 PM, Zelenak, Jim <jim_zelenak@fws.gov> wrote:
>
> > Hi All:
> >
> > Please review the attached DRAFT guidance, which incorporates several previous rounds of comments/edits from David, Jonathan, Mary and myself.
> >
> > Kurt J. - I thought these might be helpful as you/your shop evaluate potential climate change/modeling experts for participation in the expert elicitation meeting/workshop.
> >
> > SSA Core Team - please take a look at these as you reach out informally to prospective experts or have follow-up discussions with those you've already contacted. Also let me know if you see any red flags or have other edits/comments/recommendations.
> >
> > Dave - I've left two of Mary's comments in Appendix 2 that still need to be resolved (one of which I took a stab at addressing - the "ESA" paragraph). I also left in a few potential edits in Track Changes in the APA paragraph that I'd like you and Mary to take another look at. Also would like your thoughts on who else in FWS beyond the Core Team should have these. Should all the Project Leaders who sent letters to State agencies have a look?
> >
> > Thanks.
> >
> > --
> > Jim Zelenak, Biologist
> > U.S. Fish and Wildlife Service
> > Montana Ecological Services Office
> > 585 Shepard Way, Suite 1
> > Helena, MT 59601
> > (406) 449-5225 ext. 220
> > jim_zelenak@fws.gov
>
> --
> Mark McCollough, Ph.D.

> Endangered Species Specialist
> Maine Field Office
> U. S. Fish and Wildlife Service
> 17 Godfrey Drive, Suite 2
> Orono, ME 04473
> Phone 207 866-3344 x115
> Cell Phone: 207 944-5709
> mark_mccollough@fws.gov

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Jim Zelenak, Biologist
U.S. Fish and Wildlife Service
Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, MT 59601
(406) 449-5225 ext. 220
jim_zelenak@fws.gov

From: McCollough, Mark
To: Zelenak, Jim
Subject: Re: Draft Expert Elicitation Guidance and Criteria
Date: Thursday, July 23, 2015 4:08:25 PM

Jim - a lot of thought went into this document, so I have little to add. My only comment is to spell out FACA and APA the first times they are used (if they haven't been already). thanks, Mark

On Thu, Jul 23, 2015 at 12:56 PM, Zelenak, Jim <jim_zelenak@fws.gov> wrote:

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> Thanks.
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> Jim Zelenak, Biologist
> U.S. Fish and Wildlife Service
> Montana Ecological Services Office
> 585 Shepard Way, Suite 1
> Helena, MT 59601
> (406) 449-5225 ext. 220
> jim_zelenak@fws.gov

--
Mark McCollough, Ph.D.
Endangered Species Specialist
Maine Field Office
U. S. Fish and Wildlife Service
17 Godfrey Drive, Suite 2
Orono, ME 04473
Phone 207 866-3344 x115
Cell Phone: 207 944-5709
mark_mccollough@fws.gov

United States Department of the Interior

Fish and Wildlife Service

Ecological Services
Montana Field Office
585 Shepard Way, Suite 1
Helena, Montana 59601-6287
Phone: (406) 449-5225; Fax: (406) 449-5339

In reply, refer to:
File: M19 Forest Service Region 1
06E11000-2015-I-0019 2014 Programmatic NLAA screens

December 17, 2014

Eric Johnston
Deputy Director of Renewable Resources
U.S. Forest Service
Northern Region
200 East Broadway
Missoula, Montana 59802

Dear Mr. Johnston:

This is in response to your October 10, 2014 request for U.S. Fish and Wildlife Service (Service) concurrence with the determinations in the *Programmatic Biological Assessment for Activities that are Not Likely to Adversely Affect Canada Lynx, Grizzly Bear, and Designated Canada lynx Critical Habitat* (biological assessment) which analyzes impacts to the threatened grizzly bear (*Ursus arctos horribilis*), the threatened Canada lynx (*Lynx canadensis*), and designated critical habitat for Canada lynx. The Forest Service Northern Region Regional Office submitted the biological assessment on the behalf of the National Forests in Montana and Idaho within the Forest Service's Northern Region. The determinations pertain to the effects on grizzly bears, Canada lynx, and lynx critical habitat from projects or actions that meet the conditions and criteria of the appropriate screening processes contained as appendices A, B, and D to the biological assessment.

The Service has reviewed the biological assessment and screening processes and we concur with the determinations that projects and actions complying with the conditions and criteria outlined in the screening processes may affect, but are not likely to adversely affect the threatened grizzly bear, the threatened Canada lynx, or designated critical habitat for Canada lynx. Therefore, pursuant to 50 CFR 402.13 (a), formal consultation on the species and critical habitat referenced above is not required.

In 2003, biologists from the Forests, our office, and other Montana Level 1 Wildlife Team participants developed this programmatic approach to section 7 informal consultation to expedite consistent, adequate biological review and fulfillment of section 7 obligations for a wide range of minor projects and activities carried out, funded by, or approved by the Forests. The process was designed to rapidly identify those actions that have the potential to affect specific listed terrestrial species, but where the effects are clearly insignificant or discountable. Such actions

accommodate a programmatic approach to section 7 compliance. We first concurred with the biological rationales that supported not likely to adversely affect determinations pertaining to specific actions related to minor project types on April 30, 2004. We have subsequently concurred several additional times as information is updated or the process renewed.

The Service has reviewed the biological assessment and screening processes and concurs with the Forest determinations of "may affect, not likely to adversely affect" grizzly bears, Canada lynx, and designated critical habitat for Canada lynx for actions that fully comply with the conditions and criteria described or outlined in the biological assessment and screening processes, including but not limited to the following:

1. This programmatic concurrence is expressly limited to those actions with effects to listed species that are insignificant or discountable as defined in the Service's section 7 consultation handbook, based on site specific information and analysis. As described in the biological assessment, this programmatic concurrence applies to Forest projects or actions for which the screening processes (found as appendices A, B, and D to the biological assessment) clearly leads a biologist to a determination of "not likely to adversely affect." More complex projects, which do not clearly lead to a "not likely to adversely affect" determination, or those for which the project biologist determines there may be effects not accounted for in the screening processes, do not qualify for this programmatic concurrence. Such projects must be evaluated in biological assessments submitted as usual for individual or batched concurrence or formal consultation, as appropriate.

2. Application of the screening processes and the determination of project effects must be made by a qualified wildlife biologist assigned by the Forest as the lead and/or responsible biologist for the project, as described in the programmatic biological assessment.

3. In no case does this programmatic concurrence apply to any project or action that has the potential to cause or increase the likelihood of "take" as defined by regulations and the Service's section 7 handbook, based on site specific information and analysis.

4. This programmatic concurrence does not apply to management activities that individually, additively, or cumulatively are likely to adversely affect a species or critical habitat through direct impacts or impacts to habitat.

5. To ensure proper use of the screening processes under this programmatic concurrence, the 2014 biological assessment describes a review process. For all projects and actions reviewed and analyzed using the screening processes, the consultation summary sheets in Appendix E of the biological assessment must be filled out and reviewed by Forest wildlife biologists and submitted to the Service semi-annually for review. Submittal dates are June 15 and December 15 of each year. These summary sheet reports shall be submitted to the Service, and an electronic copy sent to the Forest Service Region One Regional Office Threatened and Endangered Species Program Leader.

6. To ensure proper use of the screening processes and this programmatic concurrence, the biological assessment requires a Montana/Idaho Level 1 Wildlife (Level 1) team review of projects as needed. The Level 1 team must be comprised of Forest wildlife biologists and

Service biologists, at a minimum, in order for the review process to remain valid. Also, the Level 1 team will continue to annually randomly select a number of projects and review the use of the screening processes and documentation.

Projects for which a biological assessment leads to anything other than a not likely to adversely affect determination (i.e., those that do not fully meet the screening processes) or do not fully meet all of the above conditions shall be handled according to individual project level section 7 procedures.

The Service bases its concurrence primarily on, but not limited to, the following factors: the information and determinations presented in the biological assessment prepared for the screening processes, Level 1 team meetings and discussions, information in our files, knowledge and information accrued through experience with the effects of Forest Service projects and actions on the species and critical habitat listed above, and various information gained through the review of project effect analyses during past formal and informal consultation. The species and habitat considered in this programmatic consultation have an extensive history of being considered in analyses in formal and informal consultations between the Forests and the Service. Such experience helps to inform us as to the potential effects of the actions described in the screening processes. Our concurrence with the determination that projects fitting conditions of the screening processes are not likely to adversely affect these species requires project adherence to the conditions described in the screening processes contained in appendices to the biological assessment. The Service notes that such adherence compliments or is in agreement with all biological analysis protocols and mapping strategies developed for these species during consultation with the Service, and all assumptions underlying their development.

This programmatic concurrence will expire on December 17, 2019. At that time, the Service and the Forests will review the application of this programmatic approach and jointly determine whether its use should be continued. In the interim, the Level 1 team will serve as a forum for discussion of issues or problems that may arise with the implementation of this approach, in addition to the annual review of a sample of projects.

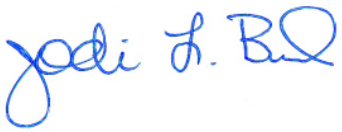
The Service may review the appropriateness of this programmatic concurrence at any time. The Service will keep informed of the latest information and science related to the species considered here, and recommend Level 1 team reviews, edits, or revisions of the screening processes as needed. Concurrence with specific projects may be invalidated as a consequence of any changes to the basis for which concurrence was issued, any problems of implementation that may be identified, changed assumptions or protocols, or when accountability measures within the programmatic concurrence process fail to be completed.

In the event that a project or action proceeds under this programmatic concurrence and later a) results in adverse effects or "take" of listed species or critical habitat, or b) exceeds the conditions of this programmatic concurrence (e.g., does not adhere to conditions in the screening processes), the appropriate Forest must initiate formal consultation or request reaffirmation of concurrence as appropriate for that project or action.

Through this process, we have appreciated the Forest Service's collaborative efforts in meeting their obligations under section 7 in a more efficient and expeditious manner. We look forward to

a continued cooperative relationship between our staffs. For any questions and other needs regarding this programmatic concurrence and ongoing section 7 processes, please feel free to contact Katrina Dixon or Jodi Bush at 406-449-5225 or Ben Conard at 509-893-8030.

Sincerely,



Jodi L. Bush
Field Supervisor
Montana Field Office

Ben Conard
Field Supervisor
Northern Idaho Field Office

cc: USFS, SO, Helena, MT (Attn: William Avey)
USFS, SO, Missoula, MT (Attn: Timothy Garcia)
USFS, SO, Hamilton, MT (Attn: Julie King)
USFS, SO, Kalispell, MT (Attn: Chip Weber)
USFS, SO, Libby, MT (Attn: Chris Savage)
USFS, SO, Dillon, MT (Attn: Melany Glossa)
USFS, SO, Bozeman, MT (Attn: Mary Erickson)
USFS, SO, Coeur d'Alene, ID (Attn: Mary Farnsworth)
USFS, SO, Grangeville, ID (Attn: Rick Brazell)
USFS, RO, Missoula, MT (Attn: Kristi Swisher)

PROGRAMMATIC BIOLOGICAL ASSESSMENT FOR ACTIVITIES THAT ARE NOT LIKELY TO ADVERSELY AFFECT CANADA LYNX, GRIZZLY BEAR AND DESIGNATED CANADA LYNX CRITICAL HABITAT

USDA Forest Service, Region 1

200 East Broadway

Missoula, MT 59801

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I. INTRODUCTION

The purpose of this programmatic biological assessment (BA) is to describe and analyze the adequacy of screens proposed for use in making determinations for simple, straightforward projects that have insignificant or discountable effects on listed terrestrial species. The Level 1 team has developed this assessment in order to facilitate project review and consultation. Section 7(a)(2) of the Endangered Species Act (ESA) of 1973 as amended, requires all federal agencies to review actions authorized, funded, or carried out by them to ensure such actions do not jeopardize the continued existence of listed species. The listed species analyzed in this document are the grizzly bear *(Ursus arctos)* and the Canada lynx *(Lynx canadensis)*. Also analyzed in this document is designated critical habitat for Canada lynx. The area of analysis includes the following National Forests:

- Custer, Gallatin, Helena, Lewis and Clark, Flathead, Lolo, Beaverhead-Deerlodge, Bitterroot, and Kootenai in Montana and South Dakota;
- Nez Perce, Clearwater, and Idaho Panhandle in Idaho, Washington and Montana.

II. PROPOSED ACTION

The Proposed Action implements a screening process to determine which proposed projects properly fit within a programmatic approach to consultation for simple, straightforward projects that would result in a "*not likely to adversely affect"* determination. The screening process also provides rationale for "*no effect"* projects; however, these are not subject to consultation and will not be discussed hereafter. Appendices A, B, and D contain the species-specific screens and screens for lynx critical habitat.

If the proposed actions are fully compliant with the wildlife screens described in the attached appendices and the screens lead to a *"not likely to adversely affect"* conclusion, the actions will be covered for terrestrial species by a programmatic concurrence from the U.S. Fish and Wildlife Service (Service). These proposed actions could proceed once the appropriate documentation is in place. The documentation process and form are described fully in Appendix D. It is possible that even though an action is identified in the screen, standard consultation[1] procedures may still be required if there is ambiguity surrounding the proposed action. Application of the screens, documentation of the screening process, and determination of effects for compliance with Section 7 must be conducted or reviewed by journey or higher level biologists (FSM 2634.03). If the programmatic screening concurrence process does not apply, the standard[1] Section 7 process is required.

Types of projects covered by the screens may vary depending on the species under analysis. To determine whether a proposed project is covered, the project needs to be compared against those projects identified in each species-specific or critical habitat screen. The following criteria describe overall considerations and species-specific considerations and apply to the proposed projects that meet the criteria described in the attached wildlife screens. A brief summary of each project by species follows. See the respective appendices for more detail.

<u>Conditions Common to all Project Types</u>

- Project types covered in this BA are for those Forest Service projects where the determination of effect clearly leads to a "*not likely to adversely affect"* (NLAA) determination. More complex

[1] Standard consultation refers to the process whereby the action agency biologist commences dialogue with Service counterparts to determine the appropriate consultation procedures. Typically, this involves contact to apprise the Service of the effects of an ongoing project and to reach consensus on such an effect and to determine if informal consultation is sufficient or if the project should proceed to formal consultation. Upon agreement of the respective consultation procedure, the action agency biologist will submit the appropriate request and documentation to the Service for concurrence or a biological opinion.

projects for which species concerns are not fully covered in this programmatic BA must proceed through the standard consultation process.

If the screening criteria are not met for one of the species or designated critical habitat, then standard consultation procedures need to be followed for that species and/or its critical habitat. However, it is possible to use the screens as a documentation process for the project activities that meet the screen criteria and include this documentation alongside the standard consultation for the species and/or critical habitat that do not meet the screen criteria.

- As always, cumulative effects must be considered; cumulative effects findings may cause the project to require standard consultation processes.

In no case does the programmatic BA cover any project that has the potential to cause or increase the likelihood of take or adverse modification as defined by the Service's regulations.

Table 1 identifies the major program areas that are described more fully in Appendices A, B, and D. The activity types identified below are presented to display the full range of program areas considered. It is recognized that individual projects may involve more than one activity type and that each individual activity type within a project will need to be screened. (For example, a vegetation management project could involve mechanical equipment use, prescribed fire, and road construction in addition to timber harvest; noxious weed control could also involve airplane or helicopter use.) Not all of the activity types are eligible for this programmatic BA since some are either ambiguous or may result in an adverse effect. However, they are listed below and in the screens to highlight that they have been considered and to provide guidance on the appropriate consultation pathway.

Table 1.

Projects included in the BA specific to grizzly bears, Canada lynx, and lynx critical habitat.*	
Timber Harvest	Forest Products
Mechanical Equipment Use	Habitat Management and Restoration
Road Construction and Maintenance	Prescribed Fire
Silviculture Activities	Watershed Restoration
Range Management	Weed Control
Recreation Management	Other (Minerals, Special Uses, etc.)

**See Appendices A, B, and D for definitions and further details.*

Projects Specific to Grizzly Bears

The scope of this programmatic BA for grizzly bears applies to areas where grizzly bears are expected to occur; i.e., it's not limited to Recovery Zone boundaries, but rather includes the area where grizzly bears may be present.

Projects with the potential to affect grizzly bears must pass through two screens to determine compatibility with the programmatic BA. A detailed discussion of projects and process elements are found in Appendix A. All projects in Table 1 must successfully comply with the following:

- The area must be in compliance with the appropriate access management direction;
- Human foods, livestock feed, garbage, and other attractants must be managed by the application of an adequate 'food storage rule' similar to the Northern Continental Divide (NCDE) or Yellowstone food storage orders. If no specific rule exists for the area, use of either the Yellowstone or NCDE order will be considered adequate.

- Projects that involve seeding or planting of grasses, forbs, or shrubs must do so in a manner that will tend not to attract bears into areas where increased mortality risk or interaction between bears and people is likely, such as adjacent to roads, developed or designated recreation and/or camping sites, etc.

Projects Specific to Canada Lynx

The scope of this programmatic BA for lynx applies to areas where Canada lynx may be present. Projects with the potential to affect Canada lynx must pass through two screens to determine compatibility with the programmatic BA. A detailed discussion of projects and process elements related to Canada lynx are found in Appendix B. All projects in Table 1 must successfully comply with the following:

- The project must be in compliance with the applicable direction in the NRLMD;
- Snowshoe hare habitat within mapped lynx habitat in Lynx Analysis Units (LAUs) will not be affected.

Projects Specific to Designated Critical Habitat for Canada Lynx

The scope of this programmatic BA for lynx critical habitat applies to those areas currently designated as critical habitat for Canada lynx.

Projects with the potential to affect Canada lynx critical habitat must pass through a separate screen to determine compatibility with the programmatic BA. A detailed discussion of projects and process elements related to critical habitat are found in Appendix D. All projects in Table D1 must successfully comply with the following:

- Snowshoe hare habitat providing PCE 1a within designated lynx critical habitat will not be affected.

III. SPECIES ASSESSMENT

Grizzly Bears

Distribution

The historic range of the grizzly bear (*Ursus arctos horribilis*) in the continental United States extended from the central Great Plains, west to California, and south to Texas and Mexico. Between 1800 and 1975, grizzly bear populations in the lower 48 states declined from over 50,000 to less than 1,000. As European settlement expanded westward, the grizzly was extirpated from most of its historical range.

Five areas in the lower 48 states currently support grizzly bear populations, located in Montana, Wyoming, Idaho, and Washington and include: the Greater Yellowstone Ecosystem (GYE), Northern Continental Divide Ecosystem (NCDE), Cabinet-Yaak Ecosystem (CYE), Selkirk Ecosystem (SE), and Northern Cascades Ecosystem (NCE). These areas represent less than two percent of the grizzly's former range (USDI 1993). The grizzly bear was first listed as threatened under ESA in 1975 (USDI 1993). The Service had designated grizzly bears in the GYE as a Distinct Population Segment (DPS) and removed this segment from the Endangered Species List in April 2007. On September 21, 2009, an order was issued by the U.S. District Court for the District of Montana, Missoula Division (*Greater Yellowstone Coalition v. Servheen*, 07-cv-00134-DWM) which enjoined and vacated the delisting of the GYE grizzly population.

Life History

Grizzly bears are long-lived with a lifespan of over 20 years. Adult bears are individualistic in behavior and normally are solitary wanderers. Home ranges of adult bears may overlap, with male ranges generally two to four times larger than those of adult females. Female home ranges are smaller while they have cubs, but increase when the cubs become yearlings. Home ranges vary in relation to food availability, weather conditions, and interactions with other bears. Home ranges are larger in the GYE compared to the more productive habitats in the northern ecosystems (USDI 1993).

Age of first reproduction and litter size varies and may be related to nutritional state. Age at first reproduction averages 5½ years (3½ to 8½ years old). Reproductive intervals for females average three years and litter size averages two cubs. The limited reproductive capacity of grizzly bears precludes rapid increases in population. Grizzly bears have one of the lowest reproductive rates among terrestrial mammals. During a female's lifetime, if she has litters of two cubs with a 50:50 sex ratio, and a 50 percent survivorship of young to age 5.5 years, at best she can replace herself with one breeding age female in the first decade of her life. Females with cubs and bears defending food supplies are common causes of confrontation with humans (USDI 1993).

Grizzly bears are opportunistic feeders and will prey or scavenge on almost any available food. Plants with high crude protein content and animal matter are important food items. The search for food has a prime influence on grizzly bear movements. Upon emergence from the den, grizzlies move to lower elevations, drainage bottoms, avalanche chutes, and ungulate winter ranges where their food requirements can be met. Throughout spring and early summer grizzlies follow plant phenology back to higher elevations. In late summer and fall, there is a transition to fruit and nut sources, as well as herbaceous materials. This is a general pattern; however, bears will go where they can meet their food requirements (USDI 1993). Grizzly bears display great diet plasticity and switch food habits according to which foods are available (Servheen 1981; Kendall 1986; Mace and Jonkel 1986; Martinka and Kendall 1986; LeFranc et al. 1987; Aune and Kasworm 1989).

Grizzly bears use a variety of habitats. In general, a grizzly bear's daily movements are largely driven by the search for food, mates, cover, security, and/or den sites. In the western portion of the NCDE ecosystem, Waller and Mace (1997) and Mace et al. (1997) demonstrated that avalanche chutes are important to bears during spring, summer, and autumn. Other open-canopied habitats such as shrub lands and places where timber has been harvested are also frequented by bears throughout the year. Mid- to high-elevation slabrock and meadow habitats possess many foods dug by bears. Grizzly bears use closed canopy forests less than expected during all seasons. Along the Rocky Mountain Front, grizzly bears selected riparian zones during all seasons (Aune and Kasworm 1989; Mace and Roberts 2011).

Blanchard found grizzly bears needed an interspersion of open areas to be used as feeding sites and nearby areas with cover. Similarly, grizzlies in the NCDE thrive in landscapes with numerous different habitat types, including those with cover and those without (Aune and Kasworm 1989; Mace et al. 1997; Waller and Mace 1997) but generally prefer to forage in areas with some type of hiding cover nearby, particularly in daylight hours.

Grizzly bears excavate dens as early as September or prior to entry in November. Dens are usually dug on steep slopes where wind and topography cause an accumulation of deep snow and where snow is unlikely to melt during warm periods. Dens are generally found at high elevations well away from human development (USDI 1993).

Survival in the NCDE is influenced by age, sex, reproductive status, and home range location (i.e., proximity to humans and human activities). While grizzly bears in the NCDE die from natural causes on

occasion, human-caused mortality is the driving force behind grizzly bear survival rates. Of 337 grizzly bear mortalities documented between 1998 and 2011, 86% (290 of 337) were human-caused (Table 1). Despite these mortalities, the survival rate for adult females, the single most important cohort affecting population trend, is high: 0.952 (95% CI = 0.892–0.980) (Mace et al. 2012).

The majority of management removals result from conflicts at sites associated with frequent or permanent human presence. Unsecured attractants such as garbage, human foods, pet/livestock foods, bird food, livestock carcasses, wildlife carcasses, barbeque grills, compost piles, orchard fruits, or vegetable gardens are usually the source of these conflicts and subsequent removals. Of the 89 management removals in the NCDE between 1998 and 2011, at least 57% (51 of 89) were related to attractants and may have been avoided if preventative measures had been taken (Grizzly Bear Conservation Strategy 2013).

Environmental Baseline

The environmental baseline for grizzly bears is described in terms of those parameters that have the potential to affect grizzly bears either through human contact and conflict or through reductions in secure habitat. More specifically, parameters that address grizzly/human conflict (e.g., access management, appropriate food storage, livestock management, and vegetation management) form the basis against which threats to grizzly bears are measured. Activities listed in Appendix A that have "*no effect*" (NE) or are "*not likely to adversely affect*" (NLAA) grizzly bears are those that have insignificant or discountable effects because they are compatible with land management direction that has helped move the grizzly bear population towards recovery and are compatible with food storage/attractant direction that reduces potential human-bear conflicts.

Access Management

Grizzly bear habitat across Region 1 is best described in terms of the availability of large tracts of relatively undisturbed land that provides some level of security from human depredation and competitive use of habitat by humans (including roading, logging, grazing, and recreation) (USDI 1993). To that end, habitat is often described in terms of core areas – areas free of motorized access during the non-denning period (IGBC 1994, 1998). For example, the percentages of core area in a grizzly bear management unit (CYE) or subunit (NCDE), as well as open and total road density, are important measurements in determining and understanding the extent of habitat security for grizzly bears.

Many studies have found that grizzly bears will generally avoid areas near open roads, and avoid areas with high road densities (Wielgus et al. 2002). Mace and Manley (1993) found that adult grizzly bears used habitat with open road densities greater than 1 mi/mi^2 less than expected. All sex and age classes of grizzly bears used habitat with total road densities greater than 2 mi/mi^2 less than expected. Grizzly bears generally adjust to disturbance associated with roads by avoiding the area that in turn results in a reduction in the amount of habitat available to the bears. Roads also provide increased access into previously remote areas that in turn encourages human settlement, recreational use, and other land uses. These activities can increase the frequency of human-bear confrontations and ultimately reduce habitat availability through avoidance behavior by bears. Because spring habitat tends to be at lower elevations, increased potential exists for conflict between bears and humans due to greater access into those areas by humans (Servheen 1983). Roads located in riparian zones, for example, may result in indirect habitat losses.

Non-motorized trail use may also indirectly reduce the amount of habitat available to grizzly bears. Multiple studies document displacement of individual grizzly bears from non-motorized trails to varying degrees (Schallenberger and Jonkel 1980; Jope 1985; McLellan and Shackleton 1989; Kasworm and Manley 1990; Mace and Waller 1996; White et al. 1999). However, none of these studies documented increased mortality risk from foot or horse trails or population level impacts to grizzly bears from

displacement. For example, while Mace and Waller (1996) found that grizzly bears were further than expected (i.e., displaced) from high-use trails (90 visitors/day) in the Swan Mountains, they reported there were no historic or recent records of grizzly bear/human conflict in their study area. While displacement merits concern because it can affect individual grizzlies through habitat loss and disrupted foraging or social behaviors, there are no data demonstrating that these impacts translate into detectable impacts to population-level variables such as grizzly bear survival or reproduction (Grizzly Bear Conservation Strategy 2013).

Food Storage

Availability of human-related foods can attract bears and cause changes in bear behavior leading to habituated and/or food-conditioned bears. Human food, livestock feed, and garbage all increase the opportunity for grizzly/human conflicts. Oftentimes, habituated and/or food-conditioned bears become a threat to human life or property and are removed from the population or killed through management action (McLellan et al, 1999). One of the most effective ways to prevent grizzly bear/human conflicts and increase grizzly bear survival on public lands is to require users and recreationists in grizzly habitat to store their food, garbage, and other bear attractants so that they are inaccessible to bears. Securing potential attractants can prevent bears from becoming food conditioned and displaying subsequent unacceptable aggressive behavior. Storing attractants in a manner that prevents bears from accessing them is effective in limiting grizzly bear mortality, grizzly bear/human encounters, and grizzly bear/human conflicts (Grizzly Bear Conservation Strategy 2013).

Livestock Grazing

Interactions between livestock and grizzly bears have historically led to the removal of grizzly bears. In several studies, livestock depredation was a leading cause for which a bear was removed and in several instances livestock depredation became a leading cause of non-hunting mortality (Thier and Sizemore 1981; Knight and Judd 1983; Knight et al. 1985; Aune and Stivers 1983). Most livestock depredations have involved sheep (Lee and Weaver 1981; Knight and Judd 1983); however, grizzly bear removals/mortalities due to cattle depredation have been reported.

Grizzlies also feed on livestock carcasses (Servheen et al. 1981; Aune and Stivers 1983). Livestock carcasses may be scattered or deposited in "boneyards." Improperly situated boneyards may function like garbage dumps, attracting bears to these areas, and increasing the likelihood of food-conditioning bears and thus increasing human/bear conflicts.

In the NCDE, most livestock depredations by grizzly bears occur on sheep or young cattle. While grizzly bears frequently coexist with large livestock such as adult cattle without preying on them, when grizzly bears encounter smaller animals such as calves, domestic sheep, goats, or chickens, they will often attack and kill them (Jonkel 1980; Knight and Judd 1983; Orme and Williams 1986; Anderson et al. 2002). Honeybees, classified as livestock in Montana (MCA 15-24-921), can also be attractants to some grizzly bears. If repeated depredations occur, managers may relocate bears or remove them from the population. As such, areas with domestic livestock have the potential to become population sinks (Knight et al. 1988). Because of the increased risk to grizzly bears posed by actions taken to protect sheep and other small livestock, the IGBC Guidelines emphasized the reduction of these types of allotments. In contrast, there are a number of permitted grazing operations for horses and mules in the NCDE, primarily on National Forest land and generally associated with outfitter and guide operations or Forest Service administrative use. There is no evidence of conflict with bears due to attractants, depredation, or forage competition related to these horse and mule permits. A number of regulations and practices related to livestock allotments promoted grizzly bear recovery through minimization of bear-livestock and related bear-human conflicts (Grizzly Bear Conservation Strategy 2013).

Vegetation Management

If not implemented properly, vegetation management programs can negatively affect grizzly bears by (1) removing cover; (2) disturbing or displacing bears from habitat during the logging period; (3) increasing human/grizzly bear conflicts or mortalities as a result of unsecured attractants; and (4) increasing mortality risk or displacement due to new roads into previously roadless areas and/or increased vehicular use on existing restricted roads, especially if roads are open to the public after vegetation management is complete. Conversely, vegetation management may result in positive effects on grizzly bear habitat once the project is complete, provided key habitats such as riparian areas and known food production areas are maintained or enhanced. For instance, tree removal for thinning or timber harvest and prescribed burning can result in localized increases in bear foods through increased growth of grasses, forbs, and berry-producing shrubs (Zager et al. 1983; Kerns et al. 2004).

Changes in the distribution, quantity, and quality of cover are not necessarily detrimental to grizzly bears as long as they are coordinated on a grizzly BMU or subunit scale to ensure that grizzly bear needs are addressed throughout the various projects occurring on multiple jurisdictions at any given time. Although there are known, usually temporary impacts to individual bears from timber management activities, these impacts have been managed acceptably using the IGBC Guidelines in place since 1986 (USFS 1986). Under these Guidelines, the grizzly bear population increased and recovered by following these two guiding principles: (1) maintain and improve habitat; and (2) minimize the potential for grizzly bear/human conflict (Grizzly Bear Conservation Strategy 2013).

Direct and Indirect Effects Analysis

The project types identified in Appendix A have been analyzed relative to the threats to grizzly bears identified in the above environmental baseline. The project types that have an initial determination of "*not likely to adversely affect"* have one or more of the features listed below. Thus, effects to grizzly bears resulting from such projects would be insignificant and/or discountable. Project types that do not incorporate these features may lead to adverse effects to grizzly bear and are not a part of this assessment.

- They occur during seasons and times when grizzly bear use is relatively low (i.e., projects are not scheduled to occur in riparian zones during the Spring Period – as specified for each Grizzly Bear ecosystem);
- They do not lead to a net increase in non-motorized human access;
- They do not lead to a net increase in motorized access;
- They do not result in a loss of security core habitat;
- They do not increase the potential for bears to become habituated and conditioned to human-related foods (i.e., livestock and their feed, garbage).

Projects with these features have minimal potential for adverse effects on grizzly bears through disturbance and displacement and human/grizzly conflict. Thus, as described in the environmental baseline section above, effects to grizzly bears resulting from such projects would be insignificant and/or discountable. Project types that do not incorporate these features may lead to adverse effects to grizzly bears and are not a part of this assessment.

Cumulative Effects Analysis

Implementation of projects that meet the screening criteria for a "*not likely to adversely affect"* determination should result in low to no cumulative effects to grizzly bears. Although there may be minor effects to individual bears due to implementation of the projects described herein, and effects from activities on non-federal lands may occur, grizzly bear recovery objectives should still be met.

Determination of Effects

Project effects will be documented relative to the screens in Appendix A, and those that would result in a "*not likely to adversely affect*" determination would receive programmatic concurrence from the Service.

Canada Lynx

Distribution

Lynx (*Lynx canadensis)* currently are found throughout Alaska and Canada (except arctic islands) south through the Rocky Mountains, northern Great Lakes Region, and northern New England. Lynx historically occurred in 16 states represented by five ecologically distinct regions: Cascade Range (Washington, Oregon), Northern Rocky Mountains (northeastern Washington, northeastern Oregon, Idaho, Montana, western Wyoming, northern Utah), Southern Rocky Mountains (southeastern Wyoming, Colorado), northern Great Lakes (Minnesota, Wisconsin, Michigan), and northern New England (Maine, New Hampshire, Vermont, New York, Pennsylvania, Massachusetts).

Resident populations currently exist only in Maine, Montana, Washington, and possibly Minnesota. They are considered extant, but no longer sustain self-supporting populations in Wisconsin, Michigan, Oregon, Idaho, Wyoming, Utah, and Colorado; they may be extirpated from New Hampshire, Vermont, New York, Pennsylvania, and Massachusetts (Ruediger, et al. 2000). The lynx was listened as threatened in 2000.

Life History

Canada lynx are medium-sized cats generally 30-35 inches long and weighing 18-23 pounds. They have large feet adapted to walking on snow, long legs, tufts on ears, and black-tipped tails (Ruediger, et al. 2000).

Lynx occur in boreal coniferous forests that have cold, snowy winters and provide a prey base of snowshoe hare (74 FR 8616-8696; McKelvey et al. 2000; Ruggiero et al. 2000). In North America, the distribution of lynx is nearly coincident with that of snowshoe hares. Lynx are uncommon or absent from the wet coastal forests of Canada and Alaska. Snowshoe hares are the primary prey of lynx, comprising 35-97% of the diet. Other prey species include red squirrel, grouse, flying squirrel, and ground squirrels, among others.

Southern populations of lynx may prey on a wider diversity of species than northern populations because of lower average hare densities and differences in small mammal communities; however, snowshoe hares are still their primary prey species. Squires indicated that lynx in western Montana prey almost exclusively on snowshoe hares during the winter (Squires et al. 2007). Squires located 86 lynx kills that included 7 prey species: blue grouse, spruce grouse, northern flying squirrel, red squirrel, snowshoe hare, least weasel, and white-tailed deer. Snowshoe hares contributed 96 percent of prey biomass (4-year average, range equals 94 to 99 percent). Red squirrels were the second most common prey (11 kills), but they only provided 2 percent biomass to the winter diet (Squires et al. 2007; Squires et al. 2010; 74 FR 8616-8696; Koehler et al. 1979; Koehler 1990). In areas characterized by patchy distribution of lynx habitat, lynx may prey opportunistically on other species that occur in adjacent habitats, potentially including white-tailed jackrabbit, black-tailed jackrabbit, sage grouse, and Columbian sharp-tailed grouse (Lewis and Wenger 1998).

The home range size of a snowshoe hare is 5–10 ha (12–25 ac); estimates vary depending on the sampling method (e.g., live-trapping vs. radio telemetry) (Keith 1990; Hodges 2000*a;* Murray 2003 *in* Interagency Lynx Biology Team 2013). Although hares are non-migratory and generally occupy the same area throughout the year, short-distance seasonal movements between winter and summer foraging areas have

been documented (Adams 1959; Bookhout 1965; Wolff 1980; Wolfe et al. 1982 *in* Interagency Lynx Biology Team 2013*)*. Lynx densities vary across the southern periphery of its range and may be linked to snowshoe hare density and abundance (Interagency Lynx Biology Team 2013). Generally, home ranges in the western United States are larger than those reported from the eastern United States or from northern Canada during peaks in snowshoe hare abundance (Aubry et al. 2000).

Both snow conditions and vegetation type are important factors to consider in defining lynx habitat. Across the northern boreal forests of Canada, snow depths are relatively uniform and only moderately deep (total annual snowfall of 39-50 inches) (Kelsall et al. 1977). Snow conditions are very cold and dry. In contrast, in the southern portion of the range of the lynx, snow depths generally increase, with deepest snows in the mountains of southern Colorado. Snow in southern lynx habitats may be subjected to more freezing and thawing than in the taiga (Buskirk et al. 2000) although this varies depending on elevation, aspect, and local weather conditions. Crusting or compaction of snow may reduce the competitive advantage that lynx have in soft snow, with their long legs and low-foot loadings. At lower snow depths there is an increase in competition for prey and an increase in potential predation on lynx.

Most lynx occurrences in the western United States were associated with Rocky Mountain conifer forests and most were within the 4920- to 6560-foot elevation zone. In Squires' northwest Montana study area, lynx used mid- to high-elevation forests during winter (range = 4134 to 7726 feet, mean = 5715 feet) and slightly higher elevations during summer (Squires et al. 2010). There is a gradient in the elevational distribution of lynx habitat from the Northern to the Southern Rocky Mountains, with lynx habitat occurring at 8000-11500 feet in the Southern Rockies.

In southwest Montana (in portions of the Gallatin, Custer, and Beaverhead-Deerlodge Forests of the GYE) both boreal forest and snowshoe hares are relatively scarce and distributed in a more patchy fashion, compared to northwestern Montana (Hodges et al. 2009). Spruce-fir and mixed spruce-fir with mature lodgepole pine stands (having dense understory and high degree of horizontal cover) supported the highest densities of snowshoe hares in Yellowstone National Park (YNP) (Hodges and Mills 2005). Researchers were able to determine the presence of 3 individual lynx, including 2 kittens born in different years in YNP, but only within the East Zone where andesitic soils supported moist spruce-fir forests with dense understories (Murphy et al. 2006). They concluded that habitat for lynx in YNP is patchy and that lynx in this part of their range use extensive exploratory movements (Squires et al., 2003). They also found that lynx are more likely to prey on alternative species. In western Wyoming, researchers found that snowshoe hare densities were highest in mature multistoried stands with high horizontal cover, but they also found relatively high hare densities in 30-70 year old lodgepole pine stands with high stem densities (Berg et al. 2012). The latter type is relatively short-lived compared to multi-storied habitats. They found few hares in young lodgepole forests where stem densities were low. They also found few hares in mixed whitebark pine-spruce-fir habitats. Relative to fire, Hodges and Mills (2005) noted that fire initially destroys habitat for hares and lynx, but that the high tree density of the forest as it reinitiates is the critical factor to producing good snowshoe hare and lynx foraging habitat (Hodges and Mills 2005).

Primary vegetation that contributes to lynx habitat is lodgepole pine, subalpine fir, and Engelmann spruce (Aubry et al. 2000). In extreme northern Idaho, northeastern Washington, and northwestern Montana, cedar-hemlock habitat types may also be considered primary vegetation. In central Idaho, Douglas-fir on moist sites at higher elevations may also be considered primary vegetation. Secondary vegetation, when interspersed within subalpine forests, which may also contribute to lynx habitat, includes cool, moist Douglas-fir, grand fir, western larch, and aspen forests. Dry forest types (e.g., ponderosa pine, Douglas-fir, or lodgepole pine with a grass-like understory) do not provide lynx habitat (Squires 2010).

Based on examination of historical and recent evidence, the 2005 Canada lynx recovery outline categorized lynx habitat and occurrence within the contiguous United States as either core areas, secondary areas, or peripheral areas (U.S. Fish and Wildlife Service 2005). The areas with the strongest

long-term evidence of the persistence of lynx populations within the contiguous United States are defined as "core areas." Core areas have both persistent verified records of lynx occurrence over time and recent evidence of reproduction. At this time, the role of areas outside of these core areas (secondary and peripheral) in sustaining lynx populations in the contiguous United States is unclear. The fluctuating nature of lynx population dynamics and the ability of lynx to disperse long distances have resulted in many individual occurrence records outside of core areas, without accompanying evidence of historic or current presence of lynx populations. Areas classified as "secondary areas" are those with historical records of lynx presence with no record of reproduction; or areas with historical records and no recent surveys to document the presence of lynx and/or reproduction. If future surveys document presence and reproduction in a secondary area, the area could be elevated to core. Secondary areas may contribute to lynx persistence by providing habitat to support lynx during dispersal movements or other periods, allowing animals to then return to "core areas." In "peripheral areas" the majority of historical lynx records is sporadic and generally corresponds to periods following cyclic lynx population highs in Canada. There is no evidence of long-term presence or reproduction that might indicate colonization or sustained use of these areas by lynx. However, some of these peripheral areas may provide habitat enabling the successful dispersal of lynx between populations or subpopulations. Based on historical lynx occurrence information (McKelvey et al. 2000*b in* Interagency Lynx Biology Team 2013), recent research (e.g., Hoving 2001; von Kienast 2003; Squires et al. 2003; Maletzke 2004; Fuller et al. 2007; Burdett 2008; Koehler et al. 2008; Vashon et al. 2008*a;* Devineau et al. 2010; and Squires et al. 2010 *in* Interagency Lynx Biology Team 2013), and results from the National Lynx Survey (K. McKelvey, unpublished data *in* Interagency Lynx Biology Team 2013), as well as snow-tracking surveys, evidence of persistence and reproduction of lynx in the core areas has been confirmed.

As explained in the Canada Lynx Conservation Assessment and Strategy (LCAS) (Interagency Lynx Biology Team 2013), a core area contains large, connected patches of boreal forest encompassing at least 480 mi^2. The term boreal forest is used here to include the true boreal forest, which is a zone extending south of the arctic tundra, as well as the southern transitional regions as described by Agee (2000) for the Northeastern and Great Lakes Regions (eastern hardwoods and temperate and boreal conifers) and the western United States (subalpine forests)(Interagency Lynx Biology Team 2013). Lynx Geographic Areas have been substantially revised to incorporate new information about lynx and lynx habitat. The map (Fig. 3.1 *in* Interagency Lynx Biology Team 2013) has also been updated (Interagency Lynx Biology Team 2013, p. 1- Chapter 3). All of the core areas, secondary areas, and peripheral areas identified in the recovery outline (U. S. Fish and Wildlife Service 2005) are encompassed within the five geographic areas (Fig. 3.1). As new information continues to be developed, the delineations may be modified (Interagency Lynx Biology Team 2013).

Within the boreal forest, lynx foraging habitat supports lynx primary prey (snowshoe hare) and has the vegetation structure suitable for lynx to capture prey. Dense saplings or mature multi-layered stands are the conditions that maximize availability of food and cover for snowshoe hares at varying snow depths throughout the winter (Interagency Lynx Biology Team 2013). Natural disturbance processes that create early successional stages exploited by snowshoe hares include fire, insect infestations, wind throw, and disease outbreaks (Plate 2.15; Kilgore and Heinselman 1990; Veblen et al. 1998; Agee 2000 *in* Interagency Lynx Biology Team 2013). Both timber harvest and natural disturbance processes provide foraging habitat for lynx when the resulting stem densities and stand structure meet the habitat needs of snowshoe hare (Plate 2.16; Keith and Surrendi 1971; Fox 1978; Conroy et al. 1979; Wolff 1980; Parker et al. 1983; Litvaitis et al. 1985; Bailey et al. 1986; Monthey 1986; Koehler 1990*a*, *b in* Interagency Lynx Biology Team 2013).

In the western United States, development of a high density (>4,500 stems/acre) of young conifer stems and branches protruding above the snow was found to provide foraging habitat for lynx within about 10–40 years following disturbance, depending on site productivity, forest type and intensity of disturbance (Sullivan and Sullivan 1988; Koehler 1990*a in* Interagency Lynx Biology Team 2013). This habitat is temporary, as the tree stems and branches eventually grow out of reach of snowshoe hares and shade out

understory saplings and shrubs. Mature multi-story conifer forests with low limbs and containing a substantial understory of young trees and shrubs provide stable lynx foraging habitat (Murray et al. 1994; Koehler et al. 2008; Squires et al. 2010; Ivan 2011*a*). In north central Washington, high snowshoe hare densities (0.4 hares/ac) were associated with sapling (<4 in dbh) densities of 1,127± 114 stems/ac and medium-sized (4–11 in dbh) tree densities of 288±32 stems/ac (Walker 2005 *in* Interagency Lynx Biology Team 2013).

Landscapes containing a mix of forest age classes are more likely to provide lynx foraging habitat throughout the year (Poole et al. 1996; Griffin and Mills 2004; Squires et al. 2010 *in* Interagency Lynx Biology Team 2013). Winter habitat may be more limiting for lynx (Squires et al. 2010). In winter, lynx do not appear to hunt in openings, where lack of cover limits habitat for snowshoe hares (Mowat et al. 2000; Maletzke et al. 2008; Squires et al. 2010 *in* Interagency Lynx Biology Team 2013). Squires (2010) found that when lynx did cross openings, they remained closer to forest edges compared to random tracks, with an average distance of 384 feet from the forest edge. Areas with recent timber harvest and areas recently burned can contribute herbaceous summer foods for snowshoe hares, and woody winter browse will develop on older sites (Fox 1978 *in* Interagency Lynx Biology Team 2013). Multi-story stands may provide a greater availability of browse as snow depths vary throughout the winter (Interagency Lynx Biology Team 2013).

Stem density and snowshoe hare density are directly and positively correlated (Conroy et al. 1979; Sullivan and Sullivan 1988; Koehler 1990*b;* Koehler and Brittell 1990; Thomas et al. 1997; Hodges 2000*a;* Mowat et al. 2000; Homyack et al. 2006 *in* Interagency Lynx Biology Team 2013). Stands may continue to provide suitable snowshoe hare habitat for many years until woody stems in the understory become too sparse, as a result of undisturbed forest succession or management (e.g., clear-cutting or thinning)(USDI 2009 74 FR p. 8637).

Vegetation management that promotes high stem density and dense horizontal cover can increase snowshoe hare densities (Keith and Surrendi 1971; Fox 1978; Conroy et al. 1979; Wolff 1980; Parker et al. 1983; Livaitis et al. 1985; Bailey et al. 1986; Monthey 1986; Koehler 1990*a, b;* Fuller et al. 2007; Robinson 2006; Homyack et al. 2007; Scott 2009; McCann and Moen 2011 *in* Interagency Lynx Biology Team 2013). Where the objective is to provide snowshoe hare habitat by creating additional early successional forest conditions, management considerations include selecting areas that are capable of, but not currently providing, dense horizontal cover (e.g., stem exclusion structural stage), designing the appropriate size and shape of treatment units, retaining coarse woody debris, and maintaining high stem densities in regenerated forests (Koehler and Brittell 1990; Homyack et al. 2004; Bull et al. 2005; Fuller and Harrison 2005; Ivan 2011*a in* Interagency Lynx Biology Team 2013).

Denning habitat is the environment lynx use when giving birth and rearing kittens until they are mobile. The most common component is large amounts of coarse woody debris to provide escape and thermal cover for kittens. Den sites typically are situated within older regenerating stands (>20 years since disturbance) or in mature conifer or dense regenerating mixed conifer-deciduous (typically spruce/fir or spruce/birch) forests (Koehler 1990*a;* Slough 1999; Moen et al. 2008; Organ et al. 2008; Squires et al. 2008 *in* Interagency Lynx Biology Team 2013). Stand structure appears to be more important than forest cover type (Mowat et al. 2000). The availability of den site does not appear to be limiting (Gilbert and Pierce 2005; Moen et al. 2008; Organ et al. 2008; Squires et al. 2008 *in* Interagency Lynx Biology Team 2013, p. 22). Denning habitat must be located within daily travel distance of an adult female lynx (typical distance is 3-6 mi) to snowshoe hare habitat (Interagency Lynx Biology Team 2013). In Montana, Squires found that lynx located their dens in a variety of forest stand types. Eighty percent of dens were in mature forest stands and 13 percent in mid-seral, regenerating stands. Young stands that were either naturally sparse or mechanically thinned were seldom used for denning. Lynx denned along the edges of regenerating forests where trees had blown down into jack-strawed piles of woody debris. At a landscape level, dens were generally in concave or drainage-like topographies and often on northeast aspects. Squires found that denning habitat is generally abundant across the coniferous forested landscape,

especially in riparian habitats and in areas where insect or disease kills patches of trees. Given the large home ranges and low den site fidelity of lynx, den sites are not likely to be limiting (Squires et al. 2008).

Environmental Baseline

Based on current knowledge of the life history, biology, and ecology of lynx, certain elements are thought to be important to the conservation of the species, as described above. These elements are described in the Northern Rockies Lynx Management Direction (USDA FS 2007), NRLMD FEIS (USDA FS 2007), the NLRMD BA (USDA 2007), NRLMD BO (USDI 2007), the Primary Constituent Element (PCE) in the most recent critical habitat designation (Federal Register /Vol.79, No. 117/Friday, September 12, 2014/Final Rule), as well as in the LCAS (Interagency Lynx Biology Team 2013). The environmental baseline for lynx is described in terms of those parameters that: (1) may affect lynx foraging by reducing the abundance and distribution of their primary prey (snowshoe hares); and (2) may impede lynx movement between patches of boreal forest through loss of connectivity within core habitat (for example, new highways or large developments), or through human activities that may either directly or indirectly result in lynx mortality.

Vegetation Alteration

The Canada Lynx Conservation Assessment and Strategy (Interagency Lynx Biology Team 2013) includes the following recommended conservation measures for vegetation management in core areas:

- Provide a mosaic that includes dense early-successional coniferous and mixed-coniferous-deciduous stands, along with a component of mature multi-story coniferous stands to produce the desired snowshoe hare density within each LAU (Plate 5.2 *in* Interagency Lynx Biology Team 2013).
- Use fire and mechanical vegetation treatments as tools to maintain a mosaic of lynx habitat, in varying successional stages, distributed across the LAU in a landscape pattern that is consistent with historical disturbance processes.
- Design vegetation management to develop and retain dense horizontal cover. Focus treatments in areas that have the potential to improve snowshoe hare habitat by developing dense horizontal cover in areas where it is presently lacking. In areas of young, dense conifers resulting from fire, timber harvest or other disturbance, do not reduce stem density through thinning until the stand no longer provides low, live limbs within the reach of hares during winter (e.g., self-pruning processes in the stem exclusion structural stage have eliminated snowshoe hare cover and forage availability during winter conditions with average snowpack). If studies are completed that demonstrate that thinning can be used to extend the duration of time that snowshoe hare habitat is available (e.g., by maintaining low limbs), then earlier thinning could be considered.
- Retain mature multi-story conifer stands that have the capability to provide dense horizontal cover (Plate 5.3 *in* Interagency Lynx Biology Team 2013). If portions of these stands currently lack dense horizontal cover, focus vegetation management practices (such as group selection harvest) in those areas to increase understory density and improve snowshoe hare habitat.
- In order to maintain the amount and distribution of lynx foraging habitat over time, manage so that no more than 30% of the lynx habitat in an LAU is in an early stand initiation structural stage (i.e., does not provide winter snowshoe hare habitat). Emphasize sustaining snowshoe hare habitat in an LAU. If more than 30% of the lynx habitat in an LAU does not provide winter snowshoe hare habitat, no further increase as a result of vegetation management projects should occur on federal lands.
- Recognizing that natural disturbances and forest management of private lands also will occur, management-induced change of lynx habitat on federal lands that creates the early stand initiation structural stage should not exceed 15% of lynx habitat on federal lands within a LAU over a 10-year period.
- Conduct a landscape evaluation to identify needs or opportunities for adaptation to climate change.

Consider potential changes in forest vegetation that could occur as a result of climate change (e.g., Gärtner et al. 2008 *in* Interagency Lynx Biology Team 2013). Identify reference conditions relative to the landscape's ecological setting and the range of future climate scenarios. For example, the historical range of variability could be derived from landscape reconstructions (e.g., Hessburg et al. 1999; Blackwell et al. 2003; Gray and Daniels 2006 *in* Interagency Lynx Biology Team 2013).

- Design harvest units to mimic the pattern and scale of natural disturbances and retain natural connectivity across the landscape.
- In aspen stands, maintain native plant species diversity including conifers.
- Recruit a high density of stems, generally greater than 1,862/ac, of conifers, hardwoods, and shrubs, including species that are preferred by hares.
- Provide for continuing availability of lynx foraging habitat in proximity to denning habitat.
- When designing fuels reduction projects, where possible retain patches of untreated areas of dense horizontal cover within treated areas.

The Canada Lynx Conservation Assessment and Strategy (Interagency Lynx Biology Team 2013) includes the following recommended conservation measures for vegetation management in secondary/peripheral areas:

- Provide a mosaic of forest structure that includes dense early-successional coniferous and mixed coniferous-deciduous stands, along with a component of mature multi-story conifer stands. Flexibility in the amounts and arrangement of various successional stages is acceptable, provided that a mosaic can be sustained. Vegetation treatments should be designed with consideration of historical landscape patterns and disturbance processes.
- Design timber harvest, planting, and thinning to include some representation of young densely-stocked regenerating stands in the mosaic for snowshoe hare production areas.

Fire management also plays a critical role in the availability of lynx habitat. Wildfire is not thought to be a threat to lynx, and often results in beneficial effects when burned areas regenerate into lynx foraging habitat. Natural fire plays an important role in creating the mosaic of vegetation patterns, forest stand ages, and structure that provide good lynx and snowshoe hare habitat, particularly in the western Great Lakes Region and in the western mountain ranges of the United States (Agee 2000, pp. 47–56 *in* Federal Register/Vol. 74, No. 36/Wednesday, February 25, 2009/Rules and Regulations, p. 8619). Fire suppression over a period of about 60 years altered vegetation mosaics and may have reduced snowshoe hare habitat. However, in recent decades, widespread fires in some western areas have increased hare habitat. In Glacier National Park, a study assessed hare pellet densities in areas of dense lodgepole pine saplings that regenerated following wildfire, compared to unburned sites. Twenty years after the fire, they found significantly higher hare pellet densities in stands with high sapling density as well as high forest edge (Cheng et al. 2011 *in* Interagency Lynx Biology Team 2013). Impacts of fire suppression are greatest in areas of low- to mid-intensity fire regimes (Quigley et al. 1996 *in* Interagency Lynx Biology Team 2013). Prescribed burns may also improve lynx habitat, provided they maintain or recruit woody debris that provides cover and denning habitat.

<u>Habitat Outside of LAUs</u>

The Northern Rockies Lynx Management Direction (NLRMD) (USDA Forest Service 2007) and the LCAS (Interagency Lynx Biology Team 2013) outlined a number of criteria to represent important life history characteristics (foraging and denning) that should be considered in the mapping of lynx habitat. Additional guidance was provided based on recommendations by the Lynx Steering Committee. The Lynx Steering Committee developed a set of mapping criteria and procedures to guide and clarify the mapping process. The consequences of applying these criteria were also assessed. Once lynx habitat was calculated, it was delineated into management areas (LAUs) that contain suitable lynx habitat in sufficient quantities and juxtaposition to other lynx habitats, and were designed to approximate the size of a female home range (Ruediger et al. 2000). In some geographic areas, lynx habitat is naturally patchy and can be

of marginal quality, providing suitable habitat that is noncontiguous and fragmented. In such areas, lynx use extensive exploratory movements (Squires et al., 2003). The utility to lynx of habitat patches that are not of a sufficient amount to comprise a LAU is unknown. The value of smaller patches of habitat could be determined by factors such as size of the patch, quality of the habitat (in terms of foraging opportunities), the spatial arrangement of the patches (within daily movement distance and proximity to other habitat blocks), and the increase in energetic costs of using such habitat. In addition, there are potential differences in the habitat needs of a breeding female versus a transient or dispersing lynx in terms of habitat distribution and size of area used by an individual lynx. Areas classified as "secondary areas" in the 2005 Canada lynx recovery outline (USDI Fish and Wildlife Service 2005) are thought to contribute to lynx persistence by providing habitat to support lynx during dispersal movements or other periods, allowing animals to then return to core areas. Areas classified as "peripheral areas" may provide habitat enabling successful dispersal of lynx between populations or subpopulations. Unlike "core areas" neither of these areas show evidence of historic or current presence of persistent lynx populations or recent evidence of reproduction, but do contain individual occurrence records of lynx. The role of secondary and peripheral areas in sustaining lynx populations is unclear. However, given the fluctuating nature of lynx population dynamics and the ability of lynx to disperse long distances, habitat patches that are too small or too dispersed to provide a home range to a breeding female may still contribute to the survival of dispersing or transient lynx temporarily residing in an area, and help to maintain connectivity between suitable habitats.

It is possible that activities listed in Table B1 or B2 could impact noncontiguous habitat outside of LAUs. Effects to these habitat patches would not impact the ability of a lynx to establish a home range within a delineated LAU. As long as there is sufficient adjacent habitat available for lynx to avoid the area, and to allow lynx movements around the action area and to avoid forest openings, suitable conditions for lynx would not be considerably reduced.

Human Activity and Development

Some human activities such as development of reservoirs or highways with high-speed and high-traffic volumes may impede lynx movement or increase lynx mortality (Ruediger et al. 2000). Although many species of wildlife are disturbed when forest roads are used (Ruediger 1996) preliminary information suggests lynx do not avoid roads (Ruggiero et al. 2000) except at high-traffic volumes (Apps 2000). Along less-traveled roads where the vegetation provides good hare habitat, sometimes lynx use the roadbeds for travel and foraging (Koehler and Brittell 1990 *in* Interagency Lynx Biology Team 2013). An analysis on the Okanogan NF in Washington showed lynx neither preferred nor avoided forest roads, and the existing road density did not appear to affect lynx habitat selection (McKelvey et al. 2000; USDI FWS 2000).

In the Northern Rockies, lynx occupy dens in early May when many forest roads are still impassable by wheeled vehicles due to persistent snowdrifts and wet, muddy roads; snowmobiles no longer use the roads because of intermittent and unpredictable availability of sufficient snow (Squires et al. 2008). Squires concluded that lynx did not avoid the subset of roads that were open to wheeled vehicle travel. Rather, the observed avoidance of roads was more a function of the correlation of roads and landscape pattern; fewer roads were located in denning habitat and higher road density occurred along forest edges and in managed stands (Squires et al. 2010 *in* Interagency Lynx Biology Team 2013).

Disturbance

Few studies have examined how lynx react to human presence. Some anecdotal information suggests that lynx are generally tolerant of humans, although given differences in individuals and contexts, a variety of behavioral responses to human presence may be expected (Staples 1995, Mowat et al. 2000 *in* Interagency Lynx Biology Team 2013). Preliminary information from winter recreation studies in Colorado indicates that some recreation uses are compatible, but lynx may avoid some developed ski areas (J. Squires, personal communication 2012 *in* Interagency Lynx Biology Team 2013).

Implementation of various vegetation management treatments, grazing, road maintenance, or other activities listed in Table B1 or B2 may result in negligible, short-term direct effects to lynx related to disturbance, in the form of increased noise levels, use of mechanized equipment, vibrations, or other disturbances associated with increased human presence and activities. Direct effects could be related to disturbance to individual lynx, causing lynx to avoid perceived threats associated with human and equipment presence and increased noise during project activities. However, these actions are expected to result in minimal responses of temporary and insignificant potential avoidance behaviors. These effects are not considered a significant disruption to lynx behavior. No anticipated risks of direct mortality or long-term impacts to the population are expected. However, activities occurring in proximity to known active lynx dens could cause more significant disturbance and should undergo standard consultation.

With respect to snow compaction due to human activities, Kolbe was able to directly measure relationships between coyotes, compacted snow routes and snowshoe hare in an area that also supports a lynx population (USDI FWS 2007). Kolbe and others (2007) suggested that compacted snow routes did not appear to enhance coyotes' access to lynx and hare habitat, and so would not significantly affect competition for snowshoe hares. After evaluating Bunnell *et al.* (2006, entire) and Kolbe *et al.(* 2007, entire), the USFWS determined that the best information available did not indicate that compacted snow routes increase competition from other species to levels that adversely impact lynx populations (CH FR 2009, p. 8639) and therefore, such activities would result in effects that are insignificant to lynx.

Lynx mortality can be caused by trapping or shooting, predation (especially by mountain lions during the snow-free season), and starvation (Squires et al. 2006). Historically, lynx populations in Montana were affected by trapping, but lynx trapping is now closed, although incidental take still occurs.

Direct and Indirect Effects Analysis

The project types identified in Appendix B have been analyzed relative to the effects to lynx identified in the above environmental baseline. The project types have an initial determination of "*not likely to adversely affect"* and have one or more of the features listed below [Interagency Lynx Biology Team 2013; NRLMD BA (USDA 2007); NRLMD BO (USDA 2007)]. Thus, effects to Canada lynx resulting from such projects would be insignificant and/or discountable. Project types that do not incorporate these features may lead to adverse effects to Canada lynx and are not a part of this assessment.

- The project does not thin stand initiation hare habitat nor does it reduce hare habitat in multi-storied stands.
- The project does not remove vegetation if more than 30% of lynx habitat in an LAU is in an early stand initiation structural stage that does not yet provide hare habitat.
- The project does not remove vegetation if more than 15% of Forest Service lands in an LAU have been regenerated in the last 10 years.
- If the project salvages burned or dead trees, tree removal occurs in areas that do not provide food or cover for snowshoe hares. A sufficient number of dead trees will be retained to provide potential lynx denning habitat.
- The project does not involve highway construction and temporary forest road construction or road maintenance would not significantly increase the traffic speed or volume on forest roads.
- The project does not involve permanent road construction or new snowmobile access in new areas which could lead to an increase in incidental trapping of lynx.
- The project does not affect potential denning habitat or denning habitat is not limiting within the action area.
- The project involves special uses or recreation uses at previously developed sites and does not involve new developments or new ski areas in lynx habitat.
- The project does not impede lynx movement and does not reduce habitat connectivity in identified linkage areas (Interagency Lynx Biology Team 2013; Squires 2013).

Cumulative Effects Analysis

Implementation of projects that meet the screening criteria for a "*not likely to adversely affect"* determination should result in low to no cumulative effects to Canada lynx. Although there may be minor effects to individual lynx due to implementation of the projects described herein and impacts from activities on non-federal lands may occur, the conservation objectives for lynx and lynx core habitat as identified in the LCAS (Interagency Lynx Biology Team 2013) should be met.

Determination of Effects

Project effects will be documented relative to the screens for Canada lynx in Appendix B and those that would result in a "*not likely to adversely affect*" determination would receive programmatic concurrence from the Service.

Canada Lynx Critical Habitat

The sections above for lynx life history and the environmental baseline are based upon the best available science, compiled in the LCAS (Interagency Lynx Biology Team 2013). This science is also applicable to designated lynx critical habitat, discussed below. The factors listed under the environmental baseline for Canada lynx critical habitat are based upon areas designated in the 2009 final rule (74 FR 2009 pp. 8615-8702) and apply to the more recent update in 2014.

Distribution

The final rule for critical habitat was published in the Federal Register on February 25, 2009, and became effective a month later on March 27, 2009. Five Critical Habitat Units (CHUs) were designated, two of which occur in the Northern Region. Unit 3 includes northwestern Montana and a small part of northeastern Idaho. This CHU is important to lynx conservation because lynx are widely distributed, breed in many locations, and occur in the highest density in this part of the Northern Rockies. Unit 5 is located in Yellowstone National Park in southwestern Montana (portions are also located in Wyoming, but Wyoming is not part of the Northern Region). Lynx habitat in Unit 5 is marginal by nature and snowshoe hare habitat is very fragmented. Lynx home ranges are therefore larger, and lynx depend more on matrix habitat. Fire and road-building projects undergo special management in Unit 5 (74 FR p. 8643).

History

Critical habitat for lynx was first designated in the Federal Register on November 9, 2006. National Forest lands were not designated initially, because it was thought these lands already provided management protection for lynx. On July 20, 2007, the rule underwent review after questions were raised on the scientific integrity and legal merit of the designation. Revision was deemed appropriate, and on February 28, 2008, the Service announced the proposed revised designation. The proposed designation added an additional 40,913 mi^2 to the existing critical habitat designation. Lynx critical habitat was further revised in 2014 (Federal Register /Vol.79, No. 117/Friday, September 12, 2014/Final Rule), resulting in relatively minor adjustments to critical habitat on National Forest System lands due to better mapping data. This revision resulted in a total of 38,954 square miles of Canada lynx critical habitat, of which 60% is on Federal lands.

Critical habitat is defined in Section 3 of the Act as: (1) The specific areas within the geographical area occupied by a species, at the time it is listed in accordance with the Act, on which are found those physical or biological features (a) essential to the conservation of the species and (b) which may require special management considerations or protection; and (2) specific areas outside the geographical area

occupied by a species at the time it is listed, upon a determination that such areas are essential for the conservation of the species. Not all locations with records of lynx presence are essential for the conservation of the species; lynx are a wide-ranging species, and areas containing periodic records that lack evidence of reproducing populations are not considered essential to the species (74 FR pg. 8618).

The Primary Constituent Element (PCE) identified in the critical habitat final rule (USDI 2009; 74 FR pp. 8638-8639) comprises the essential features of the boreal forest types that provide, for example, prey, reproduction and denning habitat, and snow conditions that give lynx their competitive advantage. Within the geographical area occupied by the lynx at the time of listing, the USFWS identified the physical and biological features that are essential to the conservation of the species and that may require special management considerations or protections. The physical and biological features are PCEs laid out in a specific quantity and spatial arrangement to be essential to the conservation of the species. Based on the above needs and the current knowledge of the life history, biology, and ecology of the species, the USFWS determined that the PCE for lynx critical habitat is:

1. Boreal forest landscapes supporting a mosaic of differing successional forest stages and containing:

    a. Presence of snowshoe hares and their preferred habitat conditions, which include dense understories of young trees, shrubs or overhanging boughs that protrude above the snow, and mature multi-storied stands with conifer boughs touching the snow surface;

    b. Winter snow conditions that are generally deep and fluffy for extended periods of time;

    c. Sites for denning that have abundant coarse woody debris, such as downed trees and root wads; and

    d. Matrix habitat (e.g., hardwood forest, dry forest, non-forest, or other habitat types that do not support snowshoe hares) that occurs between patches of boreal forest in close juxtaposition (at the scale of a lynx home range) such that lynx are likely to travel through such habitat while accessing patches of boreal forest within a home range.

Environmental Baseline

The designation of critical habitat by itself does not achieve conservation or recovery of a species, nor does it prohibit development or forest management activities that alter snowshoe hare habitat. The Act does not automatically restrict all uses of critical habitat, but only imposes restrictions under Section 7(a)(2) on Federal agency actions that may result in destruction or adverse modification of critical habitat (74 FR pp. 8621-8622). At the landscape scale within each CHU, natural and human-caused disturbance processes (e.g., fire, wind, insect infestations and forest management) influence the spatial and temporal distribution of lynx populations by affecting the PCE, as described in previous sections of this document. Portions of critical habitat units that did not contain the PCE, or where development was concentrated, were removed from the final designation. Any developed areas, and the land on which structures are located inside critical habitat boundaries, are excluded from critical habitat designation as described in the final rule (74 FR p. 8624).

Based on current knowledge of the life history, biology, and ecology of lynx, certain elements are thought to be important to the conservation of designated critical habitat, as described above. These elements are described as PCE in the critical habitat designation (Federal Register /Vol.74, No. 36/Wednesday, February 25, 2009/Final Rule), as well as in the LCAS (Interagency Lynx Biology Team 2013). The environmental baseline for lynx critical habitat is described in terms of those parameters that: (1) may affect the abundance and distribution of snowshoe hares –PCE 1a; (2) may affect desirable winter snow conditions (deep, fluffy snow for extended periods of time) – PCE 1b; (3) may alter potential denning sites having abundant coarse woody debris – PCE 1c; and (4) may impede lynx movement between

patches of boreal forest through loss of connectivity within core habitat (for example, new highways or large developments), or through human activities that may either directly or indirectly result in lynx mortality – PCE 1d. Projects that result in a reduction of PCE 1a or that result in permanent loss or conversion of the boreal forest and may lead to adverse effects to lynx critical habitat are not a part of this assessment.

Vegetation Alteration

The conservation measures and guidelines described above and in the LCAS (Interagency Lynx Biology Team 2013) regarding vegetation management in core areas are applicable to critical habitat and address the PCE and its four components.

Human Activity and Development

Human activities such as development of reservoirs or highways with high-speed and high-traffic volumes may impede lynx movement or increase lynx mortality in both boreal forest types as well as matrix habitats.

Direct and Indirect Effects Analysis

The project types identified in Appendix D have been analyzed relative to the threats to designated Canada lynx critical habitat as identified in the above environmental baseline. The project types that have an initial determination of "*not likely to adversely affect"* have one or more of the features listed below. Thus, effects to designated Canada lynx critical habitat resulting from such projects would be insignificant and/or discountable. Project types that do not incorporate these features may lead to adverse effects to lynx critical habitat and are not a part of this assessment.

PCE 1a - Snowshoe Hare Habitat and PCE 1b – Deep Fluffy Snow
Vegetation alternation that does not affect existing snowshoe hare habitat within areas of deep fluffy snow (PCE 1b) providing lynx habitat, and that complies with the conservation measures for vegetation management listed above (Interagency Lynx Biology Team 2013), and has insignificant or discountable effects on lynx critical habitat.

PCE 1c - Sites for Denning
Vegetation alteration that does not affect potential denning habitat within the boreal forest, or that occurs in LAUs where denning habitat is not limited, and has insignificant or discountable effects on lynx critical habitat.

PCE 1d - Matrix Habitat
In matrix habitat, activities that change vegetation structure or condition are not considered an adverse effect to lynx critical habitat unless those activities would create a barrier or impede lynx movement between patches of foraging habitat and between foraging and denning habitat within a potential home range, or if they would adversely affect adjacent foraging habitat or denning habitat. Projects that do not have these features have minimal potential for adverse effects on Canada lynx critical habitat through reduction in availability or connectivity of lynx critical habitat.

Thus, as described in the environmental baseline section above, effects to Canada lynx critical habitat resulting from such projects would be insignificant and/or discountable. Project types that do not incorporate these features may lead to adverse effects to Canada lynx critical habitat and are not a part of this assessment.

Cumulative Effects Analysis

Critical habitat may encompass federal, state, and private lands assessed for cumulative effects under ESA and the National Environmental Policy Act. Implementation of the projects that meet the screening criteria for a "*not likely to adversely affect"* determination should result in low to no cumulative effects to designated critical habitat for lynx. Although there may be minor effects due to implementation of the projects described herein and impacts from activities on non-federal lands may occur, the conservation objectives for lynx critical habitat as identified in 74 FR 2009 and in the LCAS (Interagency Lynx Biology Team 2013) should be met.

Determination of Effects

Project effects will be documented relative to the screens in Appendix D and those that would result in a "*not likely to adversely affect*" determination would receive programmatic concurrence from the Service.

IV. CONSULTATION CONTACTS

Kristi Swisher
TES Program Leader
Regional Office

Jeremy Anderson
Wildlife Biologist
Kootenai National Forest

Art Rohrbacher
Forest Wildlife Biologist
Beaverhead-Deerlodge National Forest

Laura Conway
Forest Wildlife Biologist
Lewis and Clark National Forest

Dave Lockman
Forest Wildlife Biologist
Bitterroot National Forest

Scott Tomson
Forest Wildlife Biologist
Lolo National Forest

Reed Kuennen
Forest Wildlife Biologist
Flathead National Forest

Rema Sadak
Forest Wildlife Biologist
Nez Perce and Clearwater National Forests

Jodie Canfield
Forest Wildlife Biologist
Gallatin and Custer National Forests

Bryon Holt
U.S. Fish and Wildlife Service
Spokane Field Office

Denise Pengeroth
Forest Wildlife Biologist
Helena National Forest

Katrina Dixon
U.S. Fish and Wildlife Service
Helena Field Office

Lydia Allen
Forest Wildlife Biologist
Idaho Panhandle National Forests

Jim Sparks
Bureau of Land Management
Missoula Field Office

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APPENDIX A

GRIZZLY BEAR PROJECT SCREENING ELEMENTS AND DETERMINATIONS

Three considerations are prerequisite to more detailed consideration of other project information and are considered in Part 1 of the screening process: (1) the area must be in compliance with the appropriate access management direction[1]; (2) human foods, livestock feed, garbage, and other attractants must be managed by the application of an adequate[2] "food storage rule" similar to the NCDE or GYE food storage orders, and if no specific rule exists for the area, use of either the GYE or NCDE order will be considered adequate; and (3) projects that involve seeding or planting of grasses, forbs, or shrubs, must do so in a manner that will tend not to attract bears into areas where increased mortality risk or interaction between bears and people is likely, such as adjacent to roads, developed or designated recreation and/or camping sites, etc.

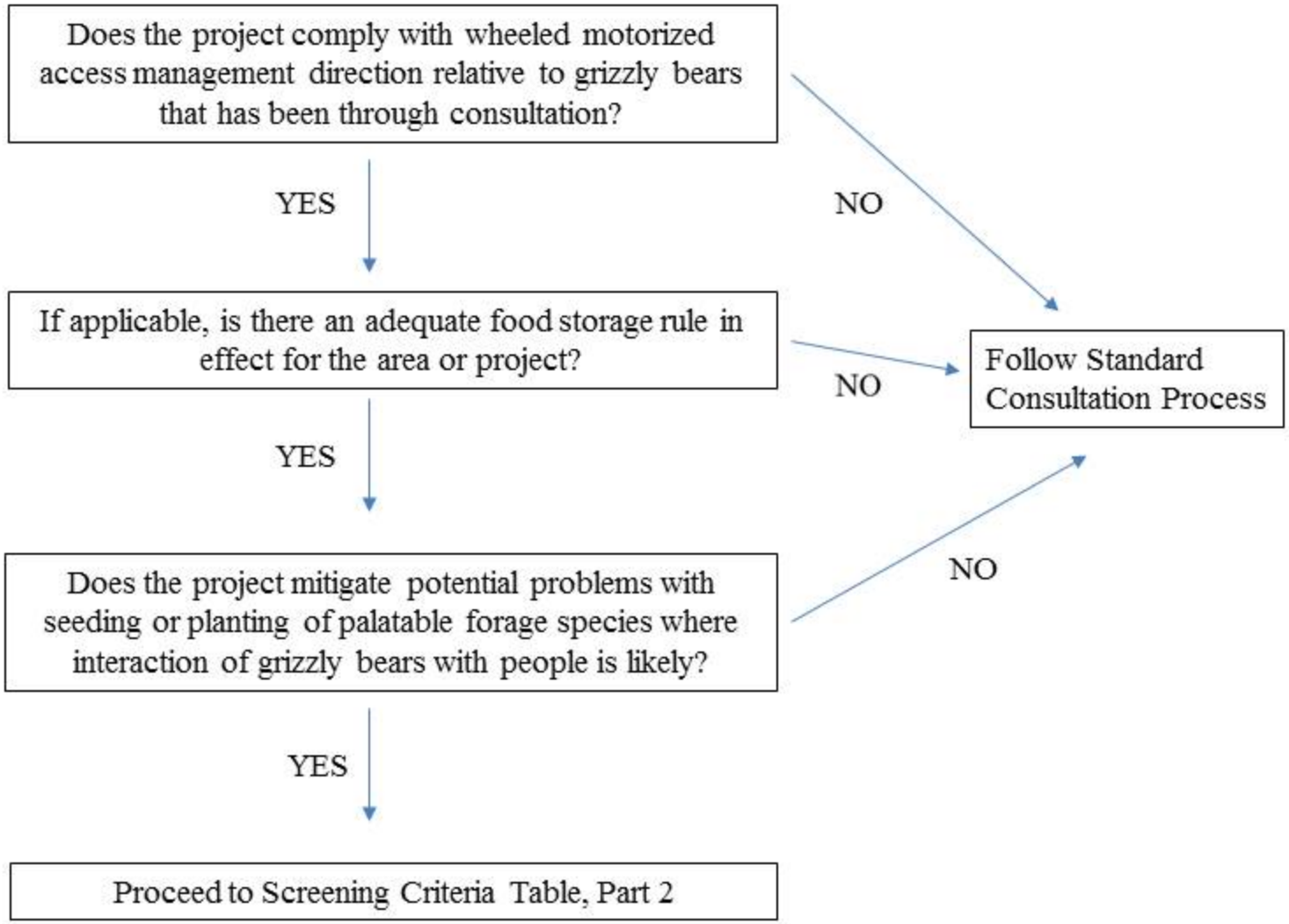
After access management, food/attractant storage, and seeding/planting of grasses, forbs, or shrubs has been considered in Part 1, only then can other project details be considered in the Screening Criteria Table, Part 2. Table 2 represents a comprehensive activity list. Factors relative to disturbance/displacement of grizzly bears and human/grizzly conflict were previously analyzed in this analysis (page 9) and are not addressed further in Table 2. There may be activities that are not included in this table. For those activities not included and for which there is an effect, follow standard consultation procedures. Also, the "*not likely to adversely affect"* (NLAA) determination reflects a conservative determination. There may be activities listed as NLAA in Table 2 that upon site-specific analyses warrant a "*no effect"* (NE) determination.

Note: The geographic scope of this programmatic biological assessment applies to areas where grizzly bears may be present– not just within Recovery Zone boundaries.

[1]Access management direction means any grizzly bear access management standards and guidelines required to be implemented on National Forest lands through Forest Plans and/or Biological Opinions pertaining to Grizzly Bear Recovery Zones (Recovery Zones); areas outside of Recovery Zones identified as receiving recurring use by grizzly bears; or other areas where grizzly bears may be present. Projects must be in compliance with the appropriate direction in order to be screened.

[2]Food shall be attended or stored in a bear resistant manner. For examples of applicable methods of bear resistant storage and definitions for 'attended' review the NCDE or GYE food storage orders.

GRIZZLY BEAR SCREENING PROCESS, PART 1



Grizzly Bear Screening Process, Part 2: The following Screening Criteria Table identifies forest activities and criteria, that when met, will allow the project to meet "screening elements." Remember to screen all appropriate activity types involved in implementation of the project. If any project activity type does not meet the identified criteria, the project should proceed through the established consultation process[3]. Please note that "meets administrative use" means "meets administrative use levels as defined in access management direction" (i.e., daily trips that do not involve heavy machinery).

#	Activity Type	Activity Component	Crew Level and Duration of Use	Screening Criteria	Determination
1	**Timber Harvest**	Harvest, skidding, and/or hauling of timber products	NA	NA	Potential LAA, Follow Standard Consultation Process
2	**Mechanical Equipment**	Off-road equipment operation, such as site preparation, fuel piling, log yarding, etc.	NA	Activity occurs outside Spring Period[4] and within 500 meters of an open or restricted road	NLAA
		Airplane or helicopter use	Use includes ≤2 activities/year and ≤2 days/activity/Action Area	NA	NLAA
3	**Existing Gravel Pit Use**	Existing gravel pit use for road maintenance, etc.	NA	Use occurs on existing open roads or if on restricted roads, use does not exceed administrative use levels	NLAA or NE

[3] References for crew levels and duration of use as well as time frames identified under Screening Criteria include: CEM – A model for assessing effects on grizzly bears, 1990; Response to peer review of the A19 and proposed approach to managing access in grizzly bear habitat, NCDE Technical Group 1/24/01; and Draft, Rationale and choices made in the review and development of an access direction proposal for the NCDE grizzly bear ecosystem, 11/24/98.

[4] Spring Period –as defined by each ecosystem's spring grizzly bear season.

#	Activity Type	Activity Component	Crew Level and Duration of Use	Screening Criteria	Determination
4	**Roads and Road Maintenance**	Opening closed or restricted roads or building permanent roads	NA	NA	Potential LAA, Follow Standard Consultation Process
		Road reclamation (includes decommissioning and/or road storage)	Complies with administrative use levels	Project occurs outside Spring Period[4]	NLAA
		Reclaiming road	NA	Does not meet administrative use levels, or occurs in riparian/spring habitat and active during Spring Period[4]	Potential LAA, Follow Standard Consultation Process
		Road maintenance: blading, culvert cleaning, brushing, etc.	NA	Use occurs on existing open roads or, if on restricted roads, use does not exceed administrative use levels	NLAA
		New temporary road construction	NA	Temporary road construction is < ½ mile; if in riparian or spring habitat, use occurs outside Spring Period[4]	NLAA
		Bridge or stream culvert replacement	NA	Use occurs on existing open roads or if on restricted roads, use does not exceed administrative use levels; project occurs outside Spring Period[4]	NLAA

#	Activity Type	Activity Component	Crew Level and Duration of Use	Screening Criteria	Determination
5	**Silviculture Activities**	Reforestation hand planting	Day use only or camping of ≤20 individuals	Use occurs on existing open roads or if on restricted roads, use does not exceed administrative use levels	NLAA
		Insect suppression Aerial chemical application (reference aircraft use guidelines in # 2 above as well)	NA	Chemical application does not affect the cutworm moth and/or its habitat	NLAA
		Insect suppression Aerial chemical application (reference aircraft use guidelines in # 2 above as well)	NA	Chemical application would affect the cutworm moth and/or its habitat	Potential LAA, Follow Standard Consultation Process
		Insect suppression Ground chemical application	NA	Use occurs on existing open roads or, if on restricted roads, use does not exceed administrative use levels	NLAA

#	Activity Type	Activity Component	Crew Level and Duration of Use	Screening Criteria	Determination
5	**Silviculture Activities, continued**	Insect suppression survey, fertilization, manual treatment, individual tree fire treatment, or pheromone treatment	NA	Use occurs on existing open roads or if on restricted roads, use does not exceed administrative use levels	NLAA
		Precommercial thinning	NA	Use occurs along existing open roads or, if on restricted roads, use does not exceed administrative use levels	NLAA
		Commercial Christmas tree harvest	NA	Use occurs on existing open roads or, if on restricted roads, use does not exceed administrative use levels	NLAA
		Disease control – manual treatment of larch through girdling to control larch mistletoe	NA	Use occurs on existing open roads or, if on restricted roads, use does not exceed administrative use levels	NLAA
6	**Range**	Infrastructure development (also see mechanical equipment use as appropriate)	NA	Project occurs outside Spring Period[4] or completed in ≤1 day in riparian areas; project does not result in an increase in public use or user type; motorized vehicle use occurs on existing open roads or, if on restricted roads, use does not exceed administrative use levels	NLAA

#	Activity Type	Activity Component	Crew Level and Duration of Use	Screening Criteria	Determination
6	**Range, continued**	Grazing	NA	Maintains or reduces existing livestock grazing or changes livestock class to a less vulnerable species, and no history of depredation or control actions	NLAA
		Grazing	NA	Increases livestock grazing, introduces new grazing where depredation is likely, or there is a history of livestock depredation	Potential LAA, Follow Standard Consultation Process
7	**Recreation**	Trail maintenance or reconstruction	NA	Results in increased use or change of user type which results in greater potential for disturbance	Potential LAA, Follow Standard Consultation Process
		Trail maintenance or reconstruction	NA	Does not result in increase in use or change in user type which results in greater potential for disturbance	NLAA
		New non-motorized trail construction (includes relocation of trail segments) of ½ mile or less	NA	Does not result in increase in use or change of user type which results in greater potential for disturbance, and project is outside of spring bear habitat, or within 500 meters of an open or restricted road	NLAA

#	Activity Type	Activity Component	Crew Level and Duration of Use	Screening Criteria	Determination
7	**Recreation, continued**	Facility operations, including developed and dispersed camping	NA	Educates public campers and enforces sanitation standards; does not increase use or change user type	NLAA
				Sanitation standards are not enforced or use is increased or user type is changed	Potential LAA, Follow Standard Consultation Process
8	**Recreation Special Uses**	This includes activities for which permits are issued and includes outfitting and permits issued to a variety of organizations that engage in activities such as mountaineering, rock climbing, outward bound, ski races, concerts, "Poker Runs," "Fun Runs," driving tours, nature watch hikes, hunting, fishing, and a wide variety of other events	Day use only or camping of ≤20 individuals and ≤5 days/analysis area	Activity occurs outside spring bear season, applicable food storage requirements are in place, and permit includes "bear aware" education message	NLAA or NE
9	**Forest Products**	Personal use firewood collection, annual Christmas tree cutting, berry picking, low/incidental mushroom picking, and collection of "other forest products" (such as bear grass greens, medicinal herbs, pachistima, etc.)	NA	Does not include off-road mechanical skidding or hauling; includes "bear aware" education message	NLAA or NE

#	Activity Type	Activity Component	Crew Level and Duration of Use	Screening Criteria	Determination
9	**Forest Products, continued**	Commercial firewood collection, berry picking, and "other forest products" (such as bear grass greens, medicinal herbs, pachistima, etc.), but does not include mushrooms	Day use only or camping of ≤20 individuals and ≤5 days total/analysis area	Does not include off-road mechanical skidding or hauling; enforces sanitation standards, and includes "bear aware" education message	NLAA
10	**Habitat Restoration**	See timber harvest, mechanical treatments, roads, weed control, and prescribed fire; also includes monitoring, fencing, fish barrier development, fish species removal/trapping, rotenone treatment, interpretation/Con Ed, meadow restoration, riparian planting and restoration, snag creation, and water source development	NA	Project occurs outside spring bear season or completed in ≤1 day in riparian areas; project does not result in an increase in public use or user type; motorized vehicle use occurs on existing open roads or, if on restricted roads, use does not exceed administrative use levels	NLAA
11	**Prescribed Fire**	General support, ignition, mop-up (also see helicopter use in # 2 above for aerial ignition projects)	NA	Project occurs outside spring bear season or completed in ≤1 day in riparian areas; motorized vehicle use occurs on existing open roads or if on restricted roads, use does not exceed administrative use levels	NLAA
		Fire line construction	NA	Fire line does not/will not function as a road or trail and will be reclaimed after the fire	NLAA

#	Activity Type	Activity Component	Crew Level and Duration of Use	Screening Criteria	Determination
11	**Prescribed Fire, continued**	Defensible space treatments (within 100 meters of structure)	NA	Planting and/or seeding does not include palatable forage species	NLAA
12	**Watershed Restoration**	Includes erosion control structures, sediment control, monitoring; also, see reforestation, timber harvest, mechanical treatments, etc.	Day use only or camping of ≤20 individuals and ≤5 days/analysis area	Project occurs outside spring bear season or completed in ≤1 day; motorized vehicle use occurs on existing open roads or if on restricted roads, use does not exceed administrative use levels	NLAA
13	**Weed Management**	Chemical, aerial, or ground application of herbicide	NA	Motorized vehicle use occurs on existing open roads or if on restricted roads, use does not exceed administrative use levels	NLAA
		Sheep or goat grazing	NA	NA	Potential LAA, Follow Standard Consultation Process
14	**Non-recreational Special Uses**	This includes maintenance of existing sites or new construction at existing sites, corridors, or other facilities and is often carried out by the entity that owns the structures or facilities	NA	Motorized vehicle use occurs on existing open roads or if on restricted roads, use does not exceed administrative use levels	NLAA

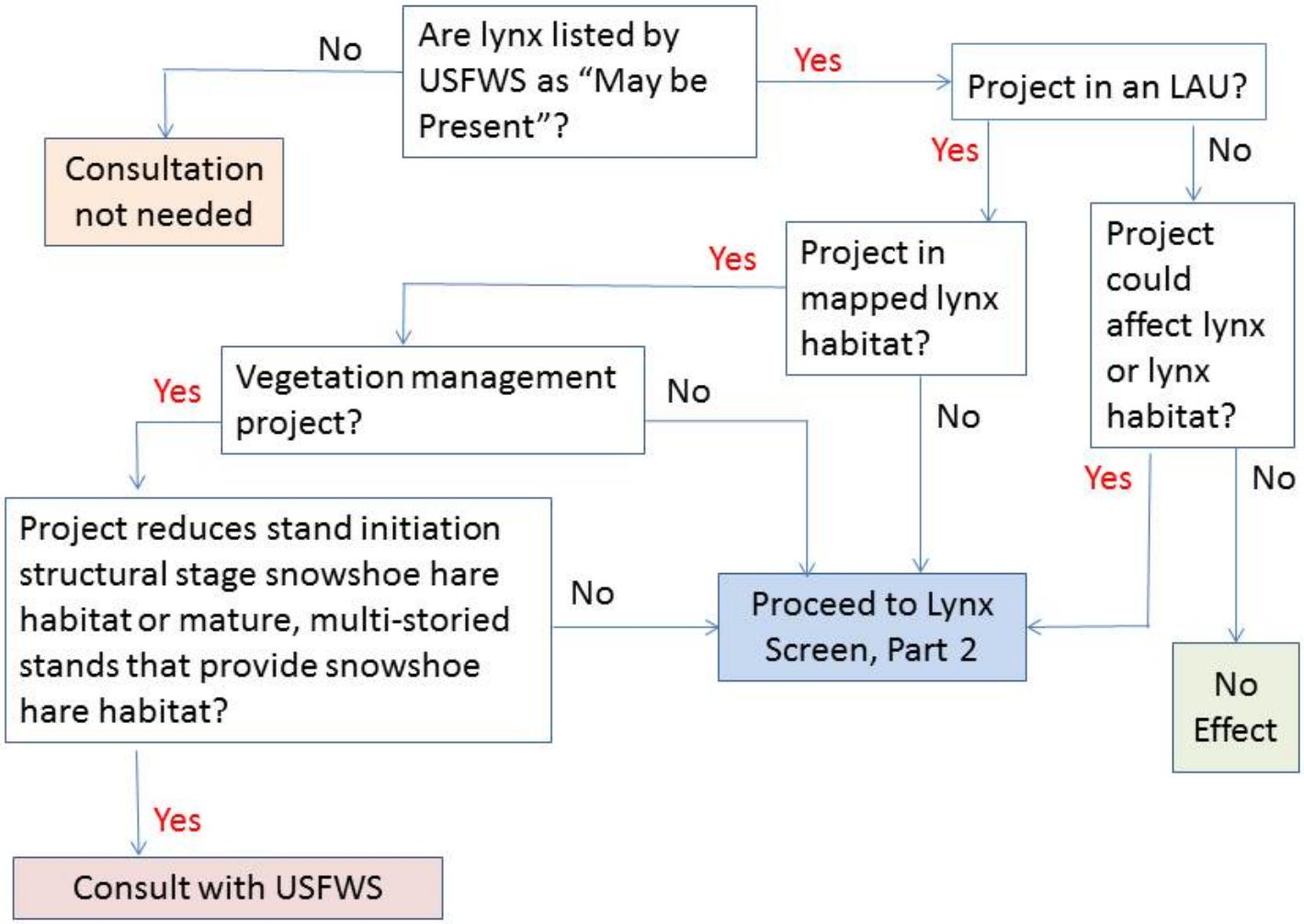
#	Activity Type	Activity Component	Crew Level and Duration of Use	Screening Criteria	Determination
14	**Non-recreational Special Uses, continued**	Construction of facilities at new sites – this includes microwaves, cell towers, substation communications, powerlines, etc.	NA	NA	Potential LAA, Follow Standard Consultation Process
15	**Miscellaneous**	Activity component not listed specifically above	NA	Must meet all screening criteria in Parts 1 and 2 of the screens table and not violate any of these criteria	NE or NLAA

APPENDIX B

CANADA LYNX PROJECT SCREENING ELEMENTS & DETERMINATIONS

The screen for Canada lynx is a two-part process. Projects are initially screened through Part 1 (Flow Chart) to determine whether lynx are listed as "may be present" and if the project meets the NRLMD or needs to be carried forward through standard consultation procedures. Part 2 consists of tables (B1 and B2), which describe the specific standards and guidelines in the Record of Decision for the NRLMD. Activities in areas that do not affect habitat but may cause disturbance to lynx have been analyzed on pages 16 and 17 and were determined to result in insignificant or discountable effects. These activities are not discussed further in Table 2, with the exception of activities affecting den sites. The U.S. Fish and Wildlife Service has determined in their Biological Opinion that the NRLMD would not jeopardize lynx; however, it is possible that a project may not meet a specific guideline and the determination of effects could be *"not likely to adversely affect."*

CANADA LYNX SCREENING PROCESS, PART 1



Canada Lynx Screening Process, Part 2 (Tables B1 and B2)

Table B1. Screening criteria for Canada lynx: Projects included in the Northern Rockies Lynx Management Direction[4]

Remember to screen all appropriate activity types involved in implementation of the project.

#	Activity Type	Activity Component	Screening Criteria	Determination
1	**Any Activity Outside of an LAU**	Any	Does not present a barrier to lynx movements through the landscape, and meets all NRLMD ALL and LINK objectives, standards and guidelines	NE or NLAA
2	**Vegetation Management**	Vegetation management is NOT in stand initiation hare habitat or in multi-storied hare habitat (stem exclusion or other)	Meets all NRLMD standards and guidelines	NLAA
			Does not meet all NRLMD standards or and guidelines	Potential LAA, Follow Standard Consultation Process

[4] All NRLMD Standards and Guidelines are hyperlinked to Table B3.

#	Activity Type	Activity Component	Screening Criteria	Determination
3	**Salvage Harvest of Burned Habitat**	Includes salvage harvest of high intensity burned areas that converted habitat to stand initiation structural stage that does not yet provide snowshoe hare habitat	Salvage operations occur before regeneration is established or on snow, no more than 250 acres per LAU per year, meets NRLMD VEGS1, VEGS2, VEGG 11, and no incidental removal of residual snowshoe hare habitat[5] (see also NRLMD VEGS6)	NLAA
4	**Other Salvage Harvest**	Includes dead, damaged, and dying trees due to causes other than high-intensity fire	No more than 250 acres per LAU per year and meets NRLMD VEGS1, VEGS2, VEGG 11 and no incidental removal of residual snowshoe hare habitat[5] (see also NRLMD VEGS6)	NLAA
5	**Silvicultural Activities**	Tree planting	Activity does not result in stand type conversion that reduces potential lynx habitat (see also NRLMD VEG G1)	NLAA or NE
		Disease control		NLAA or NE

[5] All references to snowshoe hare habitat mean summer and/or winter habitat.

#	Activity Type	Activity Component	Screening Criteria	Determination
6	**Road Construction**	Highway or forest highway construction	NA	Potential LAA, Follow Standard Consultation Process
7	**Range**	Livestock grazing in post-fire and post-harvest areas	Meets NRLMD GRAZG1	NLAA
		Livestock grazing in aspen stands	Meets NRLMD GRAZG2	NLAA
		Livestock grazing in shrub-steppe habitats	Meets NRLMD GRAZG4	NLAA
		Livestock grazing in riparian areas or willow cars	Meets NRLMD GRAZG3	NLAA
8	**Recreation**	Snowmobiling and other over-the-snow activity such as cross country skiing, snowshoe races, and dogsledding	Meets NRLMD HUG11	NLAA
		New or expanded developed recreation facilities (such as ski lifts, parking lots, buildings, picnic tables, toilet facilities – see NRLMD glossary) that result in permanent habitat loss	NA	Potential LAA, Follow Standard Consultation Process

#	Activity Type	Activity Component	Screening Criteria	Determination
8	**Recreation, continued**	Recreation Special Uses - This includes activities for which permits are issued and includes outfitting and permits issued to a variety of organizations that engage in activities such as mountaineering, rock climbing, outward bound, ski races, concerts, “Poker Runs,” “Fun Runs,” driving tours, nature watch hikes, hunting, fishing, and a wide variety of other events	Activity is consistent with existing access management specific to lynx from Forest and Travel Plans and NRLMD, and does not involve hunting mountain lions with dogs	NLAA or NE
		Maintenance and/or Trail Re-routes - This consists of maintenance of trails and trail re-routes that may require use of heavy equipment and/or blasting	Meets NRLMD HUG7 and does not result in a reduction of snowshoe hare habitat	NLAA
		New Trail Construction - This includes the development of new trails used for foot, stock, or motorcycles and may require the use of heavy equipment, blasting and/or hand tools and may create a clearing width up to 10 feet wide (FSH 2309.18)	Meets NRLMD HUG7 and does not result in a reduction of snowshoe hare habitat	NLAA

#	Activity Type	Activity Component	Screening Criteria	Determination
8	**Recreation, continued**	Permitted and Non-permitted use of Developed Sites, Facilities, and Their Maintenance - This includes special use permits issued for facilities, residences, and other structures; permits are also issued for organizational camps such as the Boy Scouts and church groups at developed campgrounds; other facilities include but are not limited to campgrounds, rental cabins, watchable wildlife sites, picnic areas, warming huts, and communication sites; also includes Forest Service administrative sites and their maintenance (such as campgrounds, trailheads, ranger stations, etc.)	Activity occurs or is associated with ski areas	Potential LAA, Follow Standard Consultation Process
			Activity is not associated with ski areas	NLAA or NE

Table B2. Screening criteria for projects not specifically included in the Northern Rockies Lynx Management Direction

#	Activity Type	Activity Component	Screening Criteria	Determination
1	**Roads and Road Maintenance**	Road Maintenance - This includes general road maintenance that may involve the brushing of vegetation on the road or along roadsides; road maintenance may include but is not limited to roadbed blading, brushing, cleaning ditches, replacing or cleaning culverts, cleaning dips, or spot graveling	Meets NRLMD HUG8; brushing activities where incidental snowshoe hare habitat removal occurs was considered baseline for consultation on NRLMD	NLAA
			No brushing associated with activity	NE
		Hazard Tree Removal	Tree removal does not result in a reduction of snowshoe hare habitat	NE or NLAA
		Road Decommissioning - This involves the use of heavy equipment and includes obliteration and other methods to hydrologically neutralize the road	Does not reduce snowshoe hare habitat	NE or NLAA
		Road Upgrades and Bridge Replacement	Meets NRLMD HUG6 and does not result in a reduction of snowshoe hare habitat	NLAA

#	Activity Type	Activity Component	Screening Criteria	Determination
1	**Roads and Road Maintenance, continued**	General Road Use - This includes hauling timber, removing mining waste and materials, and moving livestock over federal roads for which permits are required; it also includes routine road use by administrative units to carry out work associated with recreation, range, timber and minerals management, fire prevention and suppression, inventories, surveys, and other monitoring activities; this includes use of roads consistent with existing travel plans	NA	NE or NLAA
		New Permanent or Temporary Road Construction	Meets NRLMD HUG7 and HUG9 and does not reduce snowshoe hare habitat	NLAA
2	**Forest Products**	Post and Pole Sales – This includes both commercial and non-commercial post and pole sales; this typically occurs in forested stands consisting of trees 5-9” diameter at breast height	NRLMD standards and guidelines are met within the respective LAU and meets terms of permit	NLAA
		Firewood Collection - This includes both commercial and non-commercial collection and involves the collection of standing dead or down wood	NRLMD standards and guidelines are met within the respective LAU and meets terms of permit	NLAA

#	Activity Type	Activity Component	Screening Criteria	Determination
2	**Forest Products, continued**	Other Forest Products – This includes but is not limited to berry, mushroom, and bear grass collection and includes both commercial and non-commercial activities; collection of tree products is not included	NRLMD standards and guidelines are met within the respective LAU and meets terms of permit	NE
		Christmas Tree/Bough Cutting - This includes both commercial and non-commercial cutting	NRLMD standards and guidelines are met within the respective LAU and meets terms of permit	NLAA
3	**Habitat Restoration**	Forest and Shrub/Grassland Habitat Management - This includes aspen rejuvenation, shrub field maintenance and other types of ecosystem 'driven' projects designed to promote natural processes in an area	NRLMD standards and guidelines are met within the respective LAU	NLAA
4	**Noxious Weed Management**	This includes chemical and biological treatments to noxious weeds within or adjacent to lynx habitat	Activity includes aerial application	NLAA
			Activity includes only ground application (no aerial application)	NE

#	Activity Type	Activity Component	Screening Criteria	Determination
5	**Other Special Uses**	This includes non-recreation special uses and mineral and energy exploration and development and maintenance of existing sites, corridors, or other facilities and is often carried out by the entity that owns the structures or facilities; maintenance may include vegetation blading or cutting, or spraying to reduce brush and reduce the invasion of shrubs and trees among other activities	Meets NRLMD HUG12 and does not result in a reduction of snowshoe hare habitat	NLAA or NE
6	**Hardrock Mining and Gravel Pits**	Quarries, recreational mining, small mines, exploratory drilling, and reclamation of small mines	Activities do not reduce snowshoe hare habitat	NLAA or NE
7	**Ditches and Diversions**	NA	Activities do not reduce snowshoe hare habitat	NLAA or NE
8	**Surveys**	Surveys – This includes snow course surveys, patrols, track counts, habitat sampling, hair posts, remote camera stations, and radio telemetry among other methods	Operations are during winter and include repeated snow compaction activities(cross country ski trips, snowmobile trips) on ungroomed trails generally not being used by the public	NLAA

#	Activity Type	Activity Component	Screening Criteria	Determination
8	**Surveys, continued**	NA	Operations are during spring, summer, or fall	NE
9	**Miscellaneous**	Activity component not listed specifically above	Must meet all screening criteria in Parts 1 and 2 of the screens table and not violate any of these criteria	NE or NLAA

Table B3. Northern Rockies Lynx Management Direction Standards and Guidelines[6]

Northern Rockies Lynx Management Direction
ALL MANAGEMENT PRACTICES AND ACTIVITIES (ALL) *The following objectives, standards and guidelines apply to management projects in lynx habitat in lynx analysis units (LAU) and in linkage areas, subject to valid existing rights. They do not apply to wildfire suppression, or to wildland fire use*
Objective[30] ALL O1 Maintain[26] or restore[39] lynx habitat[23] connectivity[16] in and between LAUs[21], and in linkage areas[22].
Standard[43] ALL S1 New or expanded permanent developments[33] and vegetation management projects[48] must maintain[26] habitat connectivity[16] *in an LAU[21] and/or linkage area[22].*
Guideline[15] ALL G1 Methods to avoid or reduce effects on lynx should be used when constructing or reconstructing highways[18] or forest highways[12] across federal land. Methods could include fencing, underpasses or overpasses.
Standard LAU S1 *Changes in LAU[21] boundaries shall be based on site-specific habitat information and after review by the Forest Service Regional Office.*
VEGETATION MANAGEMENT PROJECTS (VEG) *The following objectives, standards and guidelines apply to vegetation management projects in lynx habitat in lynx analysis units (LAU). With the exception of Objective VEG O3 that specifically concerns wildland fire use, the objectives, standards and guidelines do not apply to wildfire suppression, wildland fire use, or removal of vegetation for permanent developments like mineral operations, ski runs, roads and the like. None of the objectives, standards, or guidelines apply to linkage areas.*
Standard VEG S1 – Stand initiation structural stage limits Standard VEG S1 applies to all vegetation management[48] projects that regenerate[37] timber, except for fuel treatment[13] projects within the wildland urban interface (WUI) [49] as defined by HFRA, subject to the following limitation: Fuel treatment projects within the WUI that do not meet Standards VEG S1, VEG S2, VEG S5, and VEG S6 may occur on no more than 6 percent (cumulatively) of lynx habitat on each administrative unit (a unit is a National Forest). For fuel treatment projects within the WUI see guideline VEG G10. **The Standard:** Unless a broad scale assessment has been completed that substantiates different historic levels of stand initiation structural stages[44] limit disturbance in each LAU as follows: If more than 30 percent of the lynx habitat in an LAU is currently in a stand initiation structural stage that does not yet provide winter snowshoe hare habitat, no additional habitat may be regenerated by vegetation management projects.

[6] Where subscripts appear, refer to glossary definitions in Appendix C.

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Standard VEG S2 – Limits on regeneration from timber mgmt. projects Standard VEG S2 applies to all vegetation management[48] projects that regenerate[37] timber, except for fuel treatment[13] projects within the wildland urban interface (WUI)[49] as defined by HFRA, subject to the following limitation: Fuel treatment projects within the WUI[49] that do not meet Standards VEG S1, VEG S2, VEG S5, and VEG S6 may occur on no more than 6 percent (cumulatively) of lynx habitat on each administrative unit (a unit is a National Forest). For fuel treatment projects within the WUI[49] see guideline VEG G10. **The Standard:** Timber management projects shall not regenerate[37] more than 15 percent of lynx habitat on NFS lands in an LAU in a ten-year period.
Guideline VEG G11 – Denning habitat *Denning habitat[6] should be distributed in each LAU in the form of pockets of large amounts of large woody debris, either down logs or root wads, or large piles of small wind thrown trees ("jack-strawed" piles). If denning habitat appears to be lacking in the LAU, then projects should be designed to retain some coarse woody debris[4], piles, or residual trees to provide denning habitat[6] in the future.*
Standard VEG S5 – Precommercial thinning limits Standard VEG S5 applies to all precommercial thinning[35] projects, except for fuel treatment[13] projects that use precommercial thinning as a tool within the wildland urban interface (WUI)[49] as defined by HFRA, subject to the following limitation: Fuel treatment projects within the WUI[49] that do not meet Standards VEG S1, VEG S2, VEG S5, and VEG S6 may occur on no more than 6 percent (cumulatively) of lynx habitat on each administrative unit (a unit is a National Forest). For fuel treatment projects within the WUI[49] see guideline VEG G10. **The Standard:** Precommercial thinning projects that reduce snowshoe hare habitat, may occur from the stand initiation structural stage[44] until the stands no longer provide winter snowshoe hare habitat only: 1. Within 200 feet of administrative sites, dwellings, or outbuildings; or 2. For research studies[38] or genetic tree tests evaluating genetically improved reforestation stock; or 3. Based on new information that is peer reviewed and accepted by the regional levels of the Forest Service and FWS, where a written determination states: a. that a project is not likely to adversely affect lynx; or b. that a project is likely to have short term adverse effects on lynx or its habitat, but would result in long-term benefits to lynx and its habitat; or 4. For conifer removal in aspen, or daylight thinning[5] around individual aspen trees, where aspen is in decline; or

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5. For daylight thinning of planted rust-resistant white pine where 80 % of the winter snowshoe hare habitat[50] is retained; or 6. To restore whitebark pine.
Standard VEG S6 – Multi-storied stands & snowshoe hare horizontal cover Standard VEG S6 applies to all vegetation management[48] projects that regenerate[37] timber, except for fuel treatment[13] projects within the wildland urban interface (WUI)[49] as defined by HFRA, subject to the following limitation: Fuel treatment projects within the WUI[49] that do not meet Standards VEG S1, VEG S2, VEG S5, and VEG S6 may occur on no more than 6 percent (cumulatively) of lynx habitat on each administrative unit (a unit is a National Forest). For fuel treatment projects within the WUI[49] see guideline VEG G10. **The Standard:** Vegetation management projects that reduce snowshoe hare habitat in multi-story mature or late successional forests[29] may occur only: 1. Within 200 feet of administrative sites, dwellings, outbuildings, recreation sites, and special use permit improvements, including infrastructure within permitted ski area boundaries; or 2. For research studies[38] or genetic tree tests evaluating genetically improved reforestation stock; or 3. For incidental removal during salvage harvest[41] (e.g. removal due to location of skid trails). (NOTE: Timber harvest is allowed in areas that have potential to improve winter snowshoe hare habitat but presently have poorly developed understories that lack dense horizontal cover [e.g. uneven age management systems could be used to create openings where there is little understory so that new forage can grow]).
Guideline VEG G1 – Lynx habitat improvement Vegetation management[48] projects should be planned to recruit a high density of conifers, hardwoods, and shrubs where such habitat is scarce or not available. Priority should be given to stem-exclusion, closed-canopy structural stage[44] *stands for lynx or their prey (e.g. mesic, monotypic lodgepole stands).* Winter snowshoe hare habitat[50] should be near denning habitat[6].
Guideline VEG G4 – Prescribed Fire Prescribed fire[34] activities should not create permanent travel routes that facilitate snow compaction. Constructing permanent firebreaks on ridges or saddles should be avoided.
Guideline VEG G5 – Habitat for alternate prey species Habitat for alternate prey species, primarily red squirrel[36], should be provided in each LAU.
Guideline VEG G10 – Fuel treatments in the WUI *Fuel treatment projects in the WUI[49] as defined by HFRA[17, 48] should be designed considering standards VEG S1, S2, S5, and S6 to promote lynx conservation.*
LIVESTOCK MANAGEMENT (GRAZ) T*he following objectives and guidelines apply to grazing projects in lynx habitat in lynx analysis units (LAU). They do not apply to*

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linkage areas.
Guideline GRAZ G1 – Livestock grazing and openings In fire- and harvest-created openings, livestock grazing should be managed so impacts do not prevent shrubs and trees from regenerating.
Guideline GRAZ G2 – Livestock grazing and aspen In aspen stands, livestock grazing should be managed to contribute to the long-term health and sustainability of aspen.
Guideline GRAZ G3 – Livestock grazing and riparian areas & willow carrs In riparian areas[40] and willow carrs[3], livestock grazing should be managed to contribute to maintaining or achieving a preponderance of mid- or late-seral stages[28], similar to conditions that would have occurred under historic disturbance regimes.
Guideline GRAZ G4 – Livestock grazing and shrub-steppe habitats In shrub-steppe habitats[42], livestock grazing should be managed in the elevation ranges of forested lynx habitat in LAUs[21], to contribute to maintaining or achieving a preponderance of mid- or late-seral stages, similar to conditions that would have occurred under historic disturbance regimes.
HUMAN USE PROJECTS (HU) The following objectives and guidelines apply to *human use projects, such as special uses (other than grazing), recreation management, roads, highways, mineral and energy development, in lynx habitat in lynx analysis units (LAU),* subject to valid existing rights. *They do not apply to vegetation management projects or grazing projects directly. They do not apply to linkage areas.*
Guideline HU G1 – Ski area expansion & development, inter-trail islands When developing or expanding ski areas, provisions should be made for adequately sized inter-trail islands that include coarse woody debris[4], so winter snowshoe hare habitat[49] is maintained.
Guideline HU G2 – Ski are expansion & development, foraging habitat When developing or expanding ski areas, foraging should be provided consistent with the ski area's operational needs, especially where lynx habitat occurs as narrow bands of coniferous forest across mountain slopes.
Guideline HU G3 – Recreation developments Recreation developments and operations should be planned in ways that both provide for lynx movement and maintain the effectiveness of lynx habitat[23].
Guideline HU G4 – Mineral & energy development For mineral and energy development sites and facilities, remote monitoring should be encouraged to reduce snow compaction.
Guideline HU G5 – Mineral & energy development, habitat restoration For mineral and energy development sites and facilities that are closed, a reclamation plan that restores[39] lynx habitat should be developed.
Guideline HU G6 – Roads, upgrading Methods to avoid or reduce effects to lynx should be used in lynx habitat when upgrading unpaved roads to maintenance levels 4 or 5, if the result would be increased traffic speeds and volumes, or a foreseeable contribution to increases in human activity or development.

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Guideline HU G7 – Roads, locations New permanent roads should not be built on ridge-tops and saddles, or in areas identified as important for lynx habitat connectivity[16]. New permanent roads and trails should be situated away from forested stringers.
Guideline HU G8 – Roads, brushing Cutting brush along low-speed[25], low-traffic-volume roads should be done to the minimum level necessary to provide for public safety.
Guideline HU G9 – Roads, new On new roads built for projects, public motorized use should be restricted. Effective closures should be provided in road designs. When the project is over, these roads should be reclaimed or decommissioned, if not needed for other management objectives.
Guideline HU G10 – Roads, ski area access *When developing or expanding ski areas and trails, access roads and lift termini to maintain and provide lynx security[10] habitat.*
Guideline HU G11 – Snow compaction Designated over-the-snow routes, or designated play areas, should not expand outside baseline areas of consistent snow compaction[1], unless designation serves to consolidate use and improve lynx habitat. This is calculated on an LAU basis, or on a combination of immediately adjacent LAUs. This does not apply inside permitted ski area boundaries, to winter logging, to rerouting trails for public safety, to accessing private inholdings, or to access regulated by Guideline HU G12. Use the same analysis boundaries for all actions subject to this guideline.
Guideline HU G12 – Winter access for non-recreation SUP & mineral & energy development Winter access for non-recreation special uses, and mineral and energy exploration and development, should be limited to designated routes[8] or designated over-the-snow routes[7].
LINKAGE AREAS (LINK) The following objective, standard and guidelines apply to *all projects within linkage areas,* subject to valid existing rights.
Standard LINK S1 – Highway or forest highway construction in linkage areas When highway[18] or forest highway[12] construction or reconstruction is proposed in linkage areas[22], identify potential highway crossings.
Guideline LINK G1 – Land exchanges NFS lands should be retained in public ownership.
Guideline LINK G2 – Livestock grazing in shrub-steppe habitats *Livestock grazing in shrub-steppe habitats[42] should be managed to contribute to maintaining or achieving a preponderance of mid- or late-seral stages[28], similar to conditions that would have occurred under historic disturbance regimes.*
REQUIRED MONITORING
Map the location and intensity of snow compacting activities, and designated and groomed routes that occurred inside LAUs during the period of 1998 to 2000. The mapping is to be completed within one year of this decision and changes in activities and routes are to be monitored every five years after the decision.

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Annually report the number of acres where any of the exemptions 1 through 6 listed in Standard VEG S5 were applied. Report the type of activity, the number of acres, and the location (by unit, and LAU[21]).
Report the acres of fuel treatment in lynx habitat within the wildland urban interface[49] as defined by HFRA[17] when the project decision is approved. Report whether or not the fuel treatment met the vegetation standard. If standard(s) are not met, report, which standard(s) are not, met, why they were not met, and how many acres were affected. Units will report to their respective USFS Regional Office. Region 1 of the USFS will consolidate all reports.

Appendix C

Northern Rockies Lynx Management Direction Definitions

[1] *Areas of consistent snow compaction* – An area of consistent snow compaction is an area of land or water that during winter is generally covered with snow and gets enough human use that individual tracks are indistinguishable. In such places, compacted snow is evident most of the time, except immediately after (within 48 hours) snowfall. These can be areas or linear routes, and are generally found in near snowmobile or cross-country ski routes, in adjacent openings, parks and meadows, near ski huts or plowed roads, or in winter parking areas. Areas of consistent snow compaction will be determined based on the area or miles used in 1998 to 2000.

[2] *Broad scale assessment* – A broad scale assessment is a synthesis of current scientific knowledge, including a description of uncertainties and assumptions, to provide an understanding of past and present conditions and future trends, and a characterization of the ecological, social and economic components of an area. (LCAS)

[3] *Carr* – Deciduous woodland or shrub land occurring on permanently wet, organic soil. (LCAS)

[4] *Course woody debris* – Any piece(s) of dead woody material, e.g., dead boles, limbs, and large root masses on the ground or in streams. (LCAS)

[5] *Daylight thinning* – Daylight thinning is a form of precommercial thinning that removes the trees and brush inside a given radius around a tree.

[6] *Denning habitat (lynx)* – Denning habitat is the environment lynx use when giving birth and rearing kittens until they are mobile. The most common component is large amounts of coarse woody debris to provide escape and thermal cover for kittens. Denning habitat must be within daily travel distance of winter snowshoe hare habitat – the typical maximum daily distance for females is about three to six miles. Denning habitat includes mature and old growth[24] forests with plenty of coarse woody debris. It can also include young regenerating forests with piles of coarse woody debris, or areas where down trees are jack-strawed.

[7] *Designated over-the-snow routes* – Designated over-the-snow routes are routes managed under permit or agreement or by the agency, where use is encouraged, either by on-the-ground marking or by publication in brochures, recreation opportunity guides or maps (other than travel maps) or in electronic media produced or approved by the agency. The routes identified in outfitter and guide permits are designated by definition; groomed routes also are designated by definition. The determination of baseline snow compaction will be based on the miles of designated over-the-snow routes authorized, promoted or encouraged in 1998 to 2000.

[8] *Designated route* – A designated route is a road or trail that has been identified as open for specified travel use.

[9] *Developed recreation* – Developed recreation requires facilities that result in concentrated use. For example, skiing requires lifts, parking lots, buildings and roads; campgrounds require roads, picnic tables and toilet facilities.

[10] *Security habitat (lynx)* – Security habitat amounts to places in lynx habitat that provide secure winter bedding sites for lynx in highly disturbed landscapes like ski areas. Security habitat gives lynx the ability to retreat from human disturbance. Forest structures that make human access difficult generally discourage human activity in security habitats. Security habitats are most effective if big enough to provide visual and acoustic insulation and to let lynx easily move away from any intrusion. They must be close to winter snowshoe hare habitat. (LCAS)

[11] *Fire use* – Fire use is the combination of wildland fire use and using prescribed fire to meet resource objectives. (NIFC) Wildland fire use is the management of naturally ignited wildland fires to accomplish resource management objectives in areas that have a fire management plan. The use of the term wildland fire use replaces the term prescribed natural fire. (Wildland and Prescribed Fire Management Policy, August 1998)

[12] *Forest highway* – A forest highway is a forest road under the jurisdiction of, and maintained by, a public authority and open to public travel (USC: Title 23, Section 101(a)), designated by an agreement with the FS, state transportation agency and Federal Highway Administration.

[13] *Fuel treatment* – A fuel treatment is a management action that reduces the threat of ignition and fire intensity or rate of spread, or is used to restore fire-adapted ecosystems.
[14] *Goal* – A goal is a broad description of what an agency is trying to achieve, found in a land management plan. (LCAS)
[15] *Guideline* – A guideline is a particular management action that should be used to meet an objective found in a land management plan. The rationale for deviations may be documented, but amending the plan is not required. (LCAS modified)
[16] *Habitat connectivity (lynx)* – Habitat connectivity consists of an adequate amount of vegetation cover arranged in a way that allows lynx to move around. Narrow forested mountain ridges or shrub-steppe plateaus may serve as a link between more extensive areas of lynx habitat; wooded riparian areas may provide travel cover across open valley floors. (LCAS)
[17] *HFRA (Healthy Forests Restoration Act)* - Public Law 108-148, passed in December 2003. The HFRA provides statutory processes for hazardous fuel reduction projects on certain types of at-risk National Forest System and Bureau of Land Management lands. It also provides other authorities and direction to help reduce hazardous fuel and restore healthy forest and rangeland conditions on lands of all ownerships. (Modified from Forest Service HFRA web site.)
[18] *Highway* – The word highway includes all roads that are part of the National Highway System. (23 CFR 470.107(b))
[19] *Horizontal cover* – Horizontal cover is the visual obscurity or cover provided by habitat structures that extend to the ground or snow surface primarily provided by tree stems and tree boughs, but also includes herbaceous vegetation, snow, and landscape topography. Horizontal cover was measured by John Squires et al. (pers. com.) in Northwestern Montana according to the following methodology:
"A canvas cover-board (2 m x 0.5 m) was erected 10 m from plot center in 4 directions (forward track, back track, and at 2, 90° angles) was read to directly measure horizontal cover. The cover board was divided into 4, 0.5 meter blocks and each block was further dividend into quarters. At each reading, technicians estimated horizontal cover by 10% class at each of the 4 heights; these 4 estimates were then averaged for an overall estimate of that reading." (According to Squires via pers. com., cover measured during the summer period averaged approximately 65% while at den sites it was measured at roughly 85%. During the winter period cover was measured at 45% while at winter kill sites it was slightly greater than 50%.)
[20] *Isolated mountain range* – Isolated mountain ranges are small mountains cut off from other mountains and surrounded by flatlands. On the east side of the Rockies, they are used for analysis instead of sub-basins. Examples are the Little Belts in Montana and the Bighorns in Wyoming.
[21] *LAU (Lynx Analysis Unit)* – An LAU is an area of at least the size used by an individual lynx, from about 25 to 50 square miles (LCAS). An LAU is a unit for which the effects of a project would be analyzed; its boundaries should remain constant.
[22] *Linkage area* – A linkage area provides connectivity between blocks of lynx habitat. Linkage areas occur both within and between geographic areas, where basins, valleys or agricultural lands separate blocks of lynx habitat, or where lynx habitat naturally narrows between blocks. (LCAS updated definition approved by the Steering Committee 10/23/01)
[23] *Lynx habitat* – Lynx habitat occurs in mesic coniferous forest that experience cold, snowy winters and provide a prey base of snowshoe hare. In the northern Rockies, lynx habitat is generally occurs between 3,500 and 8,000 feet of elevation, and primarily consists of lodgepole pine, subalpine fir and Engelmann spruce. It may consist of cedar-hemlock in extreme northern Idaho, northeastern Washington and northwestern Montana, or of Douglas fir on moist sites at higher elevations in central Idaho. It may also consist of cool, moist Douglas fir, grand fir, western larch and aspen when interspersed in subalpine forests. Dry forests do not provide lynx habitat. (LCAS)
[24] *Lynx habitat in an unsuitable condition* –Lynx habitat in an unsuitable condition consists of lynx habitat in the stand initiation structural stage where the trees are generally less than ten to 30 years old and have not grown tall enough to protrude above the snow during winter. Stand replacing fire or certain vegetation management projects can create unsuitable conditions. Vegetation management projects that can result in unsuitable habitat include clearcuts and seed tree harvest, and sometimes shelterwood cuts and commercial thinning depending on the resulting stand composition and structure. (LCAS)

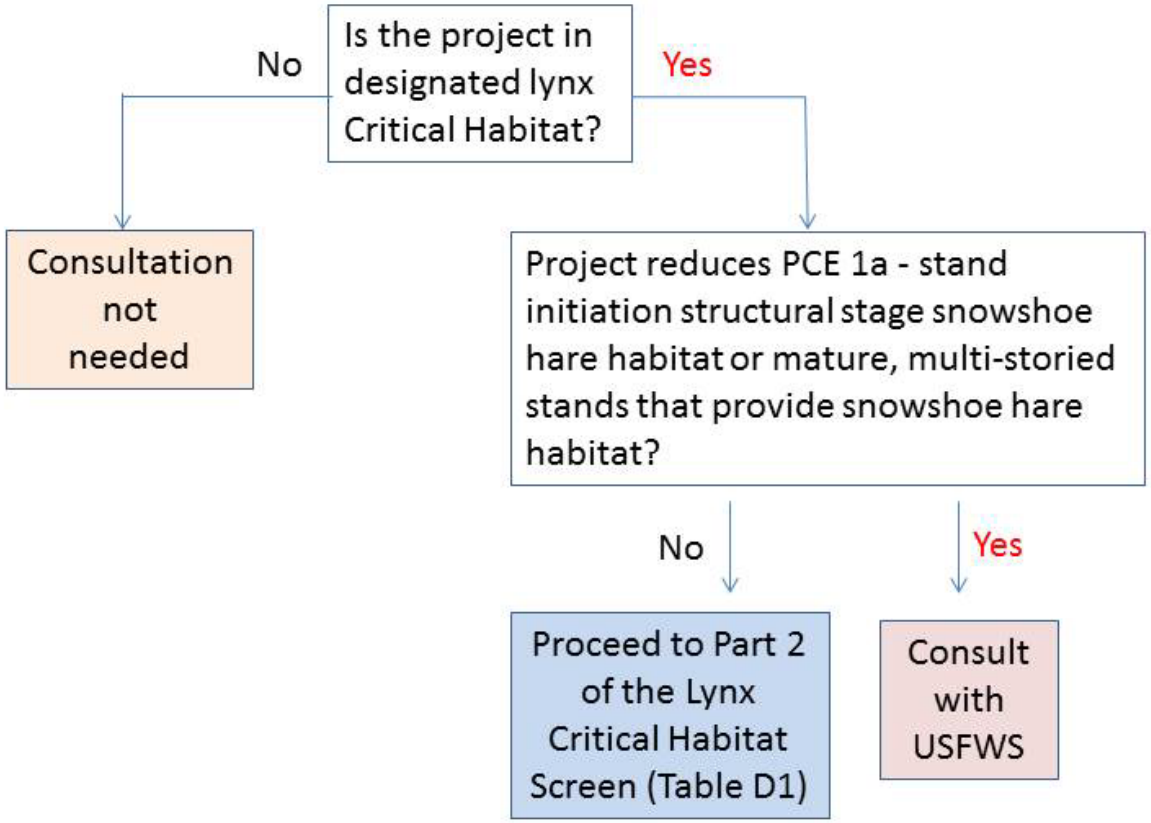
[25] *Low-speed, low-traffic-volume road* – Low speed is less than 20 miles per hour; low volume is a seasonal average daily traffic load of less than 100 vehicles per day.
[26] *Maintain* – In the context of this amendment, maintain means to provide enough lynx habitat to conserve lynx. It does not mean to keep the status quo.
[27] *Maintenance level* – Maintenance levels define the level of service provided by and maintenance required for a road. (FSH 7709.58, Sec 12.3) Maintenance level 4 is assigned to roads that provide a moderate degree of user comfort and convenience at moderate travel speeds. Most level 4 roads have double lanes and aggregate surfaced. Some may be single lane; some may be paved or have dust abated. Maintenance level 5 is assigned to roads that provide a high degree of user comfort and convenience. Normally, roads are double-lane and paved, but some may be aggregate surfaced with the dust abated.
[28] *Mid-seral or later* – Mid-seral is the successional stage in a plant community that's the midpoint as it moves from bare ground to climax. For riparian areas, it means willows or other shrubs have become established. For shrub-steppe areas, it means shrubs associated with climax are present and increasing in density.
[29] *Multi-story mature or late successional forest* – This stage is similar to the *old multistory structural stage (see below)*. However, trees are generally not as old and decaying trees may be somewhat less abundant.
[30] *Objective* – An objective is a statement in a land management plan describing desired resource conditions and intended to promote achieving programmatic goals. (LCAS)
[31] *Old multistory structural stage* – Many age classes and vegetation layers mark the old forest, multistoried stage. It usually contains large old trees. Decaying fallen trees may be present that leave a discontinuous overstory canopy. On cold or moist sites without frequent fires or other disturbance, multi-layer stands with large trees in the uppermost layer develop. (Oliver and Larson, 1996)
[32] *Old growth* – Old growth forests generally contain trees that are large for their species and site, and are sometimes decadent with broken tops. Old growth often contains a variety of tree sizes, large snags and logs, and a developed and often patchy understory.
[33] *Permanent development* – A permanent development is any development that results in a loss of lynx habitat for at least 15 years. Ski trails, parking lots, new permanent roads, structures, campgrounds and many special use developments would be considered permanent developments.
[34] *Prescribed fire* – A prescribed fire is any fire ignited as a management action to meet specific objectives. A written, approved prescribed fire plan must exist, and NEPA requirements met, before ignition. The term replaces management ignited prescribed fire. (NWCG)
[35] *Precommercial thinning* – Precommercial thinning is mechanically removing trees to reduce stocking and concentrate growth on the remaining trees, and not resulting in immediate financial return. (Dictionary of Forestry)
[36] *Red squirrel habitat* – Red squirrel habitat consists of coniferous forests of seed and cone-producing age that usually contain snags and downed woody debris, generally associated with mature or older forests.
[37] *Regeneration harvest* – The cutting of trees and creating an entire new age class; an even-age harvest. The major methods are clear-cutting, seed tree, shelterwood, and group selective cuts (Helms 1998).
[38] *Research* – Research consists of studies conducted to increase scientific knowledge or technology. For the purposes of Standards VEG S5 and VEG S6, research applies to studies financed from the forest research budget (FSM 4040) and administrative studies financed from the NF budget.
[39] *Restore, restoration* – To restore is to return or re-establish ecosystems or habitats to their original structure and species composition. (Dictionary of Forestry)
[40] *Riparian area* – An area with distinctive soil and vegetation between a stream or other body of water and the adjacent upland; includes wetlands and those portions of floodplains and valley bottoms that support riparian vegetation. (LCAS)
[41] *Salvage harvest* – Salvage harvest is a commercial timber sale of dead, damaged or dying trees. It recovers economic value that would otherwise be lost. Collecting firewood for personal use is not considered salvage harvest.

[42] *Shrub steppe habitat* – Shrub steppe habitat consists of dry sites with shrubs and grasslands intermingled.
[43] *Standard* – A standard is a required action in a land management plan specifying how to achieve an objective or under what circumstances to refrain from taking action. A plan must be amended to deviate from a standard.
[44] *Stand initiation structural stage* – The stand initiation stage generally develops after a stand-replacing disturbance by fire or regeneration timber harvest. A new single-story layer of shrubs, tree seedlings and saplings establish and develop, reoccupying the site. Trees that need full sun are likely to dominate these even-aged stands. (Oliver and Larson, 1996)
[45] *Stem exclusion structural stage* – In the stem exclusion stage, trees initially grow fast and quickly occupy all of the growing space, creating a closed canopy. Because the trees are tall, little light reaches the forest floor so understory plants (including smaller trees) are shaded and grow more slowly. Species that need full sunlight usually die; shrubs and herbs may become dormant. New trees are precluded by a lack of sunlight or moisture. (Oliver and Larson, 1996)
[46] *Timber management* – Timber management consists of growing, tending, commercially harvesting and regenerating crops of trees.
[47] *Understory re-initiation structural stage* – In the understory re-initiation stage, a new age class of trees gets established after overstory trees begin to die, are removed or no longer fully occupy their growing space after tall trees abrade each other in the wind. Understory seedlings then re-grow and the trees begin to stratify into vertical layers. A low to moderately dense uneven-aged overstory develops, with some small shade-tolerant trees in the understory. (Oliver and Larson, 1996)
[48] *Vegetation management projects* – Vegetation management projects change the composition and structure of vegetation to meet specific objectives, using such means as prescribed fire and timber harvest. For the purposes of this amendment, the term does not include removing vegetation for permanent developments like mineral operations, ski runs, roads and the like, and does not apply to fire suppression or to wildland fire use.
[49] *Wildland urban interface (WUI)* - The area adjacent to an at-risk community that is identified in the community wildfire protection plan. If there is no community wildfire protection plan in place, the WUI is the area 0.5 mile from the boundary of an at-risk community or within 1.5 miles of the boundary of an at-risk community. The WUI could also include areas if the terrain is steep, or there is a nearby road or ridge top that could be incorporated into a fuel break, or the land is in condition class 3, or the area contains an emergency exit route needed for safe evacuations. (Condensed from HFRA. For full text see HFRA § 101.)
[50] *Winter snowshoe hare habitat* – Winter snowshoe hare habitat consists of places where young trees or shrubs grow dense – thousands of woody stems per acre – and tall enough to protrude above the snow during winter, so hares can browse on the bark and small twigs (Ruediger et al. 2000). Winter snowshoe hare habitat develops primarily in the stand initiation, understory reinitiation and old forest multistoried structural stage.

APPENDIX D

CANADA LYNX CRITICAL HABITAT PROJECT SCREENING ELEMENTS & DETERMINATIONS

The lynx critical habitat screen is a two-part process. Projects are initially screened through the Flow Chart for designated critical habitat (below) to determine whether they can proceed or should be carried forward through standard consultation procedures. The second part consists of Table D1, which displays activity types, activity components, screening criteria, and effects determination.



CANADA LYNX CRITICAL HABITAT SCREENING PROCESS, PART 2

Table D1: Screening criteria for projects included in Canada Lynx Critical Habitat

#	Activity Type	Activity Component	Screening Criteria*	Determination
1	**Vegetation Management in PCE 1d- Matrix Habitat (including fuel treatments within the WUI)**	Vegetation management (except for emergency actions during a wildfire[1]) in matrix habitat that changes the composition and structure of habitat using such means as prescribed fire, precommercial thinning, commercial thinning, or other types of timber harvest (except for salvage harvest); includes felling, skidding, and/or hauling of timber products (not including salvage harvest); includes vegetation management action that reduces the threat of ignition, fire intensity, or rate of spread, or is used to restore fire-adapted ecosystems	Project activities do not create permanent travel routes or permanent firebreaks on ridges or saddles that could impede lynx movements; project activities do not create a barrier to lynx movement (PCE 1d), or adversely affect PCE elements 1a, 1b, or 1c in adjacent boreal forest	NLAA
			Project creates a permanent travel route or firebreak, or may otherwise impede lynx movements through the landscape (PCE 1d), or activities alter the physical and biological features to an extent that they may significantly affect the conservation value of adjacent boreal forest for PCE elements 1a, 1b, or 1c	Potential LAA, Follow Standard Consultation Process
2	**Vegetation Management in Mapped Lynx Habitat that is not in Matrix Habitat**	Vegetation management or removal of tree products in lynx critical habitat that does **not currently provide snowshoe hare habitat** using such means as precommercial thinning, prescribed fire, or timber harvest (includes post/pole sales, Other Forest Products, Christmas Tree/Bough Cutting, Commercial Firewood Removal, etc.); includes felling, skidding, and/or hauling of timber products	Project activities **do not** result in a permanent loss of any potential boreal forest or potential to provide PCE 1a or 1c, and conform to the conservation measures for vegetation management in core areas (see page 14); project recruits a high density of conifers, hardwoods, and shrubs where it is currently lacking	NLAA

* Emergency actions are exempt.

#	Activity Type	Activity Component	Screening Criteria*	Determination
2	**Vegetation Management in Mapped Lynx Habitat that is not in Matrix Habitat, continued**	NA	Activities could result in permanent loss or conversion of the boreal forest, such as permanent travel routes or permanent firebreaks on ridges or saddles; or activities do not conform to the conservation measures for vegetation management in core areas (see page 14)	Potential LAA, Follow Standard Consultation Process
3	**Salvage Harvest of Burned Habitat**	Includes salvage harvest of burned areas that converted habitat to early stand initiation structural stage that does not yet provide snowshoe hare habitat	If in matrix habitat (PCE 1d) activities would not create a barrier or impede lynx movement between patches of foraging habitat and between foraging and denning habitat within a potential home range, or would not adversely affect adjacent foraging habitat or denning habitat	NLAA
4	**Other Salvage Harvest**	Includes dead, damaged, and dying trees due to causes other than fire	If in boreal forest vegetation types, management conforms to the conservation measures for vegetation management in core areas (see page 14); project recruits a high density of conifers, hardwoods, and shrubs where it is currently lacking _____ If in matrix habitat (PCE 1d) activities would not create a barrier or impede lynx movement between patches of foraging habitat and between foraging and denning habitat within a potential home range, or would not adversely affect adjacent foraging habitat or denning habitat	NLAA

* Emergency actions are exempt.

#	Activity Type	Activity Component	Screening Criteria*	Determination
5	**Silvicultural Activities**	Tree planting	Activity does not result in stand type conversion that reduces potential lynx habitat	NE or NLAA
		Disease control – manual treatment of larch through girdling to control larch mistletoe; protection of rust-resistant whitebark pine or white pine trees; placement of pheromone packets	If in matrix habitat (PCE 1d), activities would not create a barrier or impede lynx movements, or would not adversely affect adjacent foraging habitat or denning habitat	NE or NLAA
6	**New Permanent Road Construction**	Highway or forest highway construction and project-level specified roads	NA	Potential LAA, Follow Standard Consultation Process
7	**New Temporary Road Construction**	NA	If in boreal forest vegetation types, the temporary road is rehabilitated so that a high density of conifers, hardwoods, and shrubs will grow _____ If in matrix habitat (PCE 1d) activities would not create a barrier or impede lynx movement between patches of foraging habitat and between foraging and denning habitat within a potential home range, or would not adversely affect adjacent foraging habitat or denning habitat	NLAA

* Emergency actions are exempt.

#	Activity Type	Activity Component	Screening Criteria*	Determination
8	**Range Management Activities that Affect Vegetative Conditions**	Livestock grazing in post-fire and post-harvest areas, aspen stands, shrub-steppe habitats or riparian areas or installation of range improvements	Unless in matrix habitat, livestock grazing is managed to be compatible with improving or maintaining lynx habitat	NLAA
9	**Recreation Management Activities that Potentially Affect Vegetative Conditions**	Developing new or expanded recreation developments (includes developing or expanding ski areas beyond the existing permit area; planned recreational developments and operations, campgrounds) that result in permanent habitat loss	NA	Potential LAA, Follow Standard Consultation Process
		Recreation Special Uses - This includes activities for which permits are issued and includes outfitting and permits issued to a variety of organizations that engage in activities such as mountaineering, rock climbing, outward bound, ski races, concerts, "Poker Runs," "Fun Runs," driving tours, nature watch hikes, hunting, fishing, etc.	Activity is consistent with existing access management specific to lynx from Forest Plans and Travel Plans	NE or NLAA
		Trail Use consistent with existing travel management	NA	NE or NLAA
		Maintenance and/or Minor Trail Re-routes - This consists of maintenance of trails and minor trail re-routes and may require use of heavy equipment	Activity is consistent with existing access management specific to lynx from Forest Plans and Travel Plans	NE or NLAA

* Emergency actions are exempt.

#	Activity Type	Activity Component	Screening Criteria*	Determination
9	**Recreation Management Activities that Potentially Affect Vegetative Conditions, continued**	New Trail Construction and/or Major Trail Re-routes and Maintenance - This includes the development of new trails used for foot, stock, or motorcycles and may require the use of heavy equipment or hand tools and may create a clearing width up to 10 feet wide (FSH 2309.18); this also includes major re-routing and may require use of heavy equipment and/or blasting	Activity is consistent with existing access management specific to lynx from Forest Plans and Travel Plans	NLAA
		Camping – Includes dispersed and existing developed campgrounds	NA	NE
		Permitted and Non-permitted use of existing Developed Sites, Facilities, and Their Maintenance - This includes special use permits issued for facilities, residences, and other structures; permits are also issued for organizational camps such as the Boy Scouts and church groups at developed campgrounds; other facilities include but are not limited to campgrounds, rental cabins, watchable wildlife sites, picnic areas, warming huts, and communication sites; also includes Forest Service administrative sites and their maintenance (e.g., campgrounds, trailheads, ranger stations, etc.)	NA	NE or NLAA

* Emergency actions are exempt.

#	Activity Type	Activity Component	Screening Criteria*	Determination
10	**Forest or Back-country Roads and Road Maintenance[1]**	Road Maintenance - This includes general road maintenance that may involve the brushing of vegetation on the road or along roadsides; road maintenance may include but is not limited to roadbed blading, brushing, cleaning ditches, replacing or cleaning culverts, replacing bridges, cleaning dips, or spot graveling	If in matrix habitat (PCE 1d) activities would not create a barrier or impede lynx movement between patches of foraging habitat and between foraging and denning habitat within a potential home range, or would not adversely affect adjacent foraging habitat or denning habitat	NLAA
			If in matrix habitat (PCE 1d) activities would create a barrier or impede lynx movement between patches of foraging habitat and between foraging and denning habitat within a potential home range, or would adversely affect adjacent foraging habitat or denning habitat	Potential LAA, Follow Standard Consultation Process
		Hazard Tree Removal	NA	NE or NLAA
		Forest or Back-country Road Decommissioning -- Roads that are generally not paved with vehicle speeds typically less than 35 miles per hour; the surface can be gravel or natural materials; this involves the use of heavy equipment to prepare the road surface and includes obliteration and other methods to hydrologically neutralize the road	NA	NE or NLAA
		Existing Road and Parking Area Upgrades (within existing disturbed area footprint)	Project does not result in increased traffic speed or volume, and does not result in a foreseeable contribution to increases in human development	NE or NLAA

* Emergency actions are exempt.

#	Activity Type	Activity Component	Screening Criteria*	Determination
10	**Forest or Back-country Roads and Road Maintenance[1] co ntinued**	General Road Use - This includes hauling timber, removing mining waste and materials, and moving livestock over federal roads for which permits are required; it also includes routine road use by administrative units to carry out work associated with recreation, range, timber and minerals management, fire prevention and suppression, inventories, surveys, and other monitoring activities	Activity is consistent with existing access management specific to lynx from Forest Plans and Travel Plans	NE
11	**Other Forest Products**	This includes but is not limited to berry, mushroom, and bear grass collection and includes both commercial and non-commercial activities; collection of tree products is not included	Activity is consistent with existing access management specific to lynx from Forest Plans and Travel Plans	NE
12	**Habitat Restoration**	Wildlife, Fisheries and Rare Plant Habitat Management - This includes aspen rejuvenation, shrub field maintenance and other types of ecosystem-driven projects designed to promote or restore natural processes in an area	If in matrix habitat (PCE 1d), activities would not create a barrier or impede lynx movement between patches of foraging habitat and between foraging and denning habitat within a potential home range, or would not adversely affect adjacent foraging habitat or denning habitat	NLAA
			If not in matrix habitat, project activities do not result in a permanent loss of any potential boreal forest or potential to provide PCE 1a or 1c	NLAA

* Emergency actions are exempt.

#	Activity Type	Activity Component	Screening Criteria*	Determination
13	**Noxious Weed Management**	This includes chemical and biological treatments to noxious weeds	NA	NE or NLAA
14	**Other Special Uses**	This includes non-recreation special uses and mineral and energy exploration and development and maintenance of existing sites, corridors, or other facilities and is often carried out by the entity that owns the structures or facilities; maintenance may include vegetation blading or cutting, or spraying to reduce brush and reduce the invasion of shrubs and trees among other activities	Activity is consistent with existing access management specific to lynx from Forest Plans and Travel Plans and occurs within existing disturbed area footprint	NLAA
15	**Hardrock Mining and Gravel Pits**	Quarries, recreational mining, small mines, exploratory drilling, and reclamation of small mines	Activity is consistent with existing access management specific to lynx from Forest Plans and Travel Plans, and occurs within existing disturbed area footprint	NLAA or NE
16	**Ditches and Diversions**	NA	NA	NLAA or NE
17	**Surveys**	Surveys – This includes snow course surveys, patrols, track counts, habitat sampling, hair posts, remote camera stations, and radio telemetry among other methods	NA	NLAA or NE

* Emergency actions are exempt.

#	Activity Type	Activity Component	Screening Criteria*	Determination
18	**Miscellaneous**	Activity component not listed specifically above	If in mapped lynx habitat, project activities do not result in a permanent loss of any existing or potential boreal forest or potential to provide PCE 1a or 1c	NLAA or NE
			If in matrix habitat, project activities do not create a barrier to lynx movement (PCE 1d), or adversely affect PCE elements 1a or 1c in adjacent boreal forest	NLAA or NE

* Emergency actions are exempt.

APPENDIX E

CONSULTATION SUMMARY SHEET FOR PROGRAMMATIC ASSESSMENT

Instructions

For all projects and actions reviewed and analyzed using the wildlife screen process, the consultation summary sheets in Appendix E of the biological assessment must be filled out by Project Biologists and submitted to Forest Biologists for review and submission to the U.S. Fish and Wildlife Service semi-annually for review. Also, the Level 1 team will annually select a number of projects at random and review the use of the screens and documentation.

Page ___ of ___

Administrative Unit: _____

Contact:_____:***Project Biologist*** Reviewed by:_____:***Forest Biologist***

Date: _____

Project Name and Description	Species	Effects of Action	Cumulative Effects (ESA)	How Does the Project Meet Screening Criteria?	Determination of Effects
Project description should provide pertinent information including all aspects of the project that potentially affect T&E species; this includes but is not limited to: project name, project location including management unit if applicable, timing of implementation and details of project activities	**Grizzly Bear**	***Briefly describe the overall effect for the entire project on the species and base it on the screening criteria***	***Briefly describe the effects of future, non-federal actions that are reasonably likely to occur in the action area (this is the area where the effects of the project may be felt)***	***Specifically identify the screening criteria and describe how the project meets these specific criteria***	• ***No effect*** • ***May affect not likely to adversely affect***
	Canada Lynx				
	Canada Lynx Critical Habitat				

From: Hanvey, Gary -FS
To: Ann_Belleman@fws.gov ; Solberg Schwab, Lisa
Subject: Programmatic BA - R1
Date: Thursday, July 23, 2015 5:43:03 PM
Attachments: image001.png
image002.png
image003.png
image004.png
2014FINAL BA Programmatic NLAA.docx
2014_12_17 LTR Bush_Conard_Johnston Programmatic NLAA effects screens concur GLLCH .pdf

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Attached is a BA prepared by Region 1 for *Programmatic Biological Assessment for Activities That are NLAA Canada Lynx, Grizzly Bear and Designated Canada Lynx Critical Habitat,* ***and*** a FWS concurrence letter signed by Jodi Bush and Ben Conard. The initial R1 programmatic BA process was developed in about 2007 or so, and I used it some when I was on the Lewis and Clark. Think I told you about it when I came on board at the BT. The attached 2014 BA is an updated/improved version that incorporates improvements to the screening processes for grizz bear, lynx and lynx critical habitat.

The programmatic process is for simple, straight-forward projects that would result in NLAA or NE calls. I'm going through the screens now for a Ski Area Expansion/Improvement Project on Big Mountain to see if the programmatic process is appropriate. Even tho the screens are very strict, there are always projects that don't always fit defined categories. BAs prepared using this process do not go thru the normal consultation process, but are filed at the Forest. The FWS randomly selects a handful of programmatic BAs annually for review to ensure the process was appropriately implemented and that calls made were appropriate.

A lot of good info in the BA regarding lynx listing history, habitat needs, environmental baseline, NRLMD interpretation, ect…… FYI.

Gary Hanvey
Wildlife Program Manager

Forest Service
Flathead National Forest - SO

p: 406-758-5255
f: 406-758-5351
ghanvey@fs.fed.us

650 Wolfpack Way
Kalispell, MT 59901, MT 59901
www.fs.fed.us

Caring for the land and serving people

From: Ivan - DNR, Jake
To: Zelenak, Jim
Cc: Kurt Broderdorp
Subject: Re: Canada lynx status assessment
Date: Friday, July 24, 2015 4:13:45 PM

Thanks Jim and Kurt. I talked with my supervisor and sent the request to participate up the chain. We'll see what happens. I have no ability to predict what we'll do anymore so won't even try. I will let you know ASAP, however. Thanks for the invitation. I hope I can participate.

Jake

Jake Ivan
Wildlife Researcher
Mammals Research Section
P 970.472.4310 | F 970.472.4457 | C 970.556.8048
317 W. Prospect Rd., Fort Collins, CO 80526
jake.ivan@state.co.us | cpw.state.co.us

On Thu, Jul 23, 2015 at 1:44 PM, Zelenak, Jim <jim_zelenak@fws.gov> wrote:

> Hi Jake,
>
> Thanks for your time on the phone. Sorry to pile on to Kurt's messages and emails, but I wanted to try to get this on your radar quickly. Below is more detail on the SSA and related expert elicitation meeting we are trying to line up for Oct. - Nov. It's looking like most folks are available the week before the TWS meeting, so we are leaning toward that preceding week of Oct. 12 (either 10/13-15 [Tu - Th] or 10/14-16 [W - F]), though the dates are not final yet.
>
> I've also attached the letter that went to CPW and which includes the number and pass code for next Wednesday's coordination call along with a 2-page SSA fact sheet.
>
> The U.S. Fish and Wildlife Service is undertaking a Species Status Assessment (SSA) for the lynx DPS (lower 48 lynx), which is intended to inform recovery planning and the eventual final recovery plan, which we are under court order to complete by Jan. 2018.
>
> The SSA framework is a relatively new (and still-evolving) process intended to result in a report that forms the scientific underpinnings for all or most of the determinations and documents the Service is required to produce in accordance with the ESA.
>
> Given the lack of solid empirical data for many lynx population parameters (e.g., the sizes of the various DPS subpopulations; survival, mortality, recruitment, immigration/emigration rates, etc.) we will need to rely on expert opinion regarding some factors and processes that are necessary to evaluate the likely viability and future health of the DPS.
>
> I'm writing to inquire about your interest and availability to either present research results or participate in a structured lynx "expert elicitation" meeting, or both, that will likely occur in mid-Oct. - mid-Nov., probably in Minneapolis (geographic mid-point of the DPS).
>
> You would contribute importantly to that meeting, where we will also invite other lynx experts from southern Canada and from specific parts of the DPS range in the lower 48, as well as climate change modelers and boreal forest ecologists.
>
> Please let me know if you are interested and potentially available to participate in such a gathering and, if so, whether there are certain dates that absolutely would not work for you. We intend to coordinate with States and other partners throughout

this process, but we will need to keep the number of participants at the expert elicitation meeting to a manageable number of folks most able to provide insight on the key variables pertinent to an assessment of the current and likely future status of lynx in the lower 48. In that regard, I welcome your thoughts/ recommendations on other lynx researchers, modelers (climate/forest processes), or managers you think also should be considered for participation at the meeting.

Thanks for considering this request. Please call if you'd like to discuss.

Cheers!

--
Jim Zelenak, Biologist
U.S. Fish and Wildlife Service
Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, MT 59601
(406) 449-5225 ext. 220
jim_zelenak@fws.gov

From: Murphy, Kerry M -FS
To: Zelenak, Jim
Subject: RE: Canada lynx status assessment
Date: Saturday, July 25, 2015 10:54:06 AM

Jim: you may put me down as "interested" in this meeting. However, I don't think I am very current with the latest lynx research. I am pretty up on managment.

I would not be available until after November 1. Travel permissions uncertain.

Of course, Gary Hanvey comes to mind as a person who might also want to invite. Also, Ann Bellman.

From: Zelenak, Jim [mailto:jim_zelenak@fws.gov]
Sent: Thursday, July 23, 2015 1:15 PM
To: Murphy, Kerry M -FS
Subject: Canada lynx status assessment

Hi Kerry,

The U.S. Fish and Wildlife Service is undertaking a Species Status Assessment (SSA) for the lynx DPS (lower 48 lynx), which is intended to inform recovery planning and the eventual final recovery plan, which we are under court order to complete by Jan. 2018.

The SSA framework is a relatively new (and still-evolving) process intended to result in a report that forms the scientific underpinnings for all or most of the determinations and documents the Service is required to produce in accordance with the ESA. I've attached a fact sheet sheet that provides some additional background.

Given the lack of solid empirical data for many lynx population parameters (e.g., the sizes of the various DPS subpopulations; survival, mortality, recruitment, immigration/emigration rates, etc.) we will need to rely on expert opinion regarding some factors and processes that are necessary to evaluate the likely viability and future health of the DPS.

I'm writing to inquire about your interest and availability to either present research results or participate in a structured lynx "expert elicitation" meeting, or both, that will likely occur in mid-Oct. - mid-Nov., probably in Minneapolis (geographic mid-point of the DPS).

You would contribute importantly to that meeting, where we will also invite other lynx experts from southern Canada and from specific parts of the DPS range in the lower 48, as well as climate change modelers and boreal forest ecologists.

Please let me know if you are interested and potentially available to participate in such a gathering and, if so, whether there are certain dates that absolutely would not work for you. We intend to coordinate with States and other partners throughout this process, but we will need to keep the number of participants at the expert elicitation meeting to a manageable number of folks most able to provide insight on the key variables pertinent to an assessment of the current and likely future status of lynx in the lower 48. In that regard, I welcome your thoughts/ recommendations on other lynx researchers, modelers (climate/forest processes), or managers you think also should be considered for participation at the meeting.

Thanks for considering this request. Please call if you'd like to discuss.

Cheers!

--
Jim Zelenak, Biologist
U.S. Fish and Wildlife Service
Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, MT 59601
(406) 449-5225 ext. 220
jim_zelenak@fws.gov

From: Zelenak, Jim
To: Jodi Bush
Subject: Wolverine Panel Climate Scientists
Date: Monday, July 27, 2015 8:19:37 AM

Shawn suggested I look into the wolverine panel for some options for climate scientists who might inform the lynx SSA expert elicitation meeting/workshop.

Can you point me to where I can find a list of the wolverine science meeting participants?

Kurt Johnson from HQ is also working on this and should have some info by midweek.

--
Jim Zelenak, Biologist
U.S. Fish and Wildlife Service
Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, MT 59601
(406) 449-5225 ext. 220
jim_zelenak@fws.gov

From: Bush, Jodi
To: Jonathan Mawdsley
Cc: Jim Zelenak
Subject: Re: Assistance with Lynx Recovery
Date: Monday, July 27, 2015 9:18:46 AM

Thanks Jonathan. JB

Jodi L. Bush
Field Supervisor
Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, MT 59601
(406) 449-5225, ext.205

On Fri, Jul 24, 2015 at 4:21 PM, Jonathan Mawdsley <jmawdsley@fishwildlife.org> wrote:

> Hi Jodi,
>
> Many thanks again for the note – here are the e-mail addresses for the directors:
>
> New York – Patricia Riexinger, patricia.riexinger@dec.ny.gov
>
> Maine – Chandler Woodcock, Chandler.woodcock@maine.gov
>
> New Hampshire – Glenn Normandeau, glenn.normandeau@wildlife.nh.gov
>
> Vermont – Louis Porter, louis.porter@state.vt.us
>
> Wisconsin – Cathy Stepp, cathy.stepp@wisconsin.gov
>
> Michigan – William Moritz, moritzw@michigan.gov
>
> Minnesota – Ed Boggess, ed.boggess@state.mn.us
>
> All the best,
>
> Jonathan
>
> **From:** Bush, Jodi [mailto:jodi_bush@fws.gov]
> **Sent:** Monday, July 20, 2015 4:17 PM
> **To:** Jonathan Mawdsley
> **Cc:** Jim Zelenak

Subject: Assistance with Lynx Recovery

Hi Jonathan. I know you are at WAFA this week so don't worry about responding til you r back in the office...

We have our state coordination call scheduled next week but realized we wanted to add some presentation over a webinar. Unfortunately we don't have the email contact information for the directors of the states we contacted.

Do you think you could send me their email addresses?

I need them for: New York, Maine, New Hampshire and Vermont

Wisconsin, Michigan and Minnesota

I have the emails and contact info for the WAFWA agencies.

Thanks for your help. If this is too onerous, we can search the internet. We thought you might have them

Jodi L. Bush

Field Supervisor

Montana Ecological Services Office

585 Shepard Way, Suite 1

Helena, MT 59601

(406) 449-5225, ext.205

From: Johnson, Kurt
To: Zelenak, Jim
Subject: Re: Draft Expert Elicitation Guidance and Criteria
Date: Monday, July 27, 2015 9:49:30 AM

I will try, Jim.

On Mon, Jul 27, 2015 at 9:17 AM, Zelenak, Jim <jim_zelenak@fws.gov> wrote:

> Yes - that would be great, Kurt. Thanks.
>
> Also, feel free to dial into the lynx SSA Implementation Team call today at 11 Mountain/1 PM Eastern time if you'd like to get a feel for where we are and/or if you'd like to update the group on your efforts.
>
> 866-857-8504
> passcode: 7620543
>
> On Fri, Jul 24, 2015 at 9:29 AM, Johnson, Kurt <kurt_johnson@fws.gov> wrote:
>
> > Thanks for this, Jim. I am working my way through lynx "regions" within the US, identifying key research, literature and experts. I should have a product for you by the middle of next week. Is that still timely?
> >
> > Have a great weekend.
> >
> > Best regards,
> >
> > Kurt
> >
> > On Thu, Jul 23, 2015 at 12:56 PM, Zelenak, Jim <jim_zelenak@fws.gov> wrote:
> >
> > > Hi All:
> > >
> > > Please review the attached DRAFT guidance, which incorporates several previous rounds of comments/edits from David, Jonathan, Mary and myself.
> > >
> > > Kurt J. - I thought these might be helpful as you/your shop evaluate potential climate change/modeling experts for participation in the expert elicitation meeting/workshop.
> > >
> > > SSA Core Team - please take a look at these as you reach out informally to prospective experts or have follow-up discussions with those you've already contacted. Also let me know if you see any red flags or have other edits/comments/recommendations.
> > >
> > > Dave - I've left two of Mary's comments in Appendix 2 that still need to be resolved (one of which I took a stab at addressing - the "ESA" paragraph). I also left in a few potential edits in Track Changes in the APA paragraph that I'd like you and Mary to take another look at. Also would like your thoughts on who else in FWS beyond the Core Team should have these. Should all the Project Leaders who sent letters to State agencies have a look?
> > >
> > > Thanks.
> > >
> > > --
> > > Jim Zelenak, Biologist
> > > U.S. Fish and Wildlife Service
> > > Montana Ecological Services Office

585 Shepard Way, Suite 1
Helena, MT 59601
(406) 449-5225 ext. 220
jim_zelenak@fws.gov

--
Jim Zelenak, Biologist
U.S. Fish and Wildlife Service
Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, MT 59601
(406) 449-5225 ext. 220
jim_zelenak@fws.gov

From:	Kurt Broderdorp
To:	Ivan - DNR, Jake
Cc:	Eric Odell; Jim Zelenak
Subject:	RE: Results of winter snow tracking
Date:	Monday, July 27, 2015 11:00:31 AM

Jake, No deadline per se, but we are looking for information for the species status assessment.

Kurt Broderdorp
US Fish and Wildlife Service
(970) 628-7186

From: Ivan - DNR, Jake [mailto:jake.ivan@state.co.us]
Sent: Friday, July 24, 2015 5:37 PM
To: Broderdorp, Kurt
Cc: Eric Odell; Jim Zelenak
Subject: Re: Results of winter snow tracking

Hi Kurt,

Sorry for the delay - between field work, meetings, vacaction, and now my Dad having an accident (may be flying home soon), this has been a crazy month. I can tell you the following right now off the top of my head. I can also get you more specifics on all of this as soon as I get a second to catch up. What is your deadline for this information?

We initiated the first part of our lynx monitoring project this past fall/winter. This initial effort consisted of estimating lynx occupancy in the San Juans across a sample of 50 75-km2 cells. The project was designed following the Ellis et al. 2013 Conservation Biology paper on wolverines (we re-programmed for lynx in CO) and should give us enough power to detect meaningful changes in occupancy and even abundance in that region. We used snow-tracking surveys everywhere we could (probability of detection is highest with this method) and deployed remote cameras in places we couldn't access via snow machine. We should have initial estimates of occupancy and distribution by the first of September.

In addition to this official monitoring effort, we also had a small crew available to conduct extra surveys in cells that were sampled during our pilot monitoring work in 2010-2011 (but were not selected for the official monitoring program) as well as those where we knew lynx to be present throughout the course of the reintroduction research (and that weren't selected to be a part of the official monitoring program). Between these efforts (speaking strictly anecdotally at the moment), we found lynx tracks in nearly all of the places where they were present in 2010-2011 and/or during the reintroduction research. The places we did not detect them this winter are places that seemed marginal in the past (e.g., we had an individual or 2 there for some years, not others). Also, due to snow conditions this past winter, we weren't able to survey as completely as we would have liked. Furthermore, we've gotten photos of lynx where we didn't get them during the pilot work. So, my initial impression is that the current distribution of lynx is similar to what is always was despite much of overstory in the San Juans being subject to the spruce beetle epidemic.

CPW has collaborated with John Squires on the Lynx-Winter Recreation Study for

the past few years, and fieldwork on that study is now complete. Approximately half of the 13 cats in that sample were Colorado-born cats (most of those had no PIT, collar, or any other CPW marking when they were captured, so they were completely new since we stopped reintroduction research work in 2010). Additionally, we have initiated a new project with him looking at the impacts of spruce beetles on lynx habitat use on the Rio Grande National Forest. At least 2 of those 4 cats were also young cats, completely unmarked, and thus represent recent reproduction. One of these was a young (estimated 2 years old) female who we documented had a litter of 2 kittens right in the middle of some of the worst beetle killed forest in the area. The other female we captured on that project this winter was an original reintroduction cat (14+ years old). She also had 2 kittens this past summer, right in the middle of some heavily impacted beetle kill. Coincidentally, her den this summer was about 500m from the last den we documented from her in 2009.

So, all in all, I would say initial evidence we have from these 2 ongoing projects is that lynx are continuing to do well in Colorado, at least in terms of distribution compared to where they were when we last kept close tabs on them. Also, we have recent evidence of ongoing reproduction. When the monitoring program is fully up and running, we will be gathering more information from mountain ranges across the state, in addition to the San Juans. That's a few years away though, assuming there is continued buy-in to keep up the effort.

Jake

Jake Ivan
Wildlife Researcher
Mammals Research Section
P 970.472.4310 | F 970.472.4457 | C 970.556.8048
317 W. Prospect Rd., Fort Collins, CO 80526
jake.ivan@state.co.us | cpw.state.co.us

On Thu, Jul 9, 2015 at 2:57 PM, Broderdorp, Kurt <kurt_broderdorp@fws.gov> wrote:
Hey guys, I hope all is well. As you might be aware, the USFWS is working on a species status assessment for Canada lynx. Jim Zelenak asked me about any results from snow tracking last winter, any lynx tracks found, locations, evidence of family groups, etc. Any information you can provide may help us with our task. Thanks.

--
Kurt Broderdorp
445 West Gunnison Avenue
Suite 240
Grand Junction, CO 81501-5720
(970) 628-7186

From: Zelenak, Jim
To: Solberg Schwab, Lisa
Cc: Jodi Bush
Subject: Re: Lynx SSA letter to the States
Date: Monday, July 27, 2015 3:37:33 PM

Hi Lisa,

Has the coordination letter to the State gone out?

Please send me an electronic copy (.pdf) if it has or when it does.

Thanks.

On Mon, Jul 20, 2015 at 2:49 PM, Solberg Schwab, Lisa <lisa_solbergschwab@fws.gov> wrote:

> I apologize it was part of my original request. Please disregard, its been a long day :)
>
> Lisa Solberg Schwab
> Biologist
> USFWS, Wyoming ES Field Office
> located at
> BLM Pinedale Field Office
> 1625 W. Pine St.
> P.O. Box 768
> Pinedale, WY 82941
> (307) 367-5340
>
> On Mon, Jul 20, 2015 at 2:45 PM, Solberg Schwab, Lisa <lisa_solbergschwab@fws.gov> wrote:
>
> > OK.
> >
> > Could you send me their email addresses?
> >
> > thank you.
> > Lisa
> >
> >
> > Lisa Solberg Schwab
> > Biologist
> > USFWS, Wyoming ES Field Office
> > located at
> > BLM Pinedale Field Office
> > 1625 W. Pine St.
> > P.O. Box 768
> > Pinedale, WY 82941
> > (307) 367-5340
> >
> > On Mon, Jul 20, 2015 at 12:48 PM, Bush, Jodi <jodi_bush@fws.gov> wrote:
> >
> > > We have just been sending them electronically. I don't have physical mail addresses.

JB

Jodi L. Bush
Field Supervisor
Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, MT 59601
(406) 449-5225, ext.205

On Mon, Jul 20, 2015 at 11:54 AM, Solberg Schwab, Lisa <lisa_solbergschwab@fws.gov> wrote:

Jodi,

I have prepared the letter for WY however I do not have physical addresses to the recipients of the CC list you have requested, could you send them to me?

Please cc Gary Frazer (FWS), Jonathan Mawdsley (AFWA-Fish and Wildlife Science Coordinator) jmawdsley@fishwildlife.org and Nick Wiley (AFWA Threatened and Endangered Species Policy Committee Chair) Nick.Wiley@myfwc.com.

Thank you!!

Lisa Solberg Schwab
Biologist
USFWS, Wyoming ES Field Office
located at
BLM Pinedale Field Office
1625 W. Pine St.
P.O. Box 768
Pinedale, WY 82941
(307) 367-5340

--

Jim Zelenak, Biologist
U.S. Fish and Wildlife Service
Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, MT 59601
(406) 449-5225 ext. 220
jim_zelenak@fws.gov

From: Bush, Jodi
To: Zelenak, Jim
Subject: Re: State lynx coordination letters
Date: Monday, July 27, 2015 3:57:28 PM

Sounds like we ought to be prepared to have the ppts to send as pdfs.

Is Mary aware of NY's lack of sending out a letter? She needs to get on them. Or tell me who to talk to make it happen. JB

Jodi L. Bush
Field Supervisor
Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, MT 59601
(406) 449-5225, ext.205

On Mon, Jul 27, 2015 at 3:43 PM, Zelenak, Jim <jim_zelenak@fws.gov> wrote:

> I have not yet received letters for Wyoming (just emailed Lisa and copied you), New York, or Michigan.
>
> I've attached the latest version of the contacts list, with email addresses and phone numbers for State agency directors, etc.
>
> Heather and I tried to test the webex, and we are having the issues Jim Renne noted, so we have to consider the possibility that we won't have it for the State coordination call on Wed. I'll keep working in it tomorrow. Also will send you a draft Powerpoint tomorrow AM with my slides for the call and maybe-webinar on Wed.
>
> I have an SSA core team call from 10-11 tomorrow.
>
> --
> Jim Zelenak, Biologist
> U.S. Fish and Wildlife Service
> Montana Ecological Services Office
> 585 Shepard Way, Suite 1
> Helena, MT 59601
> (406) 449-5225 ext. 220
> jim_zelenak@fws.gov

From: Bush, Jodi
To: Jim Zelenak
Subject: Fwd: ATTENTION -NEEDS ACTION: Updated State Coordination Letter for Lynx
Date: Monday, July 27, 2015 3:58:42 PM

Did you not get the letter? JB

Jodi L. Bush
Field Supervisor
Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, MT 59601
(406) 449-5225, ext.205

---------- Forwarded message ----------
From: **Bush, Jodi** <jodi_bush@fws.gov>
Date: Tue, Jul 21, 2015 at 8:24 AM
Subject: Re: ATTENTION -NEEDS ACTION: Updated State Coordination Letter for Lynx
To: "Hicks, Scott" <scott_hicks@fws.gov>

thanks Scott. JB

Jodi L. Bush
Field Supervisor
Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, MT 59601
(406) 449-5225, ext.205

On Tue, Jul 21, 2015 at 5:42 AM, Hicks, Scott <scott_hicks@fws.gov> wrote:

> It has, we'll e-mail you a copy.
> Scott
>
> _____
> U.S. Fish and Wildlife Service
> East Lansing Field Office
> 2651 Coolidge Road, Suite 101
> East Lansing, Michigan 48823
>
> Phone: 517-351-6274
> Fax: 517-351-1443
>
> On Mon, Jul 20, 2015 at 3:33 PM, Bush, Jodi <jodi_bush@fws.gov> wrote:
>
> > Scott. We haven't seen a copy of your letter to the state on the Lynx SSA process. Has that happened? I know you were working on it. JB

Jodi L. Bush
Field Supervisor
Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, MT 59601
(406) 449-5225, ext.205

On Fri, Jul 10, 2015 at 3:18 PM, Bush, Jodi <jodi_bush@fws.gov> wrote:

> Scott
>
> Because of a high level of interest identified through AFWA and conversations with Gary Frazer, we have determined that **all states** within the range of the Lynx DPS should be updated on the status of where we are at with Lynx Recovery Planning. To that end we also invite you to participate (however you see fit) in our planning process.
>
> In order to make sure we are reaching all states who may have an interest in the outcome of our Lynx Recovery Planning, we request that you send out the following state letter and SSA process document to your respective State Wildlife agency directors ASAP (Please see email below). We are planning on having regularly scheduled monthly calls with our state partners (information in the attached letter) and would like to make sure they are aware of the date and time of the call.
>
> If you have unanswered questions about where we are in the process, please feel free to give me a call so I can catch you up. We also have internal coordination calls on the first Tuesday of every month. August 4th will be the next one from 10-11 MTN time. Thanks for your help. JB
>
> Jodi L. Bush
> Field Supervisor
> Montana Ecological Services Office
> 585 Shepard Way, Suite 1
> Helena, MT 59601
> (406) 449-5225, ext.205
>
> > ---------- Forwarded message ----------
> > From: **Bush, Jodi** <jodi_bush@fws.gov>
> > Date: Thu, Jul 9, 2015 at 11:42 AM
> > Subject: ATTENTION -NEEDS ACTION: Updated State Coordination Letter
> > To: Eric Rickerson <eric_rickerson@fws.gov>, Michael Carrier <michael_carrier@fws.gov>, Mark Sattelberg <mark_sattelberg@fws.gov>, Ann Timberman <ann_timberman@fws.gov>, Drue DeBerry <drue_deberry@fws.gov>, Laury Zicari <laury_zicari@fws.gov>, Tom Chapman <Tom_Chapman@fws.gov>, Wally Murphy <wally_murphy@fws.gov>, Peter Fasbender <peter_fasbender@fws.gov>
> > Cc: Jeff Krupka <Jeff_Krupka@fws.gov>, Bryon Holt <Bryon_Holt@fws.gov>, Kurt Broderdorp <Kurt_Broderdorp@fws.gov>, Tamara Smith <Tamara_Smith@fws.gov>, Ann Belleman <ann_belleman@fws.gov>, Mark McCollough <Mark_McCollough@fws.gov>, Jim Zelenak <jim_zelenak@fws.gov>,

Anthony Tur <Anthony_Tur@fws.gov>, Seth Willey <seth_willey@fws.gov>, Sarah Quamme <Sarah_Quamme@fws.gov>, Laura Ragan <Laura_Ragan@fws.gov>, Krishna Gifford <krishna_gifford@fws.gov>, Eric Hein <Eric_Hein@fws.gov>, Sarah Hall <Sarah_Hall@fws.gov>, Michael Thabault <michael_thabault@fws.gov>, Lisa Mandell <lisa_mandell@fws.gov>

On Wed, Jul 1, 2015 at 11:00 AM, Bush, Jodi <jodi_bush@fws.gov> wrote:

> Hello. State Project Leaders. As I mentioned in my last email (June 26), regarding the Project Plan, we have updated the State coordination letter based on the addition of the SSA process and the subsequent altered timeline.
>
> As you are aware, the States are particularly interested in being engaged in our Lynx recovery planning process. To that end, the letter updates where we are now and identifies a monthly coordination call with our state partners to keep them appraised of our progress.
>
> **I am requesting that each state send out versions of this letter and attachment from their offices, preferably within the next several weeks. Feel free to use the version I provided (ATTACHED) as a template.**
>
> **Please cc Gary Frazer (FWS), Jonathan Mawdsley (AFWA-Fish and Wildlife Science Coordinator)** jmawdsley@fishwildlife.org **and Nick Wiley (AFWA Threatened and Endangered Species Policy Committee Chair)** Nick.Wiley@myfwc.com and provide a copy to Jim Zelanak -our Service lynx Lead.
>
> You'll note that we have identified the last wednesday of the month at 1pm MTN time as our standing coordination call with our State partners. It seemed appropriate to get this date identified upfront so could keep moving forward.
>
> As always -thanks for your help. Please call if you have questions. JB
>
> Jodi L. Bush
> Field Supervisor
> Montana Ecological Services Office
> 585 Shepard Way, Suite 1
> Helena, MT 59601
> (406) 449-5225, ext.205

From: Bush, Jodi
To: Sattelberg, Mark
Cc: Tyler Abbott; Jim Zelenak
Subject: Re: ATTENTION -NEEDS ACTION: Updated State Coordination Letter
Date: Monday, July 27, 2015 4:27:58 PM

---

great -thanks. JB

Jodi L. Bush
Field Supervisor
Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, MT 59601
(406) 449-5225, ext.205

On Mon, Jul 27, 2015 at 4:25 PM, Sattelberg, Mark <mark_sattelberg@fws.gov> wrote:

> Jim was on the cc list. I'll double check what happened. Bob is the person that I talked to last week.
>
> Mark
>
> ---
> R. Mark Sattelberg
> Field Supervisor
> U.S. Fish and Wildlife Service
> Wyoming Ecological Services Field Office
> 5353 Yellowstone Boulevard, Suite 308A
> Cheyenne, Wyoming 82009
>
> Phone: 307.772.2374 ext.234
> Cell Phone: 307.631.8186
> Fax: 307.772.2358
> mark_sattelberg@fws.gov
>
> On Mon, Jul 27, 2015 at 4:21 PM, Bush, Jodi <jodi_bush@fws.gov> wrote:
>
> > Can you send us a copy of the letter for the files?
> >
> > At the WAFWA meeting last week, we were told that Wyoming asked that Bob Lanka be engaged on this topic. Just FYI. JB
> >
> > Jodi L. Bush
> > Field Supervisor
> > Montana Ecological Services Office
> > 585 Shepard Way, Suite 1
> > Helena, MT 59601
> > (406) 449-5225, ext.205
> >
> > On Mon, Jul 27, 2015 at 4:20 PM, Sattelberg, Mark <mark_sattelberg@fws.gov> wrote:
> >
> > > Yes, and I have called them. Zack Walker should be on the phone. He is chief of non-game animal section. He probably won't be the main contact, but that hasn't been decided yet.
> > >
> > > Mark

R. Mark Sattelberg
Field Supervisor
U.S. Fish and Wildlife Service
Wyoming Ecological Services Field Office
5353 Yellowstone Boulevard, Suite 308A
Cheyenne, Wyoming 82009

Phone: 307.772.2374 ext.234
Cell Phone: 307.631.8186
Fax: 307.772.2358
mark_sattelberg@fws.gov

On Mon, Jul 27, 2015 at 3:59 PM, Bush, Jodi <jodi_bush@fws.gov> wrote:

> Hey Mark. Has the state letter gone out? State coordination call is on weds. JB
>
> Jodi L. Bush
> Field Supervisor
> Montana Ecological Services Office
> 585 Shepard Way, Suite 1
> Helena, MT 59601
> (406) 449-5225, ext.205
>
> On Thu, Jul 16, 2015 at 8:28 AM, Bush, Jodi <jodi_bush@fws.gov> wrote:
>
> > Checking in on status of the State letter. With many of those folks in Reno this week at AFWA meeting it would be great if it could go out soon. Also because we are noticing them of the conf call on July 29th of this month. Thanks. JB
> >
> > Jodi L. Bush
> > Field Supervisor
> > Montana Ecological Services Office
> > 585 Shepard Way, Suite 1
> > Helena, MT 59601
> > (406) 449-5225, ext.205
> >
> > ---------- Forwarded message ----------
> > From: **Bush, Jodi** <jodi_bush@fws.gov>
> > Date: Thu, Jul 9, 2015 at 12:47 PM
> > Subject: Re: ATTENTION -NEEDS ACTION: Updated State Coordination Letter
> > To: "Sattelberg, Mark" <mark_sattelberg@fws.gov>
> >
> > ok -thanks. JB
> >
> > Jodi L. Bush
> > Field Supervisor
> > Montana Ecological Services Office
> > 585 Shepard Way, Suite 1
> > Helena, MT 59601

(406) 449-5225, ext.205

On Thu, Jul 9, 2015 at 11:50 AM, Sattelberg, Mark <mark_sattelberg@fws.gov> wrote:

> Jodi,
>
> We are working on it.
>
> Mark
>
> ---
> R. Mark Sattelberg
> Field Supervisor
> U.S. Fish and Wildlife Service
> Wyoming Ecological Services Field Office
> 5353 Yellowstone Boulevard, Suite 308A
> Cheyenne, Wyoming 82009
>
> Phone: 307.772.2374 ext.234
> Cell Phone: 307.631.8186
> Fax: 307.772.2358
> mark_sattelberg@fws.gov
>
> On Thu, Jul 9, 2015 at 11:42 AM, Bush, Jodi <jodi_bush@fws.gov> wrote:
>
> > Just checking to see if these letters have gone out yet (I've only seen one from Maine). Its important that they get out asap so our State folks can make the conference call later this month. Thank you for your help. JB
> >
> > _____
> > **I am requesting that each state send out versions of this letter and attachment from their offices, preferably within the next several weeks. Feel free to use the version I provided (ATTACHED) as a template.**
> >
> > **Please cc Gary Frazer (FWS), Jonathan Mawdsley (AFWA-Fish and Wildlife Science Coordinator)** jmawdsley@fishwildlife.org **and Nick Wiley (AFWA Threatened and Endangered Species Policy Committee Chair)** Nick.Wiley@myfwc.com and provide a copy to Jim Zelanak -our Service lynx Lead.
> >
> > Jodi L. Bush
> > Field Supervisor
> > Montana Ecological Services Office
> > 585 Shepard Way, Suite 1
> > Helena, MT 59601
> > (406) 449-5225, ext.205
> >
> > On Wed, Jul 1, 2015 at 11:00 AM, Bush, Jodi <jodi_bush@fws.gov> wrote:
> >
> > > Hello. State Project Leaders. As I mentioned in my last email (June 26), regarding the Project Plan, we have updated the State coordination letter based on the addition of the SSA process and the subsequent altered timeline.
> > >
> > > As you are aware, the States are particularly interested in being engaged in our Lynx recovery planning process. To that end, the letter updates where we are now and identifies a monthly coordination call

with our state partners to keep them appraised of our progress.

I am requesting that each state send out versions of this letter and attachment from their offices, preferably within the next several weeks. Feel free to use the version I provided (ATTACHED) as a template.

Please cc Gary Frazer (FWS), Jonathan Mawdsley (AFWA-Fish and Wildlife Science Coordinator) jmawdsley@fishwildlife.org **and Nick Wiley (AFWA Threatened and Endangered Species Policy Committee Chair)** Nick.Wiley@myfwc.com and provide a copy to Jim Zelanak -our Service lynx Lead.

You'll note that we have identified the last wednesday of the month at 1pm MTN time as our standing coordination call with our State partners. It seemed appropriate to get this date identified upfront so could keep moving forward.

As always -thanks for your help. Please call if you have questions. JB

Jodi L. Bush
Field Supervisor
Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, MT 59601
(406) 449-5225, ext.205

From: Bell, Heather
To: Zelenak, Jim
Cc: Mary Parkin
Subject: Re: PPT for state call tomorrow
Date: Tuesday, July 28, 2015 9:53:22 AM

---

i would just leave the SSA slides in, remove the REV slides and that can be a later conversation.

Heather Bell
Ecological Services HQ
Branch of Conservation Integration
SSA Framework Team Lead
Remotely Located at
134 S. Union Blvd
Lakewood, CO 80228
303-236-4514

Check it out! SSA Framework - Google Site for Staff
at https://sites.google.com/a/fws.gov/ssa/ and the REV Google Site: https://sites.google.com/a/fws.gov/rev/

On Tue, Jul 28, 2015 at 9:25 AM, Zelenak, Jim <jim_zelenak@fws.gov> wrote:

> Heather,
>
> As we chatted about - I've attached the PPT that is so far largely the same as the one we used for the May 28 all-FWS call/webinar. I'm re-working my slides and still have some work to do.
>
> I'm thinking the same thing in terms of process/presentation - Jodi will introduce the general topic, then I will give some background, timeline, and process stuff, then Heather will provide "SSA 101," then I and possibly Jodi will wrap up and ask for questions/discussion.
>
> Given the technical difficulties with webex and live meeting, Jodi would like to send the PPT as a pdf to States today so they can follow along tomorrow. We can apologize for our technical difficulties and let them know we hope to have the webinar issues resolved for the next call (?).
>
> Anyway - Heather, take a look and make any adjustments you think are needed to your slides and send back (or if no changes needed, just let me know that). Also - do we want to have the REV slides at this point? Or leave that for a later discussion as needed?
>
> --
> Jim Zelenak, Biologist
> U.S. Fish and Wildlife Service
> Montana Ecological Services Office
> 585 Shepard Way, Suite 1
> Helena, MT 59601
> (406) 449-5225 ext. 220
> jim_zelenak@fws.gov

From: Bush, Jodi
To: Angela Rivas Nelson
Cc: Jonathan Mawdsley
Subject: Re: FW: Assistance with Lynx Recovery
Date: Tuesday, July 28, 2015 2:14:45 PM

---

thank you! JB

Jodi L. Bush
Field Supervisor
Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, MT 59601
(406) 449-5225, ext.205

On Tue, Jul 28, 2015 at 1:51 PM, Angela Rivas Nelson <Arnelson@fishwildlife.org> wrote:

> Good afternoon Jodi:
>
> Sorry for the delay in getting this to you. Here are the email addresses for the state contacts which you requested.
>
> Please let me know if you need anything else.
>
> Michigan Deputy Director -- Moritzw@michigan.gov
>
> Minnesota -- ed.boggess@dnr.state.mn.us
>
> New Hampshire -- glenn.normandeau@wildlife.nh.gov
>
> New York -- patricia.riexinger@dec.ny.gov
>
> Maine -- chandler.woodcock@maine.gov
>
> Vermont -- Louis.porter@state.vt.us
>
> Wisconsin Land Division Administrator-- kurt.thiede@wisconsin.gov

---

We've moved; please note new address and telephone/fax numbers*

Angela Rivas Nelson

Executive Assistant

Association of Fish & Wildlife Agencies

1100 First Street NE, Suite 825, Washington, DC 20002

Telephone 202-838-3465 / Fax 202-350-9869

Email: arnelson@fishwildlife.org

From: Jonathan Mawdsley
Sent: Monday, July 20, 2015 4:30 PM
To: Angela Rivas Nelson
Cc: Ron Regan
Subject: Fw: Assistance with Lynx Recovery

Hello Angela,

Here is a request from Jodi Bush, the USFWS Lynx Recovery Coordinator, for the contact information for directors in the following states:

Michigan

Minnesota

New Hampshire

New York

Maine

Vermont

Wisconsin

The Service would like to send an e-mail message to these directors inviting them to participate in a webinar outlining the lynx recovery planning process.

I would be happy to forward this information along to Jodi if you have the information readily available.

Thanks in advance for your help!

All the best,

Jonathan

From: Bush, Jodi <jodi_bush@fws.gov>
Sent: Monday, July 20, 2015 4:17 PM
To: Jonathan Mawdsley
Cc: Jim Zelenak
Subject: Assistance with Lynx Recovery

Hi Jonathan. I know you are at WAFA this week so don't worry about responding til you r back in the office...

We have our state coordination call scheduled next week but realized we wanted to add some presentation over a webinar. Unfortunately we don't have the email contact information for the directors of the states we contacted.

Do you think you could send me their email addresses?

I need them for: New York, Maine, New Hampshire and Vermont

Wisconsin, Michigan and Minnesota

I have the emails and contact info for the WAFWA agencies.

Thanks for your help. If this is too onerous, we can search the internet. We thought you might have them

Jodi L. Bush

Field Supervisor

Montana Ecological Services Office

585 Shepard Way, Suite 1

Helena, MT 59601

(406) 449-5225, ext.205

From: Bush, Jodi
To: Jim Zelenak
Subject: Fwd: FW: Assistance with Lynx Recovery
Date: Tuesday, July 28, 2015 2:14:28 PM

For your use. JB

Jodi L. Bush
Field Supervisor
Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, MT 59601
(406) 449-5225, ext.205

---------- Forwarded message ----------
From: **Angela Rivas Nelson** <Arnelson@fishwildlife.org>
Date: Tue, Jul 28, 2015 at 1:51 PM
Subject: FW: Assistance with Lynx Recovery
To: "jodi_bush@fws.gov" <jodi_bush@fws.gov>
Cc: Jonathan Mawdsley <jmawdsley@fishwildlife.org>

Good afternoon Jodi:

Sorry for the delay in getting this to you. Here are the email addresses for the state contacts which you requested.

Please let me know if you need anything else.

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Minnesota -- ed.boggess@dnr.state.mn.us

New Hampshire -- glenn.normandeau@wildlife.nh.gov

New York -- patricia.riexinger@dec.ny.gov

Maine -- chandler.woodcock@maine.gov

Vermont -- Louis.porter@state.vt.us

Wisconsin Land Division Administrator-- kurt.thiede@wisconsin.gov

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Telephone 202-838-3465 / Fax 202-350-9869

Email: arnelson@fishwildlife.org

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Cc: Ron Regan
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Thanks in advance for your help!

All the best,

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Thanks for your help. If this is too onerous, we can search the internet. We thought you might have them

Jodi L. Bush

Field Supervisor

Montana Ecological Services Office

585 Shepard Way, Suite 1

Helena, MT 59601

(406) 449-5225, ext.205

From: Bush, Jodi
To: Jim Zelenak
Subject: Fwd: FW: Assistance with Lynx Recovery
Date: Tuesday, July 28, 2015 2:14:50 PM

For your use. JB

Jodi L. Bush
Field Supervisor
Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, MT 59601
(406) 449-5225, ext.205

---------- Forwarded message ----------
From: **Angela Rivas Nelson** <Arnelson@fishwildlife.org>
Date: Tue, Jul 28, 2015 at 1:51 PM
Subject: FW: Assistance with Lynx Recovery
To: "jodi_bush@fws.gov" <jodi_bush@fws.gov>
Cc: Jonathan Mawdsley <jmawdsley@fishwildlife.org>

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Maine -- chandler.woodcock@maine.gov

Vermont -- Louis.porter@state.vt.us

Wisconsin Land Division Administrator-- kurt.thiede@wisconsin.gov

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Thanks in advance for your help!

All the best,

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Jodi L. Bush

Field Supervisor

Montana Ecological Services Office

585 Shepard Way, Suite 1

Helena, MT 59601

(406) 449-5225, ext.205

From: Zelenak, Jim
To: Bush, Jodi
Subject: Re: FW: Assistance with Lynx Recovery
Date: Tuesday, July 28, 2015 2:48:25 PM

We had all these names on the previous version of the table I sent and that you and I just looked at. The only new name in this from Angela is: "Wisconsin Land Division Administrator-- kurt.thiede@wisconsin.gov"

My look at the Wisconsin DNR website indicates that in March of this year, Kurt was appointed by Scott Walker to the Deputy Secretary of DNR, so the title she provided is inaccurate.

http://dnr.wi.gov/about/secretary.html

On Tue, Jul 28, 2015 at 2:14 PM, Bush, Jodi <jodi_bush@fws.gov> wrote:

> For your use. JB
>
> Jodi L. Bush
> Field Supervisor
> Montana Ecological Services Office
> 585 Shepard Way, Suite 1
> Helena, MT 59601
> (406) 449-5225, ext.205
>
> ---------- Forwarded message ----------
> From: **Angela Rivas Nelson** <Arnelson@fishwildlife.org>
> Date: Tue, Jul 28, 2015 at 1:51 PM
> Subject: FW: Assistance with Lynx Recovery
> To: "jodi_bush@fws.gov" <jodi_bush@fws.gov>
> Cc: Jonathan Mawdsley <jmawdsley@fishwildlife.org>
>
> Good afternoon Jodi:
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Maine -- chandler.woodcock@maine.gov

Vermont -- Louis.porter@state.vt.us

Wisconsin Land Division Administrator-- kurt.thiede@wisconsin.gov

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We've moved; please note new address and telephone/fax numbers*

Angela Rivas Nelson

Executive Assistant

Association of Fish & Wildlife Agencies

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Telephone 202-838-3465 / Fax 202-350-9869

Email: arnelson@fishwildlife.org

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Cc: Ron Regan
Subject: Fw: Assistance with Lynx Recovery

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Thanks in advance for your help!

All the best,

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I have the emails and contact info for the WAFWA agencies.

Thanks for your help. If this is too onerous, we can search the internet. We thought you might have them

Jodi L. Bush

Field Supervisor

Montana Ecological Services Office

585 Shepard Way, Suite 1

Helena, MT 59601

(406) 449-5225, ext.205

--
Jim Zelenak, Biologist
U.S. Fish and Wildlife Service
Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, MT 59601

(406) 449-5225 ext. 220
jim_zelenak@fws.gov

From:	Zelenak, Jim
To:	Parkin, Mary
Cc:	Mark McCollough; Tamara Smith; Bryon Holt; Kurt Broderdorp
Subject:	Re: lynx SSA presentation for tomorrow"s state call.
Date:	Tuesday, July 28, 2015 2:51:31 PM

Thanks Mary.

Think I will leave title slide as is - Seth wants the focus on recovery planning, as do many state partners.

On Tue, Jul 28, 2015 at 2:44 PM, Parkin, Mary <mary_parkin@fws.gov> wrote:

> Hi Jim and all,
>
> I don't see any major red flags. The only thing I wonder is if the title slide should be confined to "Canada Lynx Status Assessment," since recovery planning hasn't yet been initiated and is contingent on the results of the SSA.
>
> That said, the SSA + RP title may be what State folks are expecting to see, in which case it might be best to leave it in ...
>
> Cheers,
> Mary
>
> On Tue, Jul 28, 2015 at 3:20 PM, Zelenak, Jim <jim_zelenak@fws.gov> wrote:
>
> > Hi all - please take a look at the attached power point for tomorrow's call and let me know if you see any red flags. If so, let me know ASAP.
> >
> > Thanks.
> >
> > ---------- Forwarded message ----------
> > From: **Zelenak, Jim** <jim_zelenak@fws.gov>
> > Date: Tue, Jul 28, 2015 at 1:17 PM
> > Subject: lynx SSA presentation for tomorrow's state call.
> > To: Heather Bell <heather_bell@fws.gov>
> >
> > Take a look and let me know i fyou are OK with this as a whole and your slides (8-24) in particular. I moved one of the REV slides up (now #22), but it may now be redundant with #23 - you can decide to either leave both or pick one and let me know.
> >
> > Jodi also will review today.
> >
> > Then we will make a pdf (without notes) to send to State contacts this afternoon or tomorrow morning.
> >
> > Thanks
> >
> > --
> > Jim Zelenak, Biologist
> > U.S. Fish and Wildlife Service
> > Montana Ecological Services Office
> > 585 Shepard Way, Suite 1
> > Helena, MT 59601
> > (406) 449-5225 ext. 220

> jim_zelenak@fws.gov
>
> --
> Jim Zelenak, Biologist
> U.S. Fish and Wildlife Service
> Montana Ecological Services Office
> 585 Shepard Way, Suite 1
> Helena, MT 59601
> (406) 449-5225 ext. 220
> jim_zelenak@fws.gov

--
Mary Parkin
Endangered Species Recovery Coordinator, Northeast Region
U.S. Fish and Wildlife Service, Hadley, MA
Remotely located in Escalante, Utah:
Mailing address PO Box 637, Escalante, UT 84726
Street address 145 North Center St, Escalante, UT 84726
Phone 617-417-3331
Email mary_parkin@fws.gov

--
Jim Zelenak, Biologist
U.S. Fish and Wildlife Service
Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, MT 59601
(406) 449-5225 ext. 220
jim_zelenak@fws.gov

From: Parkin, Mary
To: Zelenak, Jim
Cc: Mark McCollough; Tamara Smith; Bryon Holt; Kurt Broderdorp
Subject: Re: lynx SSA presentation for tomorrow"s state call.
Date: Tuesday, July 28, 2015 4:44:55 PM

Hi Jim and all,

I don't see any major red flags. The only thing I wonder is if the title slide should be confined to "Canada Lynx Status Assessment," since recovery planning hasn't yet been initiated and is contingent on the results of the SSA.

That said, the SSA + RP title may be what State folks are expecting to see, in which case it might be best to leave it in ...

Cheers,
Mary

On Tue, Jul 28, 2015 at 3:20 PM, Zelenak, Jim <jim_zelenak@fws.gov> wrote:

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>
> Thanks.
>
> ---------- Forwarded message ----------
> From: **Zelenak, Jim** <jim_zelenak@fws.gov>
> Date: Tue, Jul 28, 2015 at 1:17 PM
> Subject: lynx SSA presentation for tomorrow's state call.
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> Take a look and let me know i fyou are OK with this as a whole and your slides (8-24) in particular. I moved one of the REV slides up (now #22), but it may now be redundant with #23 - you can decide to either leave both or pick one and let me know.
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Mary Parkin
Endangered Species Recovery Coordinator, Northeast Region
U.S. Fish and Wildlife Service, Hadley, MA
Remotely located in Escalante, Utah:
Mailing address PO Box 637, Escalante, UT 84726
Street address 145 North Center St, Escalante, UT 84726
Phone 617-417-3331
Email mary_parkin@fws.gov

From: McCollough, Mark
To: Zelenak, Jim
Subject: Re: lynx SSA presentation for tomorrow"s state call.
Date: Wednesday, July 29, 2015 6:02:37 AM

Yes, makes sense...when we bring up recovery planning for lynx here, the State often asks whether there will be a recovery team and who will be on it. They also want to know if they will be involved in writing the recovery plan. Perhaps we are starting to think about what group of people would write a plan and if we will have a recovery team. Until those decisions are made, it would be wise to be careful not to say anything that commits us to a particular option.

Mark

On Tue, Jul 28, 2015 at 4:53 PM, Zelenak, Jim <jim_zelenak@fws.gov> wrote:

> Good catch onthe bullet Mark - thanks.
>
> On the other - we have not decided if there will be a recovery team - that's why I said "if necessary" Highlighting that the SSA will help us determine if a recovery team needs to be formed - my thinking was to let the states know that we are not now forming/convening a recovery team, but that if we determine one is necessary, we will coordinate with them in the future about it.
>
> Make sense?
>
> On Tue, Jul 28, 2015 at 2:18 PM, McCollough, Mark <mark_mccollough@fws.gov> wrote:
>
> > Jim:
> >
> > Slide 4 5th bullet = 2014
> >
> > Last bullet in presentation: Convene recovery planning team if necessary....Have we determined if there will be a recovery planning team, and if so, who may be on the "team." States will take this literally, i.e. there will be a recovery planning team. Is there another way to word?
> >
> > Mark
> >
> > On Tue, Jul 28, 2015 at 3:20 PM, Zelenak, Jim <jim_zelenak@fws.gov> wrote:
> >
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--
Jim Zelenak, Biologist
U.S. Fish and Wildlife Service
Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, MT 59601
(406) 449-5225 ext. 220
jim_zelenak@fws.gov

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Mark McCollough, Ph.D.
Endangered Species Specialist
Maine Field Office
U. S. Fish and Wildlife Service
17 Godfrey Drive, Suite 2
Orono, ME 04473
Phone 207 866-3344 x115
Cell Phone: 207 944-5709
mark_mccollough@fws.gov

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Orono, ME 04473
Phone 207 866-3344 x115
Cell Phone: 207 944-5709
mark_mccollough@fws.gov

From: Smith, Tamara
To: Belleman, Ann
Subject: Re: Couple of questions
Date: Wednesday, July 29, 2015 10:30:48 AM

Yeah, I'm sure it will be interesting. The first part will be sort of an intro and SSA 101 but I think the second half will allow for a lot of questions...

On Wed, Jul 29, 2015 at 10:16 AM, Belleman, Ann <ann_belleman@fws.gov> wrote:

> P.S. I may call-in to SSA just today, mostly as fyi for me to hear opening comments, etc. from states, specifically WY (and MN).
>
> Ann Belleman
> U.S. Fish and Wildlife Service
> Minnesota/Wisconsin Field Office Complex
> 4101 American Blvd. E
> Bloomington, MN 55425-1665
>
> ann_belleman@fws.gov
>
> 307-421-5839 (work cell)
> (612) 725-3548 (Bloomington, MN)
>
> On Wed, Jul 29, 2015 at 9:24 AM, Belleman, Ann <ann_belleman@fws.gov> wrote:
>
> > Good for now - thanks!
> >
> > Ann Belleman
> > U.S. Fish and Wildlife Service
> > Minnesota/Wisconsin Field Office Complex
> > 4101 American Blvd. E
> > Bloomington, MN 55425-1665
> >
> > ann_belleman@fws.gov
> >
> > 307-421-5839 (work cell)
> > (612) 725-3548 (Bloomington, MN)
> >
> > On Wed, Jul 29, 2015 at 9:11 AM, Smith, Tamara <tamara_smith@fws.gov> wrote:
> >
> > > Hi Ann -
> > >
> > > I'm teleworking today - 612-600-1599. I have a call today from 9:30 -10:30 and I plan to be on the lynx SSA call this afternoon at 2 -4pm.
> > >
> > > Call anytime, but a quick answer to your question - I think TCFO still wants hard copies of BAs but I think everything else can be digital (scoping packages, etc.). It would be great if they can send you the BAs digitally also so we don't have to snail mail

anything. Hopefully we can move away from hard copies altogether, but I'm not sure that will happen anytime soon...?

Have a great day!
-Tam

On Wed, Jul 29, 2015 at 8:21 AM, Belleman, Ann <ann_belleman@fws.gov> wrote:

> Good morning Tam!
>
> The calendar shows you're (tele)working today; if so, then I'm guessing you'll be on the lynx SSA state coordination call this afternoon? I wanted to check w/you, in case I needed to fill-in if you couldn't make it.
>
> Also, I had a question re: general coordination with the 3 Forest and other district bios. This relates to my being asked by a CNF district bio if TC FO still wanted hard copies of scoping packing info and draft EA chap. 1 & 2 with the BA sent in for consult. Probably easier to talk for a couple of minutes. Are you available for a quick call sometime this week or next? If so, please let me know what # to call.
>
> Thanks - A
>
> Ann Belleman
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> Bloomington, MN 55425-1665
>
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>
> 307-421-5839 (work cell)
> (612) 725-3548 (Bloomington, MN)

--
Tamara Smith
U.S. Fish and Wildlife Service
Twin Cities Field Office
4101 American Boulevard East
Bloomington, MN 55425
612-725-3548 ext. 2219
612-600-1599 cell

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Tamara Smith
U.S. Fish and Wildlife Service
Twin Cities Field Office
4101 American Boulevard East
Bloomington, MN 55425
612-725-3548 ext. 2219
612-600-1599 cell

From: McCollough, Mark
To: Vashon, Jennifer
Subject: Re: Lynx expert meeting in MN in mid-October
Date: Wednesday, July 29, 2015 11:18:51 AM

It would be wise to hold off on travel requests until official invitations are made. The invitee list has not been finalized, nor have official invitations been made. As I indicated in my email, we are still discussing qualifications and the mix of people that would be important to have present. Today, Jim and others will discuss the role of the expert meeting in the SSA process, but there will be no announcements (as far as I am aware) of who will be on the invitation list.
thanks, Mark

On Wed, Jul 29, 2015 at 9:17 AM, Vashon, Jennifer <Jennifer.Vashon@maine.gov> wrote:

> Ok, thanks. I'll hold off on submit my travel request until the dates and invites are finalized. Maybe we will hear today in the conf call?
>
> **From:** McCollough, Mark [mailto:mark_mccollough@fws.gov]
> **Sent:** Wednesday, July 29, 2015 8:15 AM
> **To:** Dan Harrison; Vashon, Jennifer; Erin Simons-Legaard
> **Cc:** Laury Zicari
> **Subject:** Lynx expert meeting in MN in mid-October
>
> Dan, Jen, and Erin:
>
> We ask that you continue to hold the week of Oct. 12 - 16 for a lynx expert meeting in Minnesota. Tentative plans are to travel morning of Tuesday Oct. 13 with an an afternoon session that day in MN. USGS-USFWS will lead the structured process on Wednesday and Thursday, and Friday would be a travel day. There could be some work to continue on Friday.
>
> We have not made formal invitations yet and are still trying to whittle down the potential attendees to about 12. There are rigorous criteria for those who will attend. We are in the process of making final determinations on attendees, meeting agenda and process, etc.
>
> Thanks, Mark
>
> --
>
> Mark McCollough, Ph.D.

> Endangered Species Specialist
>
> Maine Field Office
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> 17 Godfrey Drive, Suite 2
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Cell Phone: 207 944-5709
mark_mccollough@fws.gov

From: Belleman, Ann
To: Jim Zelenak
Subject: Re: need lynx SSA ppt END
Date: Wednesday, July 29, 2015 1:18:26 PM

Sorry!! Found it - filed it incorrectly on my computer.

Ann Belleman
U.S. Fish and Wildlife Service
Minnesota/Wisconsin Field Office Complex
4101 American Blvd. E
Bloomington, MN 55425-1665

ann_belleman@fws.gov

307-421-5839 (work cell)
(612) 725-3548 (Bloomington, MN)

On Wed, Jul 29, 2015 at 2:13 PM, Belleman, Ann <ann_belleman@fws.gov> wrote:

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Canada Lynx Status Assessment and Recovery Planning

July 29, 2015

Outline

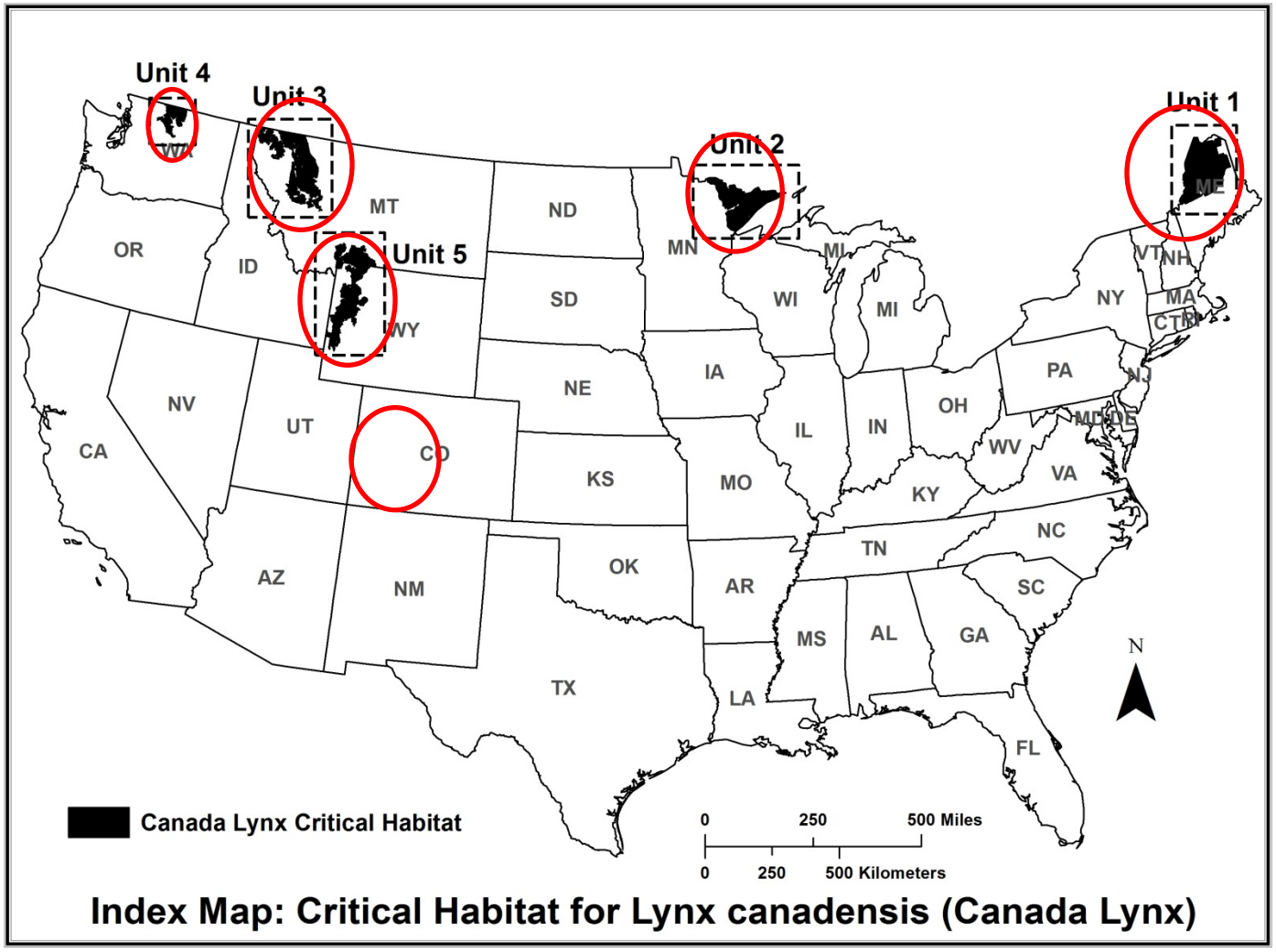
- Brief review of lynx listing history
- Update on lynx status assessment and recovery planning
- Strategy and schedule for meeting court-ordered recovery plan deadline
- Overview of Species Status Assessment (SSA)
- Questions/discussion

Brief Listing History

- 2000 (& 2003) - Contiguous U.S. DPS listed as threatened (Factor D)
- 2005 - Recovery Outline
- 2006 - CH designated
- 2007 - SPR Clarification

  - Service withdrew 2006 CH
- 2009 & 2014 - Revised CH
- June 25, 2014 – Court order to complete Recovery Plan by Jan. 15, 2018

Lynx DPS Subpopulations



Index Map: Critical Habitat for Lynx canadensis (Canada Lynx)

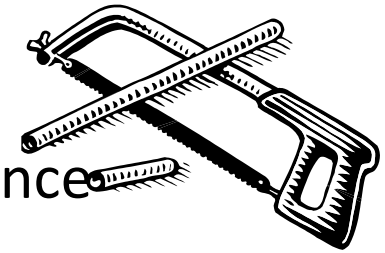
Schedule

- Court order to finalize recovery plan by Jan. 2018
- Dec. 2014/Jan. 2015 – announced re-initiation of 5-year status review
- Mar. 2015 – Decision to implement SSA framework
- Dec. 2015 – Finish SSA to allow completion of final recovery plan by court-ordered deadline
- Jan. 2016 to Jan. 2017 – Draft recovery plan
- Jan. 2017 to Jan. 2018 – Final recovery plan

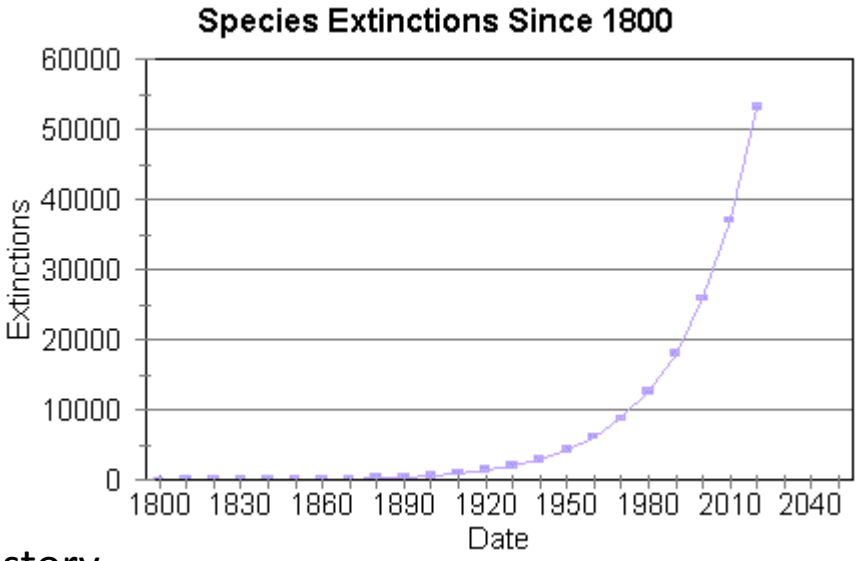
SSA Objectives

- Assess current status, threats, and future viability of each DPS subpopulation
- Prioritize information and modeling needed to best evaluate potential future conditions and viability of DPS populations
- Engage State, Tribal, other Federal, Canadian, and other stakeholders, partners, and managers, and elicit information from experts

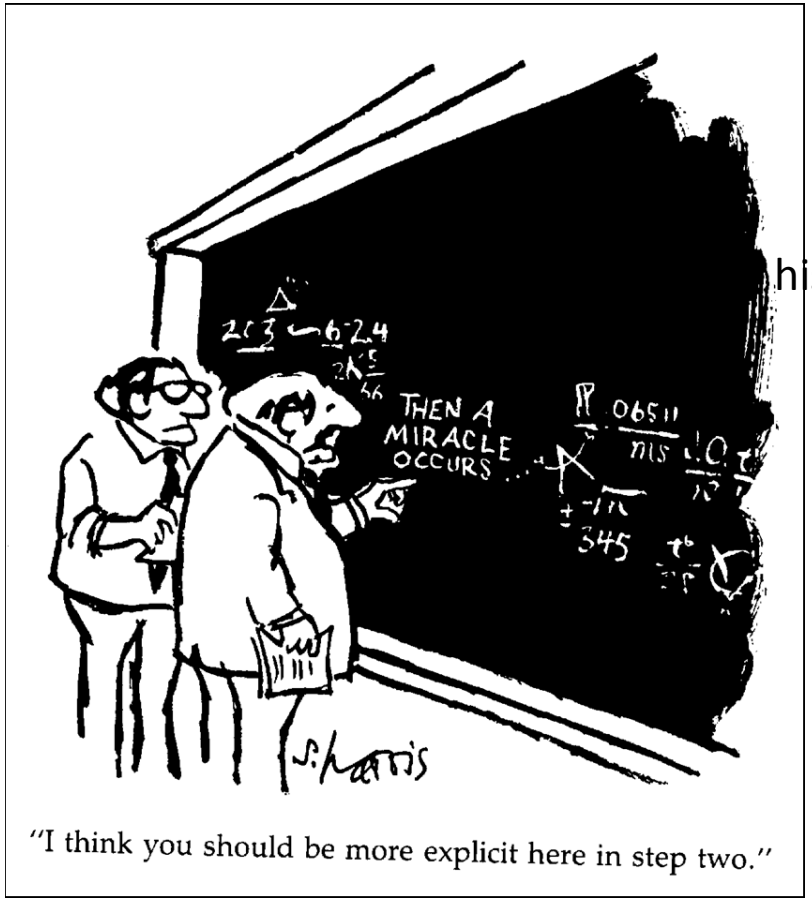
Welcome to the Species Status Assessment (SSA) Framework Overview



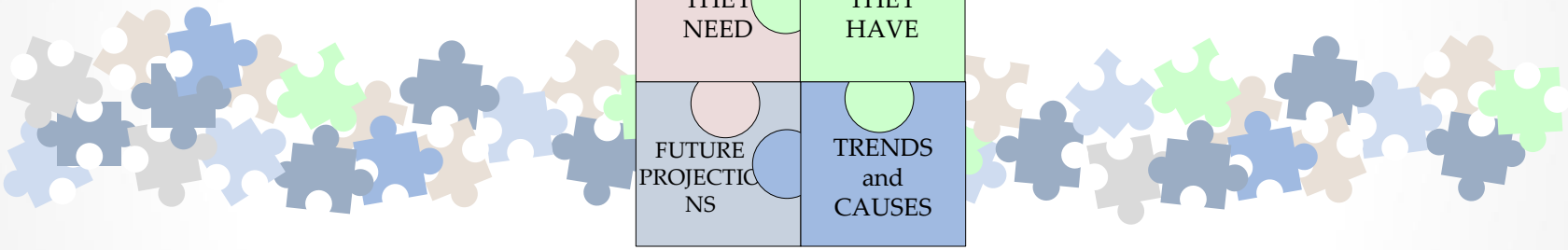
Science Policy



history



"I think you should be more explicit here in step two."



Section 7 Decisions

Section 10 Decisions

Candidate Conservation Decisions

Recovery Planning Decisions

T/E or Not Warranted Decisions

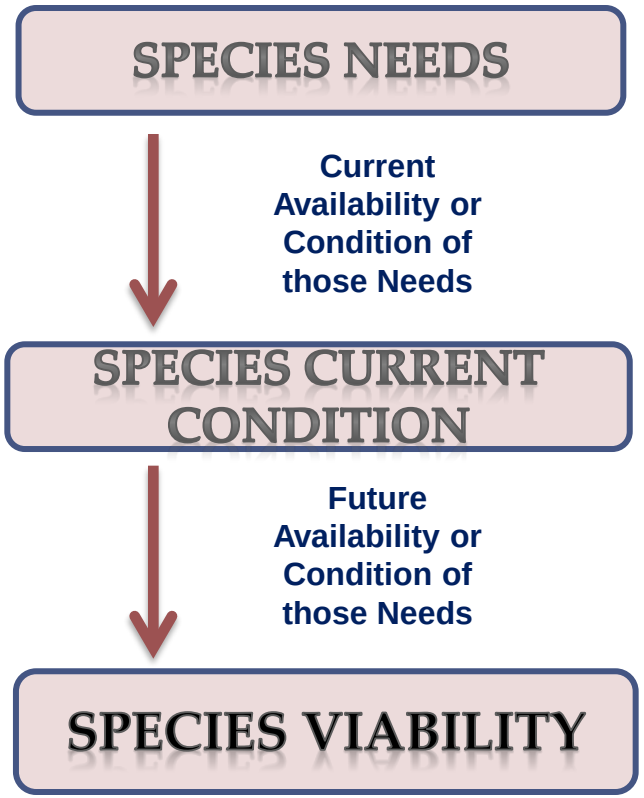
5yr Review Decisions

Candidate Assessment Decisions

Critical Habitat Decisions

List/Delist Decisions

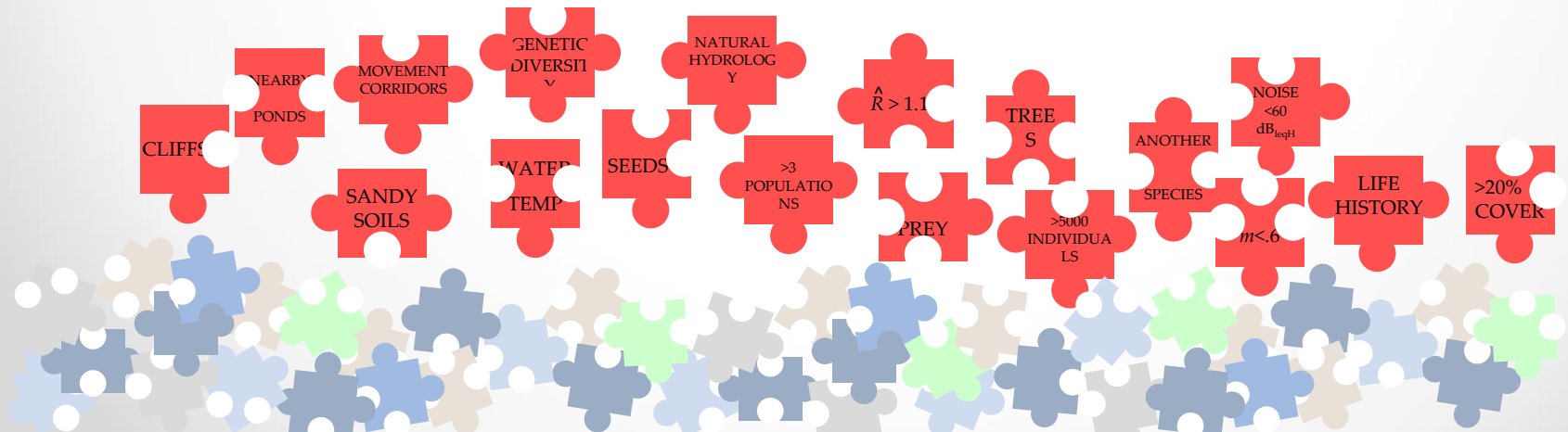
SSA Framework



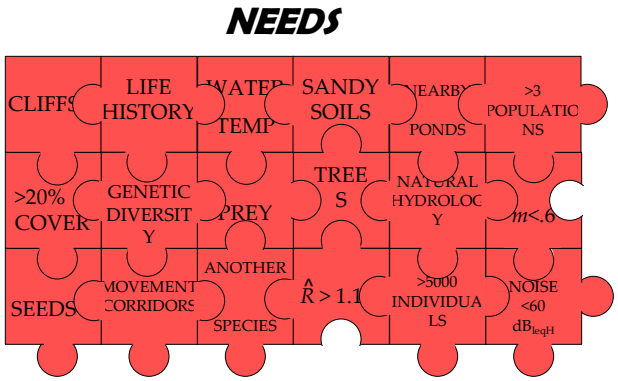
WHAT DOES THE SPECIES NEED?

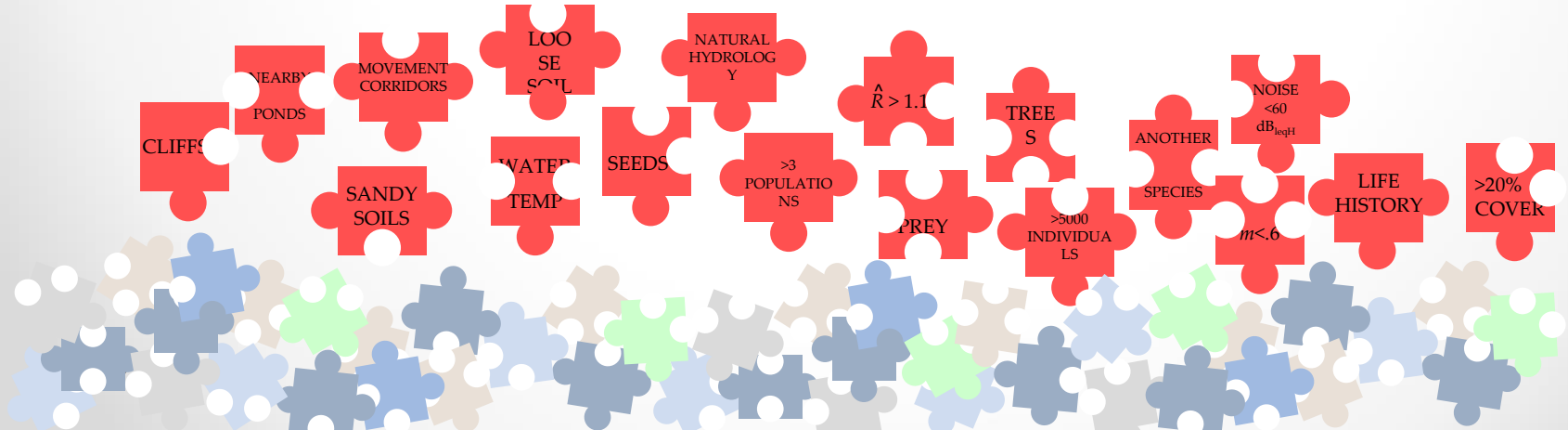
For **EACH LIFE STAGE** consider needs at the levels of

- ✓ **INDIVIDUALS**
- ✓ **POPULATIONS**
- ✓ **SPECIES**

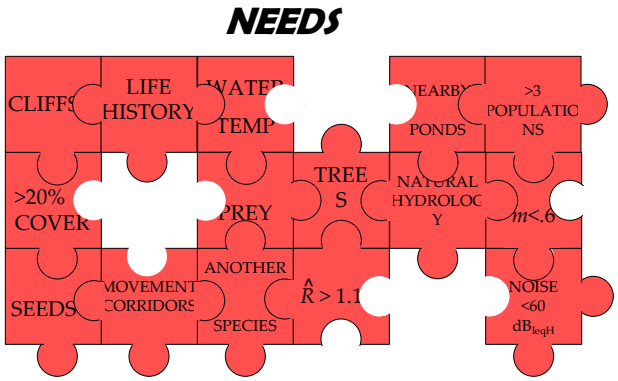


WHAT DOES THE SPECIES NEED?



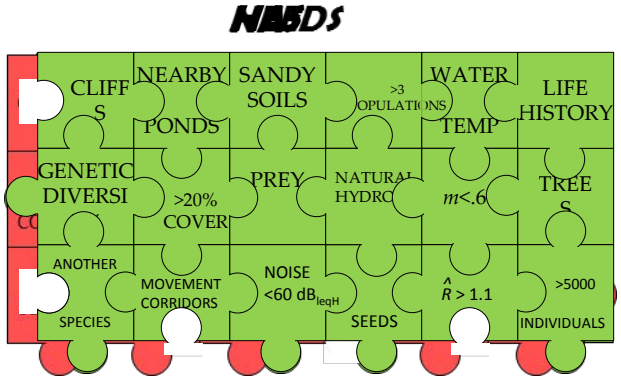


WHAT DOES THE SPECIES NEED?



MISSING PIECES - Addressing Uncertainty

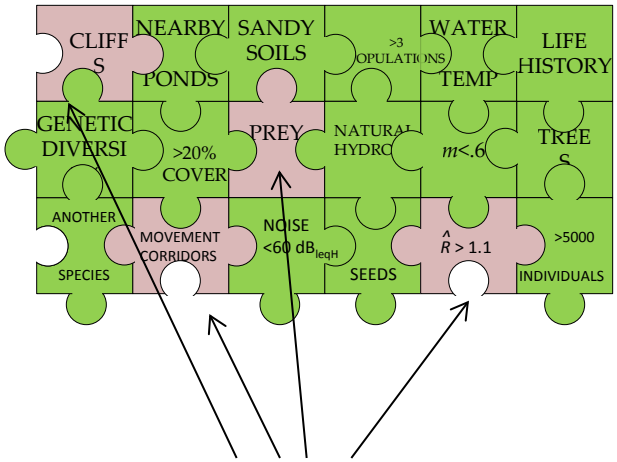
WHAT DOES THE SPECIES HAVE?



WHAT IS MISSING OR DIMINISHED?

and WHAT DOES IT MEAN?

HAS

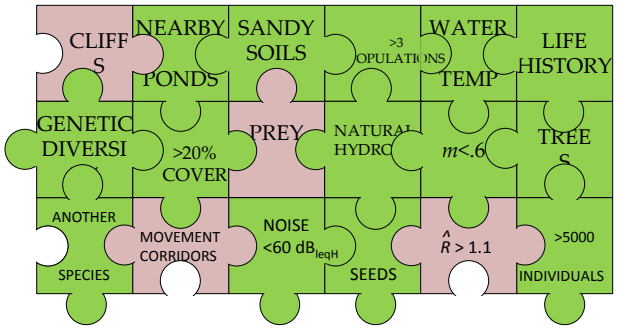


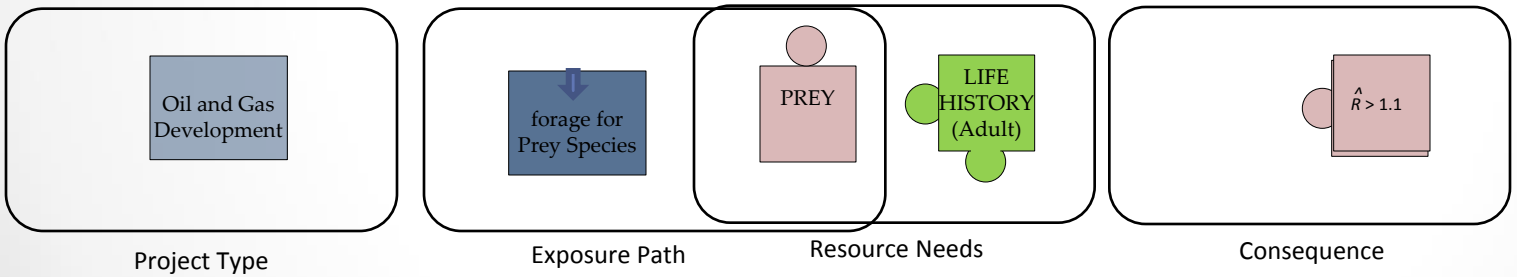
What are the implications of these missing or diminished needs?

Cause and Effect

What is happening on the landscape that could cause a decrease in the forage for the prey species?

HAS



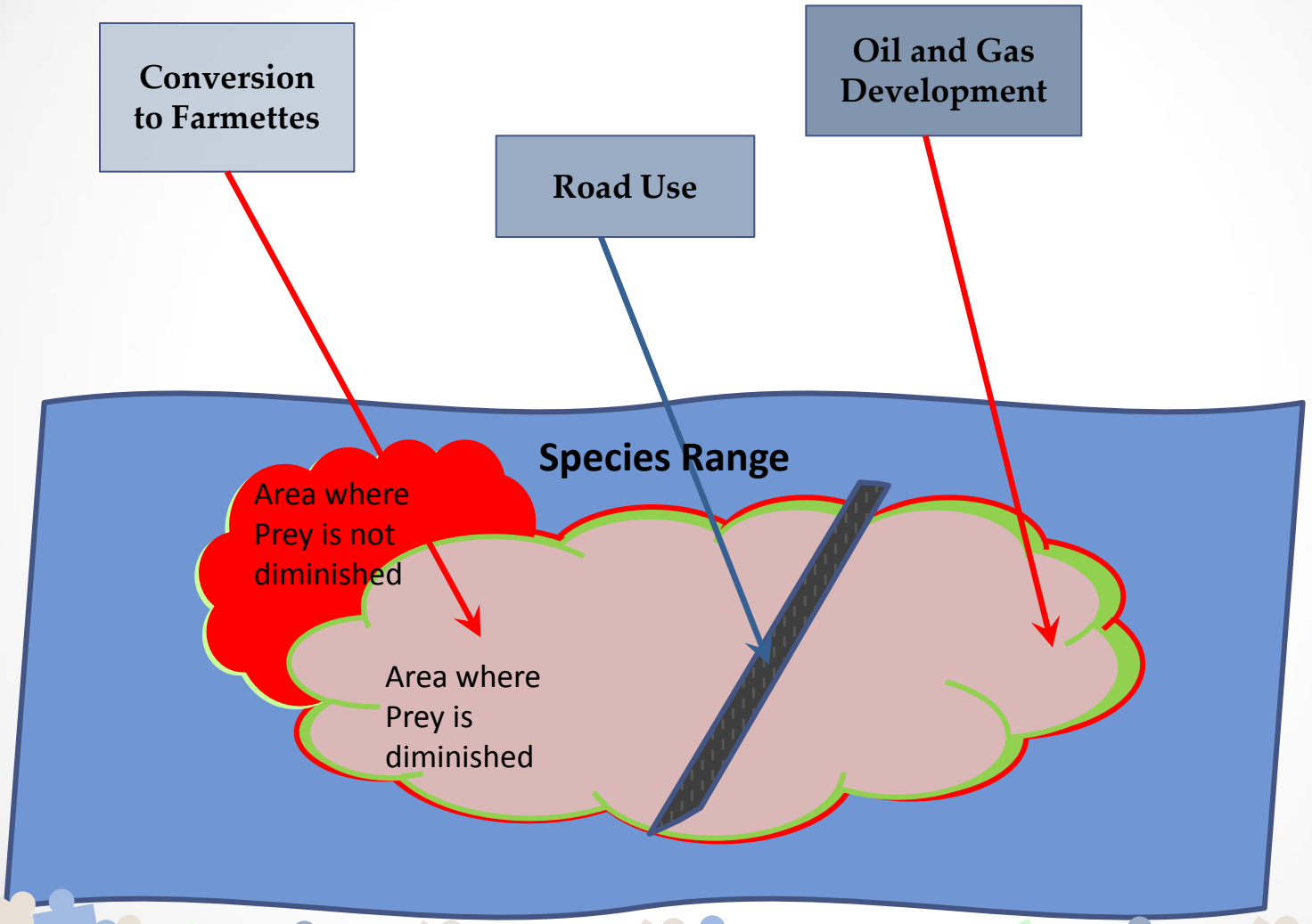


Project Type | Exposure Path | Resource Needs | Consequence

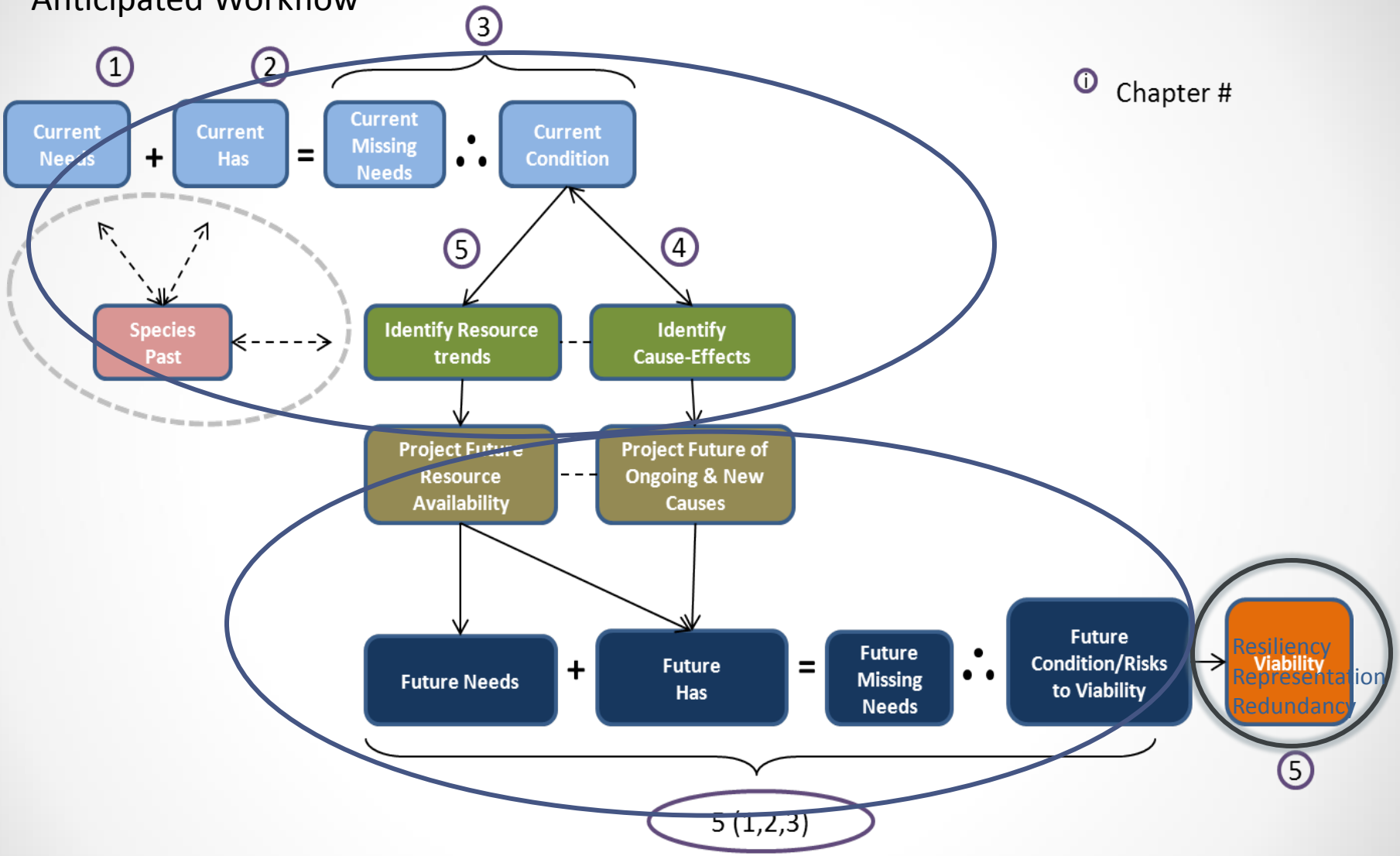
Conversion to Farmettes

Roads

Spatial and Temporal Overlap – Exposure Analysis Assessment Mapping



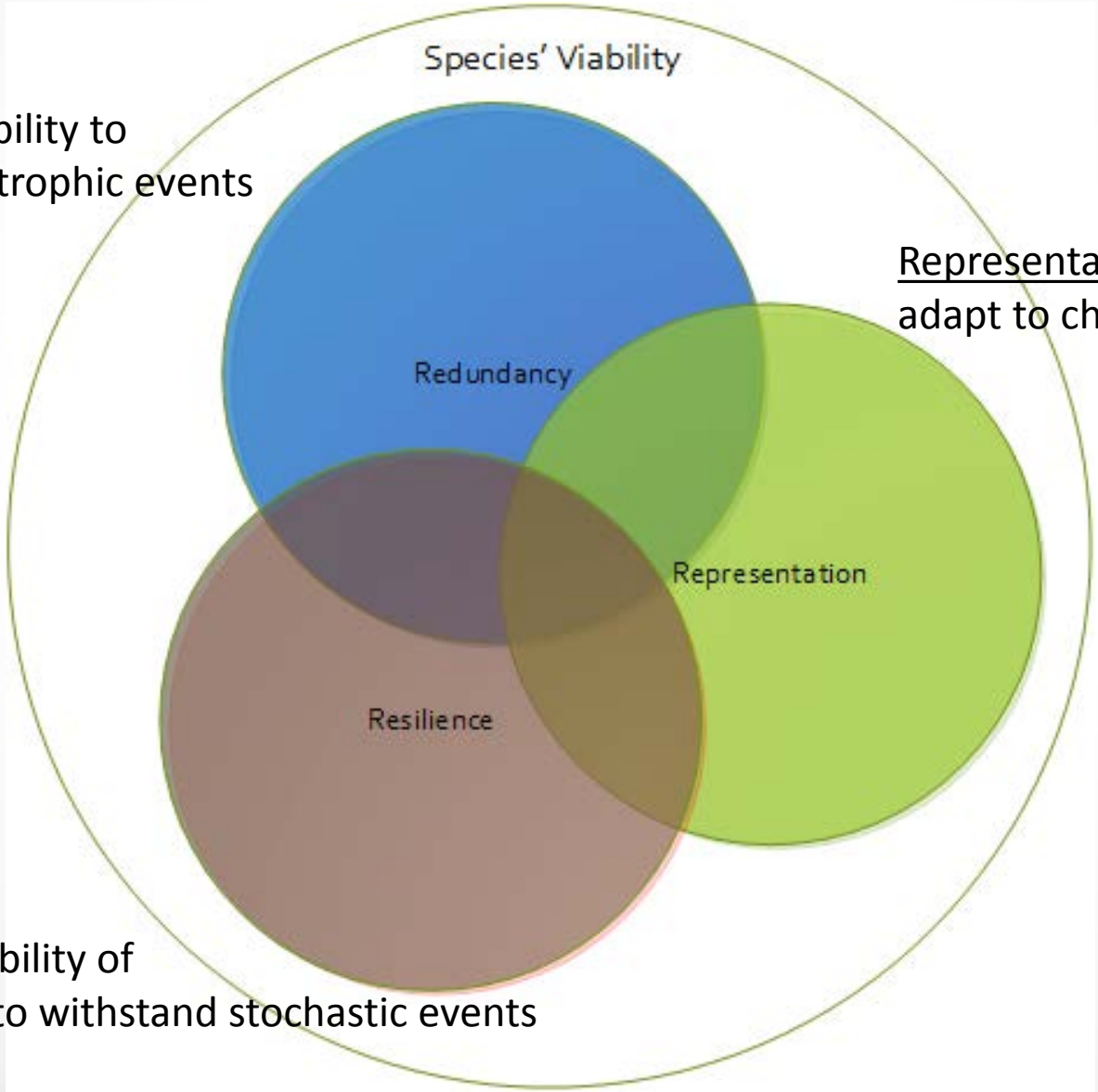
Anticipated Workflow



* Chapter 5 references methods/process used in Chapters 1,2,3 to identify **Future** Needs, Has, Gaps and Conditions

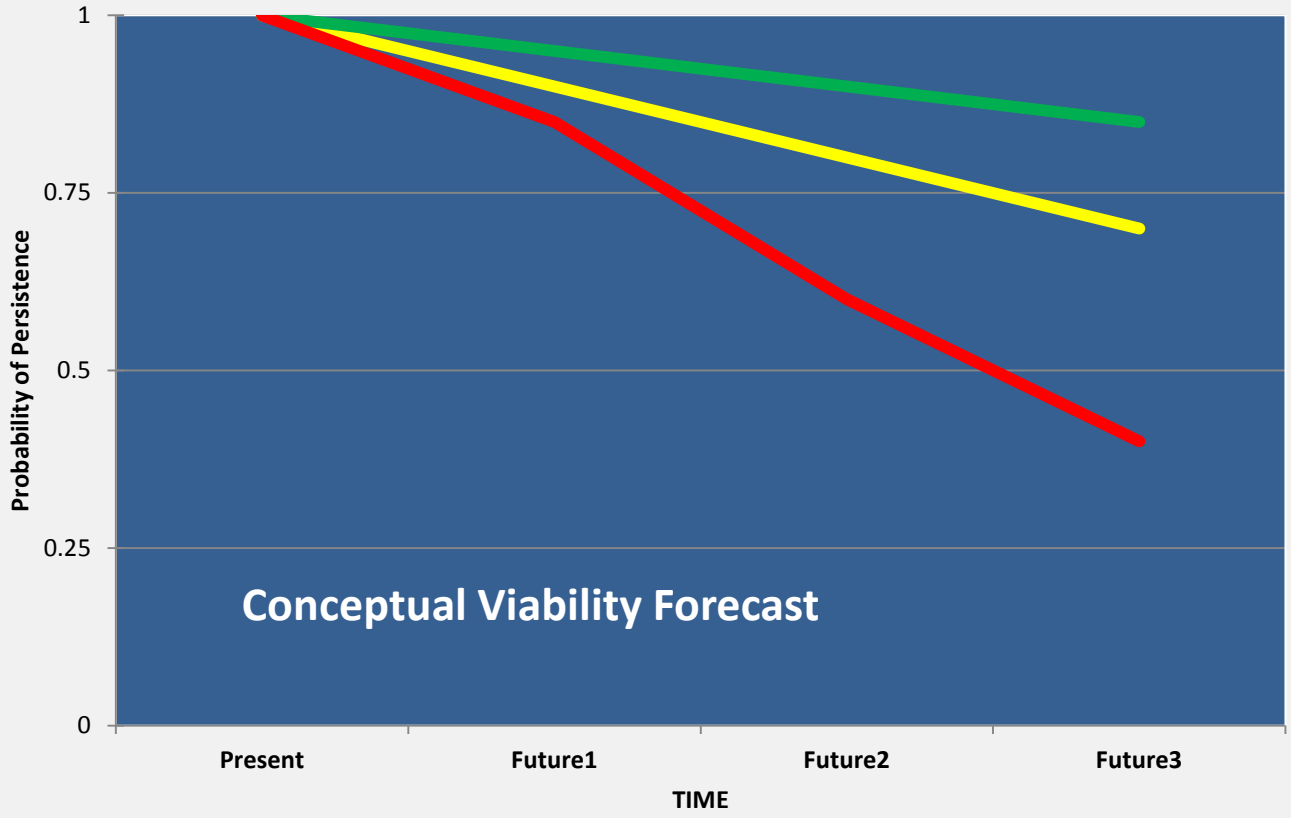
Viability – 3 R's

<u>Redundancy</u>: ability to withstand catastrophic events

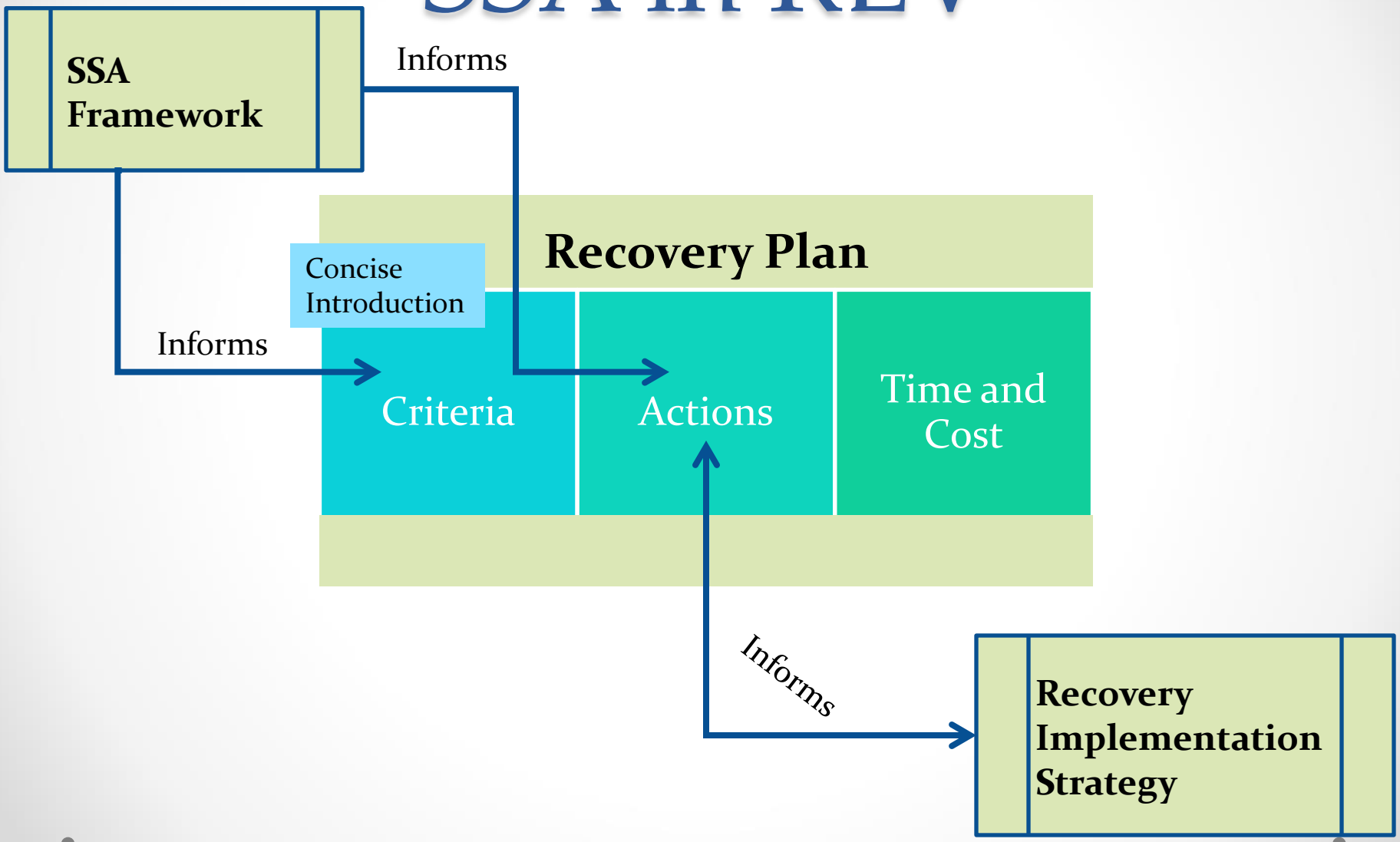


<u>Representation</u>: ability to adapt to changing environment

<u>Resiliency</u>: ability of populations to withstand stochastic events


1
0.75
0.5
0.25
0
Probability of Persistence
Conceptual Viability Forecast
Present
Future1
Future2
Future3
TIME

SSA in REV


SSA Framework
Informs
Recovery Plan
Concise Introduction
Informs
Criteria
Actions
Time and Cost
Informs
Recovery Implementation Strategy

Individual Project Planning

- Project Manager responsible for identifying staff and the roles and responsibilities of Project Manager, Core Team, SSA Team, Reviewers, Recommendations team
- Scoping on complexity of SSA analysis
- With SSA Team, IDs methodologies /expertise needed for SSA
- Role of State(s) identified; role of peer review identified

Document: Listing Project Plan

Approvals required: RD(s) reviews Listing Project Plan

Species Status Assessment

SSA Team responsible for: Information Collection, Analysis , Characterization of Results: Needs, Current, Future Condition – 3Rs

- Transparent - Shows how information was considered; Recognizes and explains uncertainty
- Efficient and Effective: Focuses discussion on major issues; peer reviewable
- Consistent : Standardizes status reviews across program (listing, recovery, and consultation)
- Collaborative: Facilitates appropriate State (and others) involvement

Document: SSA, and Executive Summary for use in the FR notice

Approvals required: none (briefings for/review by Core Team, Managers, RD, solicitor prior to Recommendation meeting)

Recommendation

Recommendation Team responsible for knowledge of and interpretation of policy and statute

- Interpretation and application of statues and policies to the information in SSA to produces a recommendation
- Facilitation and appropriate documentation

Document: Recommendation documentation for Admin Record

Approvals required: none – Recommendation forwarded to AES etc.

Finding

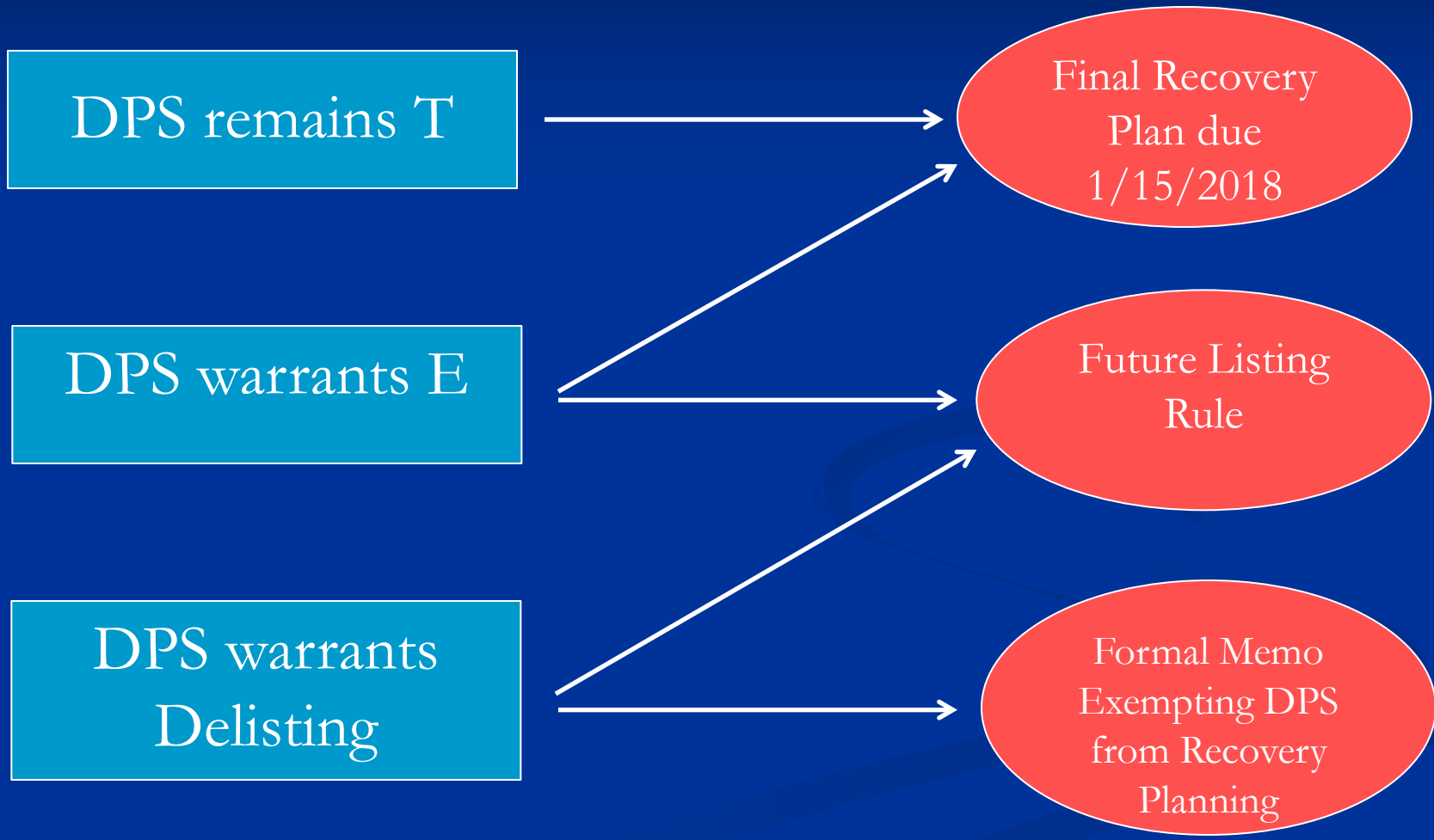
Core Team develops the Finding

- Focus on connecting the logic, brief
- Executive Summary from SSA, boilerplate language, determination

Document: FR Notice

Approvals required: PM-ARD(s)-RSOL(s)-RD(s) – PPM-ULT Manager- HQ?-AES-Director-Assistant Secretary-Executive Secretary-OMB if applicable

Potential Findings



Progress to Date

- Designated SSA teams
  - Core team of USFWS biologists covering the DPS range
  - USFWS and USGS SSA and expert elicitation practitioners
- Coordination with States and other partners
  - Requests for lynx status, monitoring data, other information
  - Coordination letter
  - Monthly update calls
- Drafted criteria and list of potential candidates for expert elicitation

Next Steps

- Identify key information gaps (e.g., population sizes/status, efficacy of current regulatory mechanisms, range of reasonable future climate scenarios) and the experts most able to help fill them
- Schedule and plan expert elicitation meeting this fall and invite attendees
- Complete SSA report by end of 2015
- Convene recovery planning team if necessary

Questions?

From: Zelenak, Jim
To: Belleman, Ann
Subject: Re: need lynx SSA ppt END
Date: Wednesday, July 29, 2015 1:27:37 PM
Attachments: 2015 07 29 Lynx SSA State Coordination emailed to states 7-28.pdf

---

On Wed, Jul 29, 2015 at 1:13 PM, Belleman, Ann <ann_belleman@fws.gov> wrote:

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jim_zelenak@fws.gov

From: Belleman, Ann
To: Zelenak, Jim
Subject: Re: need lynx SSA ppt END
Date: Wednesday, July 29, 2015 2:35:13 PM

I thought it was well organized, concise, and informative, and I think the lack of questions illustrated your thoroughness. You're good at what you do but you certainly can't do or think of everything, so I'm glad to hear you have a helpful and knowledgeable core team. Yes, maybe this is possible!

Ann Belleman
U.S. Fish and Wildlife Service
Minnesota/Wisconsin Field Office Complex
4101 American Blvd. E
Bloomington, MN 55425-1665

ann_belleman@fws.gov

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(612) 725-3548 (Bloomington, MN)

On Wed, Jul 29, 2015 at 3:21 PM, Zelenak, Jim <jim_zelenak@fws.gov> wrote:

> Thanks Ann. My head always feels like it's ready to explode after those kinds of calls, but I'll survive. I'm also never sure how it went over or how I came across. Jodi was not visibly upset, so I guess I'll take that as OK... ;-)
>
> Mark, Tam, and Bryon are helping a lot; Kurt, too, though he may need a little more coaxing - of course, they are all already swamped with their day-to-day responsibilities.
>
> Heather and Mary are also good at keeping things moving - one of my many weaknesses, so who knows,maybe this really is possible....
>
> Hope all is well with you.
>
> On Wed, Jul 29, 2015 at 2:09 PM, Belleman, Ann <ann_belleman@fws.gov> wrote:
>
> > Nice job on the call. I hope you're well and getting the help you need on this lynx SSA.
> >
> > Thanks - Ann
> >
> > Ann Belleman
> > U.S. Fish and Wildlife Service
> > Minnesota/Wisconsin Field Office Complex
> > 4101 American Blvd. E
> > Bloomington, MN 55425-1665
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jim_zelenak@fws.gov

From: Bush, Jodi
To: Thabault, Michael
Subject: Re: lynx ssa
Date: Thursday, July 30, 2015 8:53:22 AM

---

yep. we received info.

Funny thing though. Bob Lanka didn't participate in the call yesterday for the States. And he got a personal invitation.

Figures. JB

Jodi L. Bush
Field Supervisor
Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, MT 59601
(406) 449-5225, ext.205

On Thu, Jul 30, 2015 at 8:45 AM, Thabault, Michael <michael_thabault@fws.gov> wrote:

> Can't remember if I sent this to you but hopefully Seth relayed the info.
>
> Michael Thabault
> Assistant Regional Director
> Ecological Services
> U.S. Fish and Wildlife Service
> Mountain Prairie Region
> 303-236-4210
> michael_thabault@fws.gov
>
> ---------- Forwarded message ----------
> From: **Noreen Walsh** <noreen_walsh@fws.gov>
> Date: Tue, Jul 21, 2015 at 11:32 AM
> Subject: lynx ssa
> To: Michael Thabault <michael_thabault@fws.gov>, nicole_alt@fws.gov, Seth Willey <seth_willey@fws.gov>
> Cc: Matt Hogan <matt_hogan@fws.gov>
>
> Hi guys,
>
> During my conversations this week WY and MT indicated that they would appreciate us including the following people in the lynx SSA and the monthly teleconferences:

MT: Bob Inman

WY: Bob Lanka

There was much interest in SSAs and some good dialogue. I think there will be much interest in this one in particular and that it will be an opportunity for us to showcase the positive nature of the process.

Thanks for all the prep,

Noreen

Noreen Walsh

Regional Director

Mountain-Prairie Region

U. S. Fish and Wildlife Service

303 236 7920

From: Bell, Heather
To: Zelenak, Jim
Cc: Mary_Parkin
Subject: Re: Simple lynx conceptual model, and task for TODAY! (i am such a task master!).
Date: Thursday, July 30, 2015 9:25:32 AM

Jim, any chance you can send Mary and I what you have before you leave? perhaps we can continue to work on it while you are gone (don't you love it when people offer help :-))

Heather Bell
Ecological Services HQ
Branch of Conservation Integration
SSA Framework Team Lead
Remotely Located at
134 S. Union Blvd
Lakewood, CO 80228
303-236-4514

Check it out! SSA Framework - Google Site for Staff
at https://sites.google.com/a/fws.gov/ssa/ and the REV Google Site: https://sites.google.com/a/fws.gov/rev/

On Wed, Jul 15, 2015 at 11:05 AM, Zelenak, Jim <jim_zelenak@fws.gov> wrote:

> When do you leave for vacation?
>
> As I lie awake in bed this morning at 3 AM, I was thinking about how to address this. There is not one single "ultimate" question we are trying to answer - or at least not one that does not rely on the need to first answer a whole series of related questions. If I had to provide one, it would be something like:
>
> "What is the likelihood of the persistence and health of the lynx DPS at various points (40 and 80 years? 50 and 100 years?) in the foreseeable future given climate change and other existing and potential future threats, and existing and potential future conservation efforts?"
>
> I decided (at about 3:30) that I would make a chart or a couple short paragraphs comparing individual, population, and species (i.e., the DPS) needs and how those relate (for pops and the DPS) to the 3 Rs and hence the likelihood of future persistence of the DPS. I will try to work on that today, although attempts thus far to do so have been foiled by the need to respond to other things, like requests from DOJ for work on the Admin. record for the lynx critical habitat lawsuit and collaboration with the State of MT on wolverine habitat mapping, as well as a few calls from lynx SSA core team members.
>
> Anyway, I'm going to get back to this and hope to have something today or tomorrow to share with you both and with Dave. I think this will inform the conversation you'd like me to have with Dave and will provide the "fodder" for the Core Team that you mentioned. I think we should have this and the response of the core team before we try to draw flow chartrs or other graphics for lynx as was done for grayling. Just my 2 cents.
>
> Jim
>
> On Wed, Jul 15, 2015 at 7:41 AM, Bell, Heather <heather_bell@fws.gov> wrote:
>
> > 1) TAsk for today, Mary could you work with Jim and Dave and get what the ultimate question is we are trying to address in the EXpert meeting drafted for the core team/Seth to comment on? Jim, if you don't hear back from Mary just call DAve and you two can work on it. I would really like to see this before I leave for vacation! That way the review of the cardinal/core questions and which are most important will stand out clearly

(less time fumbling around!)

2) Ok guys i did this while we were on the phone, it is nothing fancy and please don't feel you need to use it (in fact I would suggest we do a new one once we have reviewed the cardinal questions), but it will give you an idea of what we are interested in. this is only for resilience and eventually you would add the metrics such as abundance, population growth rate, distribution, but don't worry about that now because we know where those go on the "picture".

I also attached grayling, as one was done for each population, which would mean you could capture the uniqueness of each region ensuring that the specific concerns of each of your core team were captured. You might find in the end you don't need that uniqueness, but it is ALWAYS good to capture people's thoughts and acknowledge that they have been heard.

Jim, if this is good enough to get core folks thinking about what they believe drives Lynx resilience, then send it out to the Core team for them to chew on for the next two weeks, and to determine what they believe would be the top drivers in their region. We could then get that wrapped up as a draft in 2 weeks and get that to Dave/Jennifer. Now, this is s thought. Perhaps this is something we share somehow with the States....

3) Get the criteria for choosing experts!

Heather Bell
Ecological Services HQ
Branch of Conservation Integration
SSA Framework Team Lead
Remotely Located at
134 S. Union Blvd
Lakewood, CO 80228
303-236-4514

Check it out! SSA Framework - Google Site for Staff
at https://sites.google.com/a/fws.gov/ssa/ and the REV Google
Site: https://sites.google.com/a/fws.gov/rev/

--
Jim Zelenak, Biologist
U.S. Fish and Wildlife Service
Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, MT 59601
(406) 449-5225 ext. 220

jim_zelenak@fws.gov

From: Jonathan Mawdsley
To: Bush, Jodi
Subject: RE: Fw: Lynx SSA process, state "expert" list
Date: Monday, August 03, 2015 1:47:50 PM

Thanks, Jodi. Let me know if you need any help in getting responses from individual states. I would also be willing to reach out to states who were not on the call last week and encourage them to participate.

Best,
Jonathan

From: Bush, Jodi [mailto:jodi_bush@fws.gov]
Sent: Monday, August 03, 2015 3:31 PM
To: Jonathan Mawdsley
Subject: Re: Fw: Lynx SSA process, state "expert" list

Thanks Jonathan. I thought we'd asked the states to nominate one or two folks -so Rex may well end up being the appropriate person. We should get to this in the next week or so. Thanks for checking in. JB

Jodi L. Bush
Field Supervisor
Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, MT 59601
(406) 449-5225, ext.205

On Thu, Jul 30, 2015 at 5:54 PM, Jonathan Mawdsley <jmawdsley@fishwildlife.org> wrote:

Hello Jodi,

Thanks to you and your colleagues for an illuminating and interesting call yesterday! Here is an expression of interest in the expert elicitation panel from one of our state wildlife diversity managers, Rex Sallabanks from Idaho. I have worked closely with Rex and have a very high regard for his coordination and collaboration abilities.

All the best,

Jonathan Mawdsley

From: Sallabanks,Rex <rex.sallabanks@idfg.idaho.gov>

Sent: Thursday, July 30, 2015 5:49 PM
To: Jonathan Mawdsley
Subject: Lynx SSA process, state "expert" list

Hi Jonathan,

There was some talk on the SSA conference call yesterday about a list of suggested state contacts to more directly engage in the expert elicitation meeting (MN in the fall). Not necessarily as lynx ecology experts but also to enable the states to remain apprised of process and progress. I am curious if you know of anybody on the list from Idaho, or if you need assistance identifying someone from Idaho (if indeed this is an assignment of yours). I am moderately interested although no lynx expert … but would need to elevate this up the chain of command if we ever get that far.

Thanks, Rex.

Rex Sallabanks, PhD, CPM
Wildlife Diversity Program Manager
Idaho Department of Fish and Game

---

208 287 2754 (direct)
208 921 6932 (mobile)
208 334 2920 (office)

From: Zelenak, Jim
To: Zack Walker
Bcc: Mark Sattelberg; Tyler Abbott
Subject: Re: Lynx Coordination Call
Date: Tuesday, August 04, 2015 3:34:10 PM

Thanks Zack - glad you were able to make the call.

On Tue, Aug 4, 2015 at 3:20 PM, Zack Walker <zack.walker@wyo.gov> wrote:

> Jim,
> Thanks for the email, and I wanted to let you know that I was able to make the call. I got on late due to some technical difficulties but was able to hear much of the meeting. My apologies if you were taking roll on who was attending. When I connected I didn't announce myself. There was a number of people in conference and I didn't want to disturb.
>
> I have the presentation as well, thank you again for checking in on this.
>
> Zack
>
> On Tue, Aug 4, 2015 at 3:14 PM, Zelenak, Jim <jim_zelenak@fws.gov> wrote:
>
>> Hi Bob,
>>
>> We were surprised not to have anyone from Wyoming Game and Fish on the Lynx SSA coordination call last week, and I wanted to make sure that you weren't prevented from participating due to conference line capacity limitation or other potential technical difficulty. We haven't heard from others who wanted to join but were unable to, but I just wanted to make sure that was not the case for you or your staff.
>>
>> I believe I'd previously sent you a PDF copy of the presentation we went over on the call but, if not, let me know and I will send it. Also feel free to give a call if you have any questions about the SSA or recovery planning processes for the lynx DPS.
>>
>> Jim
>>
>> --
>> Jim Zelenak, Biologist
>> U.S. Fish and Wildlife Service
>> Montana Ecological Services Office
>> 585 Shepard Way, Suite 1
>> Helena, MT 59601
>> (406) 449-5225 ext. 220
>> jim_zelenak@fws.gov
>
> --
> Zack Walker
> Certified Wildlife Biologist®
> Statewide Nongame Bird and Mammal Program Supervisor
> Wyoming Game and Fish
> 260 Buena Vista
> Lander, WY 82520
> Phone: (307) 332-7723 x239

Fax: (307) 332-6669
Zack.Walker@wyo.gov

--
Jim Zelenak, Biologist
U.S. Fish and Wildlife Service
Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, MT 59601
(406) 449-5225 ext. 220
jim_zelenak@fws.gov

From: Belleman, Ann
To: Hanvey, Gary -FS
Subject: Re: misc.
Date: Thursday, August 06, 2015 7:13:04 AM

Interesting info re: lynx absence in what I thought to be the stronghold in the US (not including Maine, which seems to fluctuate considerably due to industry forest mgmt.) Even here on the Superior NF, where lynx have persisted albeit in relatively small #s - the researcher responsible for most of the work here, Ron Moen, seems to think this pop. S of the Can. border has never been/never will be flush with lynx.

Crown of the Continent area is getting a lot of attention, including for grizz and connectivity. While it may be USFS status quo even on the Flathead, sounds like some good monitoring and research is being done.

I may give Jim Z a call rather than email him. Will let you know of anything of interest. Talk soon.

Ann Belleman
U.S. Fish and Wildlife Service
Minnesota/Wisconsin Field Office Complex
4101 American Blvd. E
Bloomington, MN 55425-1665

ann_belleman@fws.gov

307-421-5839 (work cell)
(612) 725-3548 (Bloomington, MN)

On Wed, Aug 5, 2015 at 6:43 PM, Hanvey, Gary -FS <ghanvey@fs.fed.us> wrote:

> Just got back for a Staff Review Field Trip – about 20 folks from the SO and Districts - focus was on precommercial thinning (PCT) and lynx – very good trip and can share with you some observations in the field and some of the discussion. Looked at PCT in WUI and some different PCT prescription/techniques the Forest is trying that promote future lynx habitat and better/faster multi-forest stand conditions. Amy and I also brought up the WUI issue. Good discussion on taking a hard look at Squires telemetry data relative to lynx use of past PCT units on the Forest. Chip Weber suggested that is something he wants me to work with John on – says its one of the reasons he brought me here - Rob and I suggested that should be a focus of the new R1RO position, and Chip agreed. I will share with you more next time we talk. Maybe some pics of thin units as well as examples.
>
> Also meet with SW Crown Carnivore Working Group folks last Friday in Seeley Lake – lots of good discussion about continuing and expanding carnivore monitoring work into neighboring Forests. Lots of insight on lynx issues – interesting that of the 17 different lynx known in the SW Crown Project Area, only 5 are females (now 4 females since one was killed on the Interstate last year). That's a concern. Also talked about the fact that locals

(and especially older local trappers) have been telling group bios where they have historically seen lynx and lynx tracks, but don't see them there anymore. Jim Sparks was also present, and said they have not seen any lynx or lynx tracks the past few years in the Garnet Range either – older trappers have told Jim they were once very common. So, sure seems like red flags to me.

Not sure how to respond to your question below. Seems like Jim would have invited me if he wanted me. I certainly would be willing to participate and I think the Forest would support it – not sure what might happen after the interview on the 20th, but likely the Region would support participation as well. If you want to suggest it to Jim, I'm OK with it.

****

Gary Hanvey

Forest Wildlife Biologist

Flathead National Forest

Supervisors Office – Kalispell, MT

Office Phone: 406.758.5255

Cell Phone: 406.781.1765

ghanvey@fs.fed.us

From: Belleman, Ann [mailto:ann_belleman@fws.gov]
Sent: Wednesday, August 05, 2015 8:47 AM
To: Hanvey, Gary -FS
Subject: misc.

FYI - I emailed Kurt B this morning re: KM being on the draft lynx expert panel list and his response was that he didn't think there'd be any issues because this exercise is purely biological. The lynx SSA core team isn't seeking mgmt. recommendations and isn't a debate. It'll be up to the core team to sort out differing points of view re: lynx biology.

The list indicates that Kerry is unavailable for the mid-Oct. meeting in Minneapolis but is interested in being involved ... will be interesting to hear the differing pts. of view between Squires and him - but looks like that won't happen at least in person at the meeting in Mpls.

Are you interested in being on this panel? If so, I could suggest your name to Jim Z.

Ann Belleman

U.S. Fish and Wildlife Service

Minnesota/Wisconsin Field Office Complex

4101 American Blvd. E

Bloomington, MN 55425-1665

ann_belleman@fws.gov

307-421-5839 (work cell)

(612) 725-3548 (Bloomington, MN)

From: Smith, Tamara
To: Jim Zelenak
Subject: lynx core team call next week
Date: Thursday, August 06, 2015 4:31:40 PM

Hi Jim - fyi - I will not be able to attend next Tuesday's Lynx SSA core team call - I'll be at the SSA workshop here in R3!

Thanks
Tam

--
Tamara Smith
U.S. Fish and Wildlife Service
Twin Cities Field Office
4101 American Boulevard East
Bloomington, MN 55425
612-725-3548 ext. 2219
612-600-1599 cell

From:	Zelenak, Jim
To:	Haskell, Shawn
Cc:	Mark McCollough; Anthony Tur
Subject:	Re: lynx info from ME
Date:	Friday, August 07, 2015 9:46:29 AM

Thanks Shawn.

I'm working with Mark McCollough in Maine and Tony Tur for NH and VT (both copied on this email), so I think we are good on contacts for all 3 states.

Give my regards to Charlie Todd. That summer (1988 or 89 - geez, can it really have been that long ago?) at Borestone Mountain was a lot of fun, and I have many fond memories. It also was the start of many years of raptor-related work for me. Lynx lawsuits and related challenges sometimes make me wonder if I should have stuck to that line of work - lynx work is certainly less fun most days than being a hack-site attendant.....

At what hack site(s) did you work?

Cheers,

Jim

On Thu, Aug 6, 2015 at 12:26 PM, Haskell, Shawn <Shawn.Haskell@maine.gov> wrote:

> Mr. Zelenak, I'm currently reviewing a manuscript regarding Canada lynx conservation and management and am reminded that your office sent out an information request a few months back regarding a lynx status assessment. I've recently heard my Directors say a few times that they want to be sure that the Service has the most up-to-date information and best available science for Maine's situation and the national review, so I am following up with you for some assurance for them. The attached memo is probably the most recent development we have to report on in Maine, and I've attached our recent comments submitted to the Federal Register as well as general brief overviews. I can give you contacts for NH and VT, too if you'd like, as they also have breeding populations of lynx now, which will likely be the full extent of recovery in northern New England.
>
> Following a 12-yr field study, Jen Vashon and others reported their findings in our own lynx assessment, which you can find here: http://www.maine.gov/ifw/wildlife/species/mammals/canada_lynx.html Vashon, Jakubas, and others also developed an Incidental Taker Plan, which can be found here (e.g., pgs 75-77 & App 7): http://www.fws.gov/mainefieldoffice/Canada_lynx.html . If you have any questions, I can put you in touch with our State's lynx expert here in Bangor. As one ex-hack site attendant to another, I hope things are well in Big Sky Country. (Charlie says hello). shawn
>
> P.S. our north woods system may be a little different than others….we have lots of reports of lynx hunting our abundant ruffed grouse and swiping them from hunters….where else do lynx overlap so greatly with wild turkeys? I hope I'm not too late, but I think news of this review was slow to get to the east coast.

Shawn P. Haskell, Ph.D.

Maine Dept of Inland Fisheries & Wildlife

Research & Assessment Section, Supervisor

650 State St., Bangor, ME 04401

207-941-4467

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Jim Zelenak, Biologist
U.S. Fish and Wildlife Service
Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, MT 59601
(406) 449-5225 ext. 220
jim_zelenak@fws.gov

From:	Zelenak, Jim
To:	Kimberly Hersey
Cc:	Jodi Bush; Mary Parkin; Kate Novak
Subject:	Re: Utah lynx representative
Date:	Friday, August 07, 2015 9:47:52 AM

Will do, Kim.

Thanks,

Jim

On Tue, Aug 4, 2015 at 4:13 PM, Kimberly Hersey <kimberlyasmus@utah.gov> wrote:

> Hi Jim,
>
> I was on the conference call last week and will be acting as Utah's representative through the status review and recovery planning process. Please include me on the distribution list.
>
> Thanks,
> Kim
>
> --
> Kimberly Asmus Hersey
> Mammal Conservation Coordinator
> Utah Division of Wildlife
> (801) 362-0795
> kimberlyasmus@utah.gov

--
Jim Zelenak, Biologist
U.S. Fish and Wildlife Service
Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, MT 59601
(406) 449-5225 ext. 220
jim_zelenak@fws.gov

From:	Zelenak, Jim
To:	Joshua Uriarte
Cc:	Sam Eaton; Bryon Holt; Jodi Bush; Mary Parkin; Seth Willey
Subject:	Re: Lynx Status Assessment Call
Date:	Friday, August 07, 2015 10:22:12 AM

Hi Joshua,

Glad you could make the call, and we will certainly include you and Sam on our contact list for the lynx SSA and recovery planning.

Just to clarify - our draft list of candidates for the fall expert elicitation meeting will not include a representative from each of the 15 states within the range of the lynx DPS. Rather, we are looking for the experts most capable of describing the current and likely future status of each of the 6 lynx populations within the DPS. We also will be looking to keep the group of experts and other participants to a reasonably small number to facilitate open discussion and efficient transfer/capture of relevant information. We will consider recommendations made by States and other partners, but ultimately the Service will make final determinations on which experts will be invited to the meeting.

If the SSA ultimately suggests that lynx clearly no longer warrant protection under the ESA, the Service would write a formal memo that the DPS is exempt from the Act's requirement for a recovery plan. That would indicate the need for a future delisiting rule, which would include draft and final rules published in the Federal Register, with associated public comment and peer-review. That is likely a several-year process in itself, and the lynx DPS would retain its threatened status until such a final rule is published and in effect (typically 30 days after publication of the final rule).

Hope this helps. Let me know if you have questions or need additional information.

Jim

On Mon, Aug 3, 2015 at 3:58 PM, Joshua Uriarte <Joshua.Uriarte@osc.idaho.gov> wrote:

> Jim,
>
> My name is Joshua Uriarte from the Idaho Governor's Office of Species Conservation. I was on the call for the Lynx Status Assessment and Recovery Planning call on July 29th. Could you include myself and Sam Eaton, CC'ed, from the office on the email list to look at the draft list of expert science candidates from each state for the meeting in Minneapolis in October or November? Also could you include us on any updates that you send to the group that may be coming forth on lynx recovery planning as the information comes in.
>
> I did have a question on the SSA (Species Status Assessment) Framework from the presentation on July 29th. As I understood the SSA is set up to be the science portion of the ESA decision process and will help determine if a Recovery Plan is needed. At the end of 2015, the SSA is expected to be completed. If this assessment concludes that a recovery plan is not needed, does that negate the listing determination of the species and deem that the species is no longer in need of ESA protections?

> Thank you,
>
> **Joshua Uriarte**
>
> **Program Manager & Policy Advisor**
>
> **Governor's Office of Species Conservation**
>
> **304 North 8th Street, Suite 149**
>
> **Boise, Idaho 83702**
>
> **P:208-332-1556/F:208-334-2172**
>
> **Species.idaho.gov**

--
Jim Zelenak, Biologist
U.S. Fish and Wildlife Service
Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, MT 59601
(406) 449-5225 ext. 220
jim_zelenak@fws.gov

Although partly speculative, this interpretation best explains the unique morphology of the skull roof, braincase, stapes and stapedial articulation. Furthermore, the recent discovery of deeply grooved branchial arches in *Ichthyostega* (Fig. 1c, d) suggest that, similar to *Acanthostega*[10], it was primarily aquatic rather than the terrestrially adapted creature previously depicted.

Much of the significance of this specialized structure lies in its discovery in what might have been regarded as a primitive tetrapod. This level of specialization so early in the tetrapod fossil record suggests unsuspected diversity among animals that have previously been considered essentially conservative in their cranial anatomy. The ear of *Ichthyostega* is wholly unique, differing markedly from that of its contemporary *Acanthostega*, which seems to represent the ancestral pattern for later tetrapods[16] (Fig. 4). These two are the earliest known tetrapod ears, separated by no more than 10 million years from *Panderichthys*-like ancestors with unmodified fish spiracles and hyomandibulae[11]. It thus seems that at the origin of tetrapods, ear evolution involved not just a functional shift, but a radical and hitherto unrecognized morphological and functional diversification. The early appearance of a specialized hearing organ in *Ichthyostega* suggests that the otic apparatus had at least some auditory function very early in tetrapod history, on which specializations could be built, although it seems to have related to underwater rather than aerial hearing. □

Methods

High-resolution X-ray CT was used on MGUH f.n. 180. CT-scanned sections were used to create three-dimensional computer models of the objects by reconstructing the surfaces that connected corresponding outlines on adjacent sections[19,20].

The otic region and the posterior skull region of the specimen were scanned as two consecutive overlapping data sets with slightly different alignments. We acquired 73 sections of the otic region and 67 sections of the posterior section (on separate occasions). Figure 2a, c–d is based on the anatomically anterior scan set alone, whereas Fig. 2b incorporates both scan sets. Both scans used second-generation (translate-rotate) mode CT, with X-rays set at 420 kV and 1.8 mA and pre-filtered through brass to reduce beam hardening. The parameters of the scans for both series were: 420 kV; 1.8 mA; slice thickness 0.5 mm; interslice spacing 0.5 mm; SOD (source-to-object distance) 752 mm; diameter of field of reconstruction 80 mm (1,024 × 1,024 voxels); voxel size 78 × 78 × 500 μm. Sections were saved as 16-bit TIFF files. Each data set was segmented using Mimics 7.3 software (Materialise N. V.). Because of lateral changes and similarity in the X-ray attenuation values within individual bones and the matrix, local rather than global thresholds were used to create the bone masks (see Supplementary Movies created from these models).

Received 13 May; accepted 11 July 2003; doi:10.1038/nature01904.

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Supplementary Information accompanies the paper on **www.nature.com/nature**.

Acknowledgements We thank the staff of MGUH and the Demark and Greenland Geological Survey for cooperation, access to material and support in the field; M. Colbert (UTCT) for technical assistance; H. Blom for discussion of the anatomy of *Ichthyostega*; and NERC and BBSRC for funding the project and additional CT scanning.

Competing interests statement The authors declare that they have no competing financial interests.

Correspondence and requests for materials should be addressed to J.A.C. (j.a.clack@zoo.cam.ac.uk).

Ecological and genetic spatial structuring in the Canadian lynx

Eli Knispel Rueness[1], Nils Chr. Stenseth[1], Mark O'Donoghue[2], Stan Boutin[3], Hans Ellegren[4] & Kjetill S. Jakobsen[1]

[1]*Centre for Ecological and Evolutionary Synthesis, Department of Biology, University of Oslo, P.O. Box 1031 Blindern, N-0315 Oslo, Norway*
[2]*Fish and Wildlife Branch, Yukon Department of Environment, P.O. Box 310, Mayo, Yukon Y0B 1M0, Canada*
[3]*Department of Biological Sciences, University of Alberta, Edmonton, Alberta T6G 2E9, Canada*
[4]*Department of Evolutionary Biology, Uppsala University, Nordbyvägen 18D, SE 752 36 Uppsala, Sweden*

The Canadian lynx, distributed all across the northern part of North America, is well known for its regular population cycles—cycles that have different underlying structures in different parts of Canada[1]. Using both nuclear and mitochondrial DNA markers, we report here a close resemblance between the earlier observed spatial ecological structuring of the Canadian lynx[1] and its spatial genetic structuring. Specifically, we demonstrate that the Rocky Mountains represent a barrier to gene flow in western Canada, and, somewhat surprisingly, we detect the presence of a geographically invisible barrier south of Hudson Bay (coinciding with the separation between the ecological Continental and Atlantic regions[1]). No evidence for isolation in different glacial refugia within North America was found. We suggest that ecological factors underlying the spatial dynamic structuring also strongly influence the genetic structuring of the Canadian lynx.

The Canadian lynx (*Lynx canadensis*) is distributed fairly continuously throughout the boreal forest of North America. Its main prey species is the equally widely distributed snowshoe hare (*Lepus americanus*). The interaction between snowshoe hares and lynx—itself affected by hare–vegetation dynamics[2,3]—is generally believed to generate the well-known regular cycles throughout boreal North America[1,2–5]. Both species have been the subject of numerous ecological studies (for summaries, see refs 6, 7). The geographical synchrony and ecological structuring have also received much attention[1,5,8]. Genetic studies (applying microsatellite data) in the

western part of Canada have recently reported high gene flow for both the lynx[9] and the hare[10]. However, no genetic study has thus far covered the entire boreal North American subcontinent, and no study has explored the genetic population structure of lynx within a historical context—a dimension that is important if we are to understand the complex interaction between population genetics and ecology.

We analysed nine microsatellite loci as well as two segments of the mitochondrial genome (cytochrome *b* (*cytb*) and D-loop) for samples of the Canadian lynx, covering its main distribution range. By choosing genetic markers with different rates of evolution, we examined the relative roles played by historical and contemporary influences in shaping the observed spatial structuring. We divided our samples into five large-scale regions: East, Prairie, North, Northwest and British Columbia (BC; Fig. 1), each containing individuals sampled from a number of widespread localities to avoid local effects. Differentiation in microsatellite allele frequencies between regions, measured as pair-wise F_{ST} values, was low but significantly higher than expected under a random distribution of genotypes (see also Supplementary Information), except between the Prairie and North regions (Table 1)—both encompassed by the Continental region of ref. 1. BC was more strongly differentiated than the other regions, regardless of geographical distance (Fig. 2), whereas the remaining point estimates clearly follow a linear increase with geographical distance. This shows that the Rocky Mountains and the adjacent Coastal Mountains represent a barrier to gene flow, not only in the east–west direction, but also to north–south movement. This finding is consistent with studies of radio-collared lynx, showing that long-distance dispersers from the southern Yukon tended to stay north of these mountain ranges and moved northwestward and southeastward rather than south and west into the BC region[6].

East of the Rocky Mountains there are few, if any, potential large-scale geographical barriers to movement of lynx within the boreal forest of Canada—except for the St Lawrence river (see Supplementary information). However, Stenseth *et al.*[1]. reported evidence suggesting that the dynamic structure is divided into three regions

Table 1 **Genetic differentiation between geographical regions**

Microsatellites	Mitochondrial DNA				
	East	Prairie	North	Northwest	BC
East		0.0622**	0.0223*	0.0342*	0.0422*
Prairie	0.0062**		0.0301	−0.0074	0.0119
North	0.0091*	0.0017		0.0261	0.0027
Northwest	0.0156***	0.0095**	0.0027*		0.0073
BC	0.0136**	0.0097**	0.0172**	0.0244***	

Pair-wise F_{ST} estimates for microsatellites below diagonal and mtDNA above diagonal. Significant values indicated as * at the 0.05 level, ** at 0.01 level and *** at the 0.001 level.

across Canada—the Pacific, Continental and Atlantic regions. They argued that this structuring was due to climatic factors—factors that might have profound effects on the winter conditions (such as snow conditions). This ecological structuring may or may not have an effect on the genetic structuring of lynx across Canada. In addition to contemporary ecological processes, genetic population structuring is also a result of various historic processes. During the late Pleistocene, Canada was covered by two extensive ice sheets, separated by the Rocky Mountains, and colonization of the country by biota took place after the retreat of the ice about 12,000 yr before present[11]. Isolation in different glacial refugia has been shown to have a profound effect on the genetic differentiation within several species[12,13]. Fossil data, although scarce, indicate that Canadian lynx were present in refugia both in Beringia and south of the ice edge[14]. The oldest fossils date back to the Sangamonian interglacial (130–115,000 yr before present) and were found in the southern refugium[14].

Mitochondrial DNA genealogies may allow discrimination between different possible explanations for any detected geographical association[15]. The star-like shape of the Canadian lynx mtDNA genealogy (Fig. 3a), with one common haplotype having a central position and recent derivatives independently connected to it by short branches, is just as expected for an abundant species that has expanded its range relatively recently from small or modest numbers of founders[16]. Also, the observed mismatch distribution was as

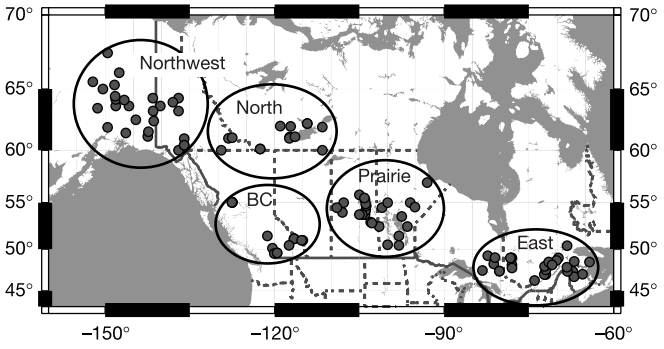

Figure 1 Distribution of the sample localities. Dots, sample localities; dashed lines, province borders; solid line, the Canada–US border. Individual samples (in total 184) were divided on five large-scale geographical regions, as indicated by circles on the map. These were East (Quebec and Ontario) $n = 46$, Prairie (Manitoba and Saskatchewan) $n = 48$, North (NWT and southeast Yukon) $n = 25$, Northwest (Yukon and Alaska) $n = 40$ and BC (British Columbia) $n = 24$ (n is number of individuals). Samples were taken from widespread localities within each region, so these do not represent local populations. Deviations from Hardy–Weinberg equilibrium, heterozygote deficiencies, indicated substructuring within all the regions except BC (see Supplementary Information). The East region corresponds to the Atlantic zone described in ref. 1, the BC region to the Pacific zone, and Prairie and North regions to the Continental zone. Alaska was not covered in ref. 1; it is, however, reasonable to assume that the Northwest region is included in the Continental zone.

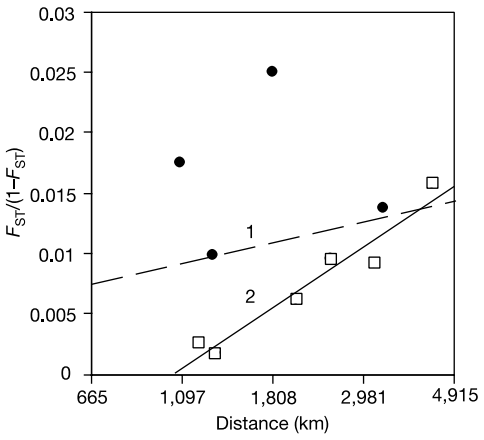

Figure 2 Linearized F_{ST} plotted against geographical distances between samples. Linearized F_{ST} is given by $[F_{ST}/(1 - F_{ST})]$, and is derived from microsatellite data; note logarithmic x-axis. The distances between the centres of the samples ranged between 1,080 km (North and BC) and 4,336 km (East and Northwest). When all samples were compared (curve 1, dashed line), we observed no increase in genetic differentiation with increasing distance between samples (slope, $b = 0.0034$). Removing the BC samples (black dots), however, gave a regression line (curve 2) that is significantly steeper ($b = 0.0098$) than expected under a random distribution of genotypes among regions (Mantel test, $P = 0.044$).

expected after a recent population expansion (raggedness index 0.03, $P = 0.90$), probably corresponding to the post-glacial expansion in North America. None of the major clades was restricted to any geographical region (Fig. 3b), but nested clade analysis[17] suggested restricted gene flow with isolation by distance—indicating that this has taken place after the range expansion, a finding consistent with the above-reported microsatellite results (Fig. 2). The effect of the Rocky Mountains as a barrier to gene flow was not detected in the mtDNA data (Table 1), which might be explained by the lower rate of evolution in mtDNA than in microsatellites, leading to a slower accumulation of genetic differences in mtDNA. This further suggests that the differentiation we observed with the microsatellite analyses is caused by present rather than historical isolation. Altogether, we found no evidence for past fragmentation in different glacial refugia within North America.

The genetic differentiation between regions in terms of haplotype frequencies, F_{ST}, demonstrates that the eastern region (the Atlantic region of ref. 1) is clearly distinct from all of the other regions (Table 1). The largest F_{ST} value was found between the neighbouring East and Prairie regions, implying that the distinctiveness of the East cannot be explained through an isolation-by-distance effect. As lynx habitat is more or less continuous between the East and the Rocky Mountains, the differentiation cannot be caused by any physical barrier hindering gene flow either. However, Doebeli and Dieckmann[18] have recently demonstrated that genetic diversification may occur along environmental gradients. The differences in climatic conditions between the Atlantic and the Continental region (see ref. 1) may indeed represent such a gradient, leading to the observed genetic structuring.

Although the East region was significantly differentiated from the other regions on the basis of both nuclear and mitochondrial DNA (Table 1), it did not deviate from the general pattern of isolation by distance in the microsatellite data (Fig. 2). This incongruence between patterns indicated by nuclear and mitochondrial markers might be explained by differences in the male and female migration rates, as mtDNA is maternally inherited and hence only reflects the structure of the female population. Stronger differentiation in mtDNA than in nuclear markers would be expected in species with female philopatry. Although male-biased dispersal is characteristic of many species of mammals[19], the data are thus far unclear as to whether this is the case for lynx. Natal philopatry by female kits[20] and male-biased immigration[21] have been noted in some studies, but the most extensive study to date of lynx dispersal[22] showed no clear sex bias in dispersal rates or distances.

The level of differentiation in the Canadian lynx is expected to be low owing to the fairly recent population expansion since the latest glaciation, especially given that lynx are periodically abundant and highly mobile. Nevertheless, we have been able to demonstrate the effect of the Rocky Mountains as a geographical barrier in western Canada (a barrier that was not detected in ref. 9), and the existence of a geographically invisible barrier in eastern Canada. Altogether, this may suggest a link between the ecological and genetic spatial structuring across Canada—a link that is probably due to differences in snow conditions[1] and/or differences in the spatio-temporal dynamics of lynx within each of the regions. Future studies aimed at disentangling this link between the ecological and genetic spatio-temporal processes will certainly be rewarding. □

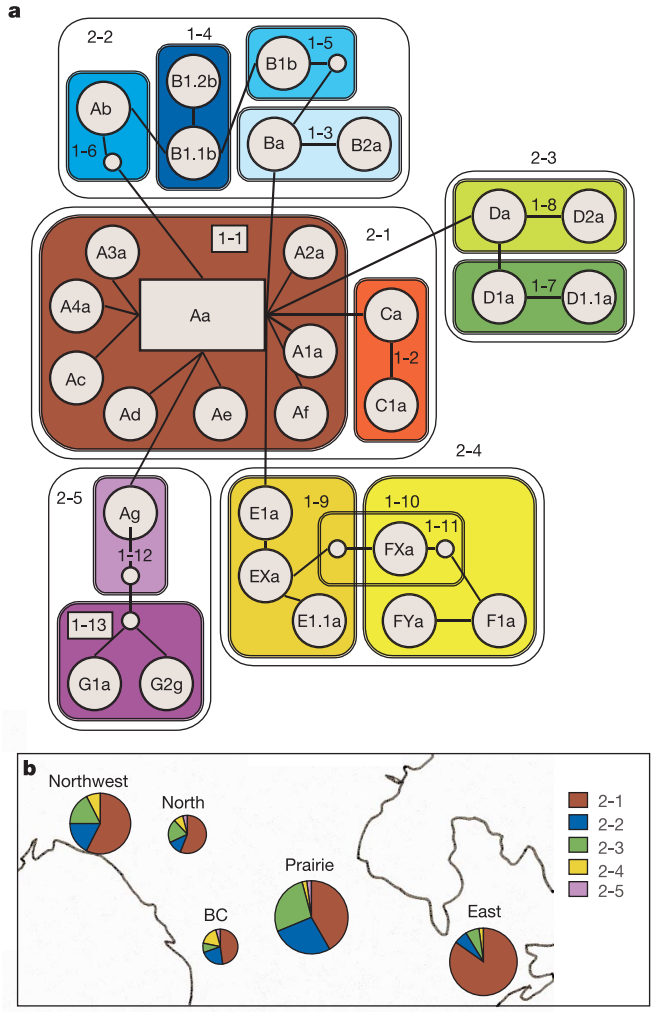

Figure 3 Distribution of mtDNA haplotypes. **a**, Minimum spanning network between mtDNA haplotypes. The D-loop haplotypes are denoted by capital letters and numbers, and Cytb haplotypes are denoted by lower-case letters. Each line represents a single mutational change. Small circles indicate interior nodes that were not present in the sample owing to either insufficient sampling or extinct haplotypes. Similar haplotypes are grouped in clades, shown as colour-coded areas. Loops indicate that more than one equally parsimonious alternative connection exists between haplotypes or clades. Clade 2-1 is the central node of the cladogram, and 59% of the sequenced individuals grouped within this clade; the central haplotype Aa was expressed by 44% of the individuals. **b**, Distribution of clades among geographical regions. The sizes of the pie-charts are proportional to the number of individuals analysed from each region. The network and information about geographical distribution of haplotypes and clades was used for nested clade analysis in order to infer the historical and current processes that probably led to the observed structuring. It is assumed that interior clades are older than tip clades. Restricted gene flow was indicated by the finding that tip clades tend to cover smaller geographical ranges than interior clades (for details, see Supplementary Information).

Methods

Microsatellite analysis

The following nine loci from ref. 23 were used: Fca008, Fca031, Fca043, Fca149, Fca391, Fca441, Fca559, Fca628 and F115. Calculations of gene diversity, Hardy–Weinberg tests, *F*-statistics, the test for population differentiation, regressions for isolation by distance and Mantel tests were done in GENEPOP ver. 3.3 (ref. 24).

mtDNA analysis

mtDNA was amplified and sequenced using the following primers. D-loop: mtU, 5′-CTTTGGTCTTGTAAACCAAAAAA; and R3, 5′-TAAGAACCAGATGCCAGGTA. Cytb: Cytb-1 and Cytb-2 (ref. 25). Altogether, 553 base pairs (bp) of the D-loop and 383 bp of Cytb were sequenced for each individual. Pair-wise F_{ST} estimates were calculated in Arlequin 2000 (ref. 26). The total sample was tested for sudden population expansion by the mismatch distributions approach[27] describing the pair-wise differences between sequences, as implemented in Arlequin 2000 (ref. 26). Minimum spanning networks were constructed using the statistical parsimony approach of ref. 17, using the software TCS version 1.13 (ref. 28). Nested clades were identified following the rules of ref. 17, treating

ambiguities according to ref. 29. The null hypothesis of no geographical association of clades and nested clades was tested by permutation of clades against sampling locations for tip and interior clades in the program GeoDis ver. 2.0 (ref. 30). The biological interpretation of the results was done following the inference key of ref. 15.

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Correspondence and requests for material should be addressed to N.C.S. (n.c.stenseth@bio.uio.no). Sequences have been deposited in GenBank under accession numbers AY319482–AY319505 (D-loop) and AY319506–AY319512 (Cytb).

Evolution of cooperation and conflict in experimental bacterial populations

Paul B. Rainey[1,2] **& Katrina Rainey**[3]

[1]*Department of Plant Sciences, University of Oxford, South Parks Road, Oxford OX1 3RB, UK*
[2]*School of Biological Sciences, University of Auckland, Private Bag 92019, Auckland, New Zealand*
[3]*27 Westwell Road, Auckland, New Zealand*

A fundamental problem in biology is the evolutionary transition from single cells to multicellular life forms[1–3]. During this transition the unit of selection shifts from individual cells to groups of cooperating cells[1,3,4]. Although there is much theory[5–15], there are few empirical studies[16]. Here we describe an evolutionary transition that occurs in experimental populations of *Pseudomonas fluorescens* propagated in a spatially heterogeneous environment[17]. Cooperating groups are formed by over-production of an adhesive polymer[18], which causes the interests of individuals to align with those of the group. The costs and benefits of cooperation, plus evolutionary susceptibility to defecting genotypes, were analysed to determine conformation to theory[1,3,12]. Cooperation was costly to individuals, but beneficial to the group. Defecting genotypes evolved in populations founded by the cooperating type and were fitter in the presence of this type than in its absence. In the short term, defectors sabotaged the viability of the group; but these findings nevertheless show that transitions to higher orders of complexity are readily achievable, provide insights into the selective conditions, and facilitate experimental analysis of the evolution of individuality.

Multicellularity has evolved independently on several occasions and is likely to have simple, albeit diverse, explanations[1,2]. Until now, attention has focused on the advantages of multicellularity and its implications for the development of complexity[1,2,19–21]. Less consideration has been given to the selective conditions necessary for the evolutionary origin of simple undifferentiated groups: these have special significance because they may have been the raw material for the evolution of multicellular organisms[2,15,22].

The origin of cooperating groups of cells requires an understanding of how selection operates at the level of individual cells[1,3,6,8,12]. Of central importance is the genetic relatedness of the cooperating individuals: if interactions are with relatives then genes causing altruistic or cooperative behaviour can increase in frequency[5]. While costs of cooperation to individual cells are readily envisaged (expression of traits necessary for cohesion, reduced accessibility of clustered cells to nutrients, build-up of toxic metabolic waste) the selective benefit to forming undifferentiated groups of cells is unclear. Size may be an important factor because larger groups of cells are less prone to predation[2,16,20]; some can migrate further[23]. Recent theory suggests that enhanced resource utilization efficiency and reduced interaction with noncooperative individuals are also relevant[15]. A related issue concerns the existence of spatial structure[13], which increases chances for interactions to occur among genetically related cells[5].

Populations of ancestral smooth (SM) *P. fluorescens* rapidly diversify when propagated in a spatially structured environment (static broth microcosms), generating, via genetic mutation, a range of niche specialist genotypes that are maintained by negative frequency dependent selection[17]. One prominent class of niche specialist is the wrinkly spreader (WS), which colonizes the air–liquid interface. Colonization of this niche enables cells to avoid the anoxic conditions that rapidly build up in unshaken broth culture.

Differences in niche preference of ancestral SM and derived WS genotypes (Fig. 1) led to the hypothesis that WS genotypes owe their

Supplementary information to

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Below follows supplementary information referred to in the main text and further supporting the conclusions reported in the published paper.

We present:

Table 1. Summary statistics for microsatellite loci averaged over all regions

Table 2. Diversity indices for regions, averaged over all loci

Table 3. Distribution of haplotypes among regions

Figure 1. Nested Clade Analysis

At the end of this Supplementary Information, we also discuss (I) the barrier imposed by the St. Lawrence River in the eastern Canada, and (II) the use of F_{ST} as a measure of differentiation among geographic regions.

Table 1. Summary statistics for microsatellite loci averaged over all regions

Locus	Number of alleles	Gene diversity H_E	F-statistics F_{IS}	F_{ST}
Fca008	7	0.796	0.149***	0.021***
Fca031	8	0.769	0.076	0.008*
Fca043	5	0.641	0.032*	0.008
Fca149	6	0.355	0.124***	-0.009
Fca391	7	0.738	-0.055	0.006**
Fca441	8	0.795	0.060	0.012
Fca559	21	0.897	0.062**	0.007
Fca628	7	0.725	0.103*	0.016
F115	33	0.935	0.167***	0.013***
Average	10.67	0.738	0.081***	0.010***

Table 2. Diversity indices for regions, averaged over all loci

Sample	#	Number of alleles	SD	Gene diversity H_S	SD	F-statistics F_{IS}
East	46	8.00	6.44	0.719	0.059	0.080*
Prairie	48	8.56	5.77	0.744	0.057	0.118***
North	25	7.89	4.78	0.746	0.056	0.097***
Northwest	40	8.11	6.33	0.727	0.054	0.095***
BC	24	7.11	4.65	0.720	0.056	-0.038
Total	183	10.67	8.19	0.738	0.057	0.081***

Table 3. Distribution of haplotypes among regions

Sample	n	Aa	Ac	Ad	Ae	Af	A1a	A2a	A3a	A4a	Ba	B2a	Ab	B1b	B1.1b	B1.2b
East	46	23	3				5	4	2		2				1	
Prairie	48	14		1	1			2	1		4	1	1	1	5	1
NWT	25	11			1	1		1			3					
Northwest	40	14		1			1	2	1	1	2				3	2
BC	23	8				3					3				2	
Total	182	70	3	2	2	4	6	9	4	1	14	1	1	1	11	3

Sample	Ca	C1a	Da	D2a	D1a	D1.1a	E1a	E1.1a	Exa	F1a	FXa	FYa	Ag	G1a	G2g
East	2		1		2			1							
Prairie		1	6		7			1							1
NWT				2	2	1				1	1		1		
Northwest		3	4		3		1	2							
BC					2				1	2		1		1	
Total	2	4	11	2	16	1	1	4	1	3	1	1	1	1	1

Figure 1. Nested Clade Analysis

Haplotypes			1-step clades			2-step clades		
No.	Dc	Dn	No.	Dc	Dn	No.	Dc	Dn
Aa	1443	1454						
Ac	0	2431^{L}						
Ad	1226	1323						
Ae	570	759						
Af	379^{S}	933^{S}						
A1a	1432	2369^{L}						
A2a	1616	1696						
A3a	1683	1862						
A4a	0	2100						
I-T	315	-295						
1-2-3-5-6-7-NO RGF/LDD			1-1	1510	1508			
C1a	818	1456						
Ca	0	2868						
I-T	-818	1412	1-2	1897	1945			
			I-T	-387	-437	2-1	1530^{L}	1523^{L}
B2a	0	773						
Ba	1023	1028						
I-T	1023	256	1-3	1213	1205			
B1.2b	1008	1364						
B1.1b	1143	1174						
I-T	136	-190	1-4	1016	1009			
		B1b	1-5	0	867			
		Ab	1-6	0	867	2-2	1085^{S}	1092^{S}
D1.1a	0	621						
D1a	1100	1099						
I-T	1100	478	1-7	1058	1052			
D2a	0	355^{S}						
Da	1357^{L}	1362^{L}						
I-T	1357^{L}	1007^{L}						
1-2-3-4-No RG/IBD			1-8	1116	1141			
			I-T	57	89	2-3	1089^{S}	1114^{S}
EXa	0	579						
E1.1a	1731	1764						
E1a	0	1300						
I-T	1385	1092	1-9	1372	1380^{L}			
Fya	0	247						
F1a	455	424						
I-T	455	176	1-10	379^{S}	501^{S}			
		Fxa	1-11	0	582			
			1-2-11-17-4-No RGF/IBD			2-4	891^{S}	1081
		Ag	1-12	0	613			
		G1a/G2a	1-13	567	668			
			I-T	-567	-56	2-5	647	739
						I-T	421^{L}	346^{L}
						1-2-3-4-No RGF/IBD		

The numbers refer to the sequence of the questions of the inference key (Templeton *et al.* 1995) that the observed pattern generated, followed by the answer to the final question. RGF = Restricted gene flow, LDD = Long distance dispersal and IBD = Isolation by distance.

(I) The St. Lawrence River as a genetic barrier

Our East region was divided by the St. Lawrence River. A sub-division of the individual samples from the East revealed significant differentiation on either side of the river showing that it acts as a barrier to gene flow. As this study focused on large-scale issues, we pooled all the individual samples from the East in our analyses. To further investigate the impact of the St Lawrence River as geographic barrier, a larger number of samples on a more local scale should be analysed. It should be noticed though that significant differentiation between the Easten (Atlantic) region and the samples from the Continental region was retained when excluding the samples (n=11) from southeast of the St. Lawrence River (New Brunswick and Gaspésie).

(II) Regarding F_{ST} and gene flow

We have presented the differentiation between large-scale regions (pair-wise F_{ST}) in Table 1. The deviations from Hardy Weinberg proportions observed within the regions do not affect the relative magnitudes of the F_{ST} – values. F_{ST} can thus be regarded as reliable estimates of the relative level of differentiation between regions. Importantly, these measures should not be translated into estimates of gene flow in terms of number of migrants per generation (*Nm*), as several of the assumptions for making such estimates are violated in our data (see e.g. Whitlock and McCauley 1999)

Low F_{ST} -values do not necessarily imply high gene flow (see, e.g., Balloux, and Lugon-Moulin 2002). This is particularly true for highly variable markers in recently expanded, large populations with high dispersal. To transform F_{ST} -values into *Nm* under such conditions might indeed be misleading.

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The subtle role of climate change on population genetic structure in Canada lynx

JEFFREY R. ROW[1], PAUL J. WILSON[2], CELINE GOMEZ[1], ERIN L. KOEN[2], JEFF BOWMAN[3], DANIEL THORNTON[1,4] and DENNIS L. MURRAY[1]

[1]*Department of Biology, Trent University, Peterborough, Ontario K9J 7B8, Canada,* [2]*Environmental and Life Sciences, Trent University, Peterborough, Ontario K9J 7B8, Canada,* [3]*Wildlife Research and Development Section, Ontario Ministry of Natural Resources, Trent University DNA Building, 2140 East Bank Drive, Peterborough, Ontario K9J 7B8, Canada,* [4]*Panthera, 8 West 40th Street, 18th Floor, New York, NY 10018, USA*

Abstract

Anthropogenically driven climatic change is expected to reshape global patterns of species distribution and abundance. Given recent links between genetic variation and environmental patterns, climate change may similarly impact genetic population structure, but we lack information on the spatial and mechanistic underpinnings of genetic–climate associations. Here, we show that current genetic variability of Canada lynx (*Lynx canadensis*) is strongly correlated with a winter climate gradient (i.e. increasing snow depth and winter precipitation from west-to-east) across the Pacific-North American (PNO) to North Atlantic Oscillation (NAO) climatic systems. This relationship was stronger than isolation by distance and not explained by landscape variables or changes in abundance. Thus, these patterns suggest that individuals restricted dispersal across the climate boundary, likely in the absence of changes in habitat quality. We propose habitat imprinting on snow conditions as one possible explanation for this unusual phenomenon. Coupling historical climate data with future projections, we also found increasingly diverging snow conditions between the two climate systems. Based on genetic simulations using projected climate data (2041–2070), we predicted that this divergence could lead to a threefold increase in genetic differentiation, potentially leading to isolated east–west populations of lynx in North America. Our results imply that subtle genetic structure can be governed by current climate and that substantive genetic differentiation and related ecological divergence may arise from changing climate patterns.

Keywords: climate gradient, habitat imprinting, isolation by resistance, landscape genetics, principal components analysis, snow conditions

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Introduction

Large-scale climate patterns are consistently one of the strongest global predictors of species diversity and abundance (Thuiller *et al*., 2004; Luoto *et al*., 2006). Given the extent that anthropogenic factors are projected to modify climate patterns, a major research focus has centered on quantifying the species-level impacts of climate change, with much of this work pointing to widespread changes in global biodiversity (Burns *et al*., 2003; Parmesan & Yohe, 2003; Root *et al*., 2003; Thomas *et al*., 2004; Thuiller *et al*., 2005; Hoegh-Guldberg & Bruno, 2010). More recently, evidence has emerged linking dispersal with environmental and climatic boundaries (Geffen *et al*., 2004; Sacks *et al*., 2004; Stenseth *et al*., 2004; Garroway *et al*., 2008; Muñoz-Fuentes *et al*., 2009), suggesting that changes in climate may similarly reshape within-species variation for widespread species. However, aside from the few examples of demonstrated correlation between large-scale genetic structure and climate conditions, the underlying spatial patterns associated with climate change are not fully articulated. This leaves us with limited understanding of the mechanisms underlying genetic–climate associations and places us in a poor position to predict these potentially more subtle consequences of climate change.

Restricted dispersal between different ecotypes or across climate boundaries could be the result of a variety of factors related to habitat quality or the behavior of individuals. One possible explanation for restricted dispersal across a transition zone is deterioration of habitat quality within the transition zone or a particular ecotype. This would lead to a lower number of individuals moving through or into the undesirable habitat and result in increased genetic differentiation. Recently, some have suggested these patterns could also arise through habitat imprinting, where individuals are more

Correspondence: Jeffrey R. Row, tel. +1 705 748 1011 X6148, fax +1 705 748 1003, e-mail: jeff.row@me.com

likely to choose habitats where conditions are similar to those in which they were reared (Geffen *et al.*, 2004; Stenseth *et al.*, 2004; Muñoz-Fuentes *et al.*, 2009). Although imprinting to natal habitat conditions has been shown experimentally for a variety of species (Thorpe, 1945; Wecker, 1963; Teuschl *et al.*, 1998; Vogel *et al.*, 2002), there is less direct evidence found across natural populations (but see: Olson & Horne, 1998). However, the role of natal habitat imprinting in generating genetic boundaries for wide-ranging species, was supported through radio-telemetry data, where individual coyotes were found less likely to disperse across an ecological boundary (Sacks *et al.*, 2005) likely leading to an identified genetic barrier (Sacks *et al.*, 2004). Regardless of the underlying mechanism, if dispersal patterns are related to climatic conditions, then regional variation in climate change could modify or displace transition zones and have genetic implications for the species that span them.

Two prevailing climate trends in North America, the Pacific-North American (PNO) and North Atlantic Oscillation (NAO), converge in eastern North America, causing a cline of differential snow conditions (Hurrell, 1996). Given the ecological importance of snow conditions for temperate species (Telfer & Kelsall, 1984; Campbell *et al.*, 2005), there is strong potential for these differential conditions to cause increased genetic structure for the terrestrial animals across this region (Stenseth, 1999; Rueness *et al.*, 2003). This appears to be the case for the Canada lynx (*Lynx canadensis*), whose range extends across the northern half of North America and across the PNO-NAO climate boundary. Overall genetic differentiation across the range of lynx is low, with several studies finding little or no differentiation across large geographic scales (Schwartz *et al.*, 2002; Rueness *et al.*, 2003; Strobeck, 2006; Row *et al.*, 2012), which is likely related to the long-distance dispersal patterns of lynx (Slough & Mowat, 1996; Poole, 1997). Studies that have compared range-wide genetic variation in lynx, however, showed differentiation to be greater across the PNO-NAO climate boundary compared to other parts of their range, including populations distributed on either side of the Rocky Mountains (Rueness *et al.*, 2003; Row *et al.*, 2012). Given the influence of snow hardness on lynx capture success of their primary prey, snowshoe hare (*Lepus americanus*), some have suggested this pattern may be driven by differential snow conditions within the PNO and NAO (Rueness *et al.*, 2003; Stenseth *et al.*, 2004). Yet, despite this observation there is a paucity of information on the spatially explicit distribution of individuals and genetic variation throughout this region.

In this study, we carried out a test of the spatial relationship between lynx genetic structure and abundance relative to climatic variation, using samples and harvest records collected from eastern Canada, and across the PNO and NAO climate systems. We controlled and tested for the possible effects of distance and other ecological variables (density of forest, anthropogenic disturbance) on genetic structure, which could lead to a spurious correlation between climate and genetic patterns. Secondly, we used an isolation by resistance analysis (McRae, 2006) and abundance data to compare the likelihood of three different potential isolating mechanisms: (i) limited dispersal across a climatic transition zone, perhaps through habitat imprinting or other behavioral syndromes; (ii) a single climatic zone providing more favorable conditions, leading to restricted and asymmetric dispersal across climate boundaries; or (iii) unfavorable habitat conditions within the transition zone itself. If habitat imprinting or other behavioral response is responsible for restricted gene flow, we predicted that the transition zone will provide a higher cost to dispersal without a gap in distribution or drop in abundance.

Although the region examined here represents a continent-wide climatic transition zone, we have very little information on how climate change may be impacting snow conditions across the PNO-to-NAO climatic zones. Thus, in addition to quantifying the genetic implications of climatic patterns for lynx across this region, we use historical (1958–2008) climate data and future projections (2041–2100) to determine the effects of climate change on this transition zone. We used genetic simulations to quantify the possible effects of any documented changes in snow conditions on lynx population structure.

Materials and methods

Genetic sampling and abundance

From fur auction houses, we collected tissue samples from the hide of legally trapped (2009–2011) lynx (N = 499) distributed from Manitoba to Quebec, Canada (Fig. 1a). We extracted DNA and genotyped individuals for 14 microsatellite loci (Lc111, Fca441, Lc118, Fca096, Fca035, Lc109, Fca559, Lc106, Lc110, Fca031, Fca043, Fca077, Fca090, and Fca391) following the methods outlined in Row *et al.* (2012). We generated random locations within each trapline or management unit to use as the lynx sampling locations because we did not know the exact harvest location. Across the same region (Fig. 1b), we derived a proxy for recent lynx abundance by finding the maximum number of harvested lynx per trapline or management unit over the last 10 years (1997–2007) and dividing this by the area of the management unit or trapline. We omitted traplines where no individual lynx was trapped over the 10-year period.

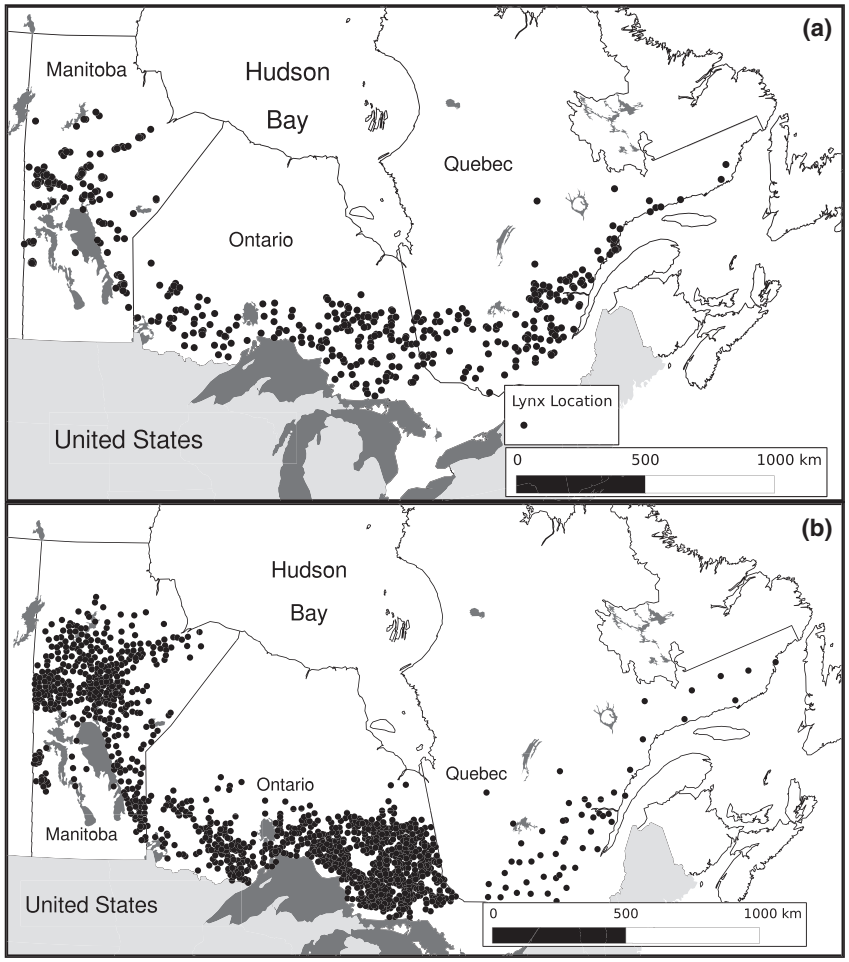

Fig. 1 Distribution of Canada lynx (*Lynx canadensis*) genetic samples and harvest data collected from Manitoba to Quebec, Canada. (a) Genetic sampling locations were derived by randomly generating locations within each trapline or management unit. (b) Centroids of trapline or management units for which harvest records were used to quantify lynx abundance.

Climate and ecological variation

We determined winter climate values using North American climate grids (~10 km^2 resolution; McKenney *et al*., 2006) and calculated average, contemporary (2000–2010) winter (October–April) climate conditions [minimum and maximum temperature, snow depth (2000–2008 only), amount of winter precipitation, and the difference between minimum and maximum temperature] at each lynx sampling location. We summarized the climate patterns using a Principal Components Analysis (PCA) with the first principal component (hereafter CV1) explaining the majority (92%) of the climate variation across this region (Figure S1). Snow conditions were the strongest contributor to this axis, with low values of CV1 representing lower winter precipitation (loading = 0.96) and less snow depth (loading = 0.23); temperature variables were only minor contributors to the axis (loadings < 0.08). We multiplied the axis loadings by raw climate values to derive CV1 climate grids used in the analyses described below.

To quantify ecological variation, we calculated the density of four different forest variables: open needle-leaved coniferous forest (15–40% canopy cover), open broad-leaved deciduous forest (15–40% canopy cover), closed needle-leaved coniferous forest (>40% canopy), and closed broad-leaved deciduous forest (>40% canopy cover) at each lynx sampling location. To derive the percent coverage within 10 km^2 grid cells, we resampled raw data from Globecover 2009 landcover maps (300 m^2 resolution) (Sophie *et al*., 2010). We also used the Global Human Influence Index grid (Sanderson *et al*., 2002), resampled to 10 km^2, to derive a human influence score. Again, we summarized ecological variation across our study area using a PCA. The first two PCA axes explained >83% of the variation (Figure S1), with the first axis (EV1) distinguishing between open and closed forest (loadings: open needle-leaved = −0.83; closed broad-leaved = 0.35; closed needle-leaved = 0.43) and the second axis (EV2) separating needle-leaved from broad-leaved forest and increased human influence (loadings: closed broad-leaved = −0.11; human = −0.11; open needle-leaved = 0.41; and closed needle-leaved = 0.90). We retained these two axes and used their loadings to derive two ecological grids used in the analysis below.

Genetic variation

We first quantified genetic variation across our study region using spatial Bayesian clustering as implemented in TESS 2.3.1 (Chen *et al.*, 2007). We followed the users manual and used a nonadmixture analysis to estimate the number of genetic clusters (k). In total, we ran 10 replicates of 100 000 MCMC iterations (50 000 burn-in) for values of k between 1 and 5. We chose the most likely number of clusters according to when the mean Deviance Information Criterion (DIC) values from the 10 replicate runs reached a plateau and/or the Q-matrix of assignment probabilities stabilized.

Spatial Bayesian clustering assumes individuals can be placed in discrete clusters and thus previous studies have identified an inability of this approach to correctly distinguish clinal (Frantz *et al.*, 2009) or low levels of (Latch *et al.*, 2006) genetic structure. Thus, we further quantified genetic structure using a spatial Principal Components Analysis (sPCA) using the *adegenet* package (Jombart, 2008) in R (R Development Core Team, 2012). sPCA is a modification of PCA analysis that simultaneously maximizes the genetic variance between individuals and spatial autocorrelation in the principle axes. In the sPCA, the proximity of individuals was defined using a Gabriel graph connection network (Gabriel & Sokal, 1969) and following Jombart (2008), we tested for significant, geographically correlated genetic structure in the principle axis using a global randomization test. If significant genetic structure was found, we visualized the extent and spatial distribution of genetic structure using scree plots and displaying retained axes geographically. Each axis represents differentiation along a given axis with most extreme values being most differentiated.

Genetic–climate associations

We tested for significant associations between retained sPCA axes (i.e. genetic variation) and environmental [i.e. Climate (CV1) and Ecological (EV1 & EV)] Variation by first testing for spatial autocorrelation in the residuals of a linear regression using a Lagrange Multiplier test (Anselin *et al.*, 1996). If significant spatial autocorrelation was present, we used a Generalized Least-Squared (GLS) regression, which assumes spatial autocorrelation within a sphere, with a set maximum distance (range) and baseline autocorrelation (y-intercept; nugget). This method compares favorably to other spatial regression methods (Beale *et al.*, 2010). The range and nugget were first selected by optimizing the root mean square error and then conducting the same analysis with a fixed range of 500 km (distance of positive spatial autocorrelation in allele frequencies; Figure S2) and 1000 km (approximate maximum dispersal distance by lynx; Poole, 1997) and a fixed nugget set to the mean value selected by the optimized models. We compared all univariate and multivariate models with the retained PCA components and selected the best model using AIC_c. Results were consistent for all values of the range and nugget and thus only the results with a fixed nugget and range (500 km) are reported.

Only winter climate conditions (CV1) showed a significant correlation with genetic variation (see results). Alternative explanations for the correlation are (i) isolation by distance between individuals (IBD); (ii) resistance to dispersal within and into the PNO (low CV1 values) or NAO (high CV1 values) climate systems; or (iii) from restricted dispersal across the transition zone due to changing climate conditions. We tested among these possible scenarios by comparing individual pairwise genetic distance (proportion of shared alleles; D_{PS}; Bowcock *et al.*, 1994) to pairwise resistance distances (McRae, 2006) derived from cost surfaces using CIRCUITSCAPE 3.5.7. Cost surfaces were derived from the CV1 climate grids to represent each of the three dispersal scenarios. In the first, resistance values ranged between 1 and 115 and were consistent (same distribution and range) with the CV1 grid values, but rescaled to positive values greater than one. Thus, in this scenario resistance to dispersal was higher for the NAO climate system and represented less gene flow from west-to-east. PCArev was the reverse of the PCA grid [Max(PCA) – PCA value] and represented a high cost to dispersing from east-to-west. Lastly, we derived transition zone cost surfaces representing the highest costs to dispersal in the transition zone (center of CV1) using a slight modification of the equation provided by Shirk *et al.* (2010):

$$R_i = \mathrm{Rmax} * e^{\frac{-(PCA_i - \mathrm{MaxCost})^2}{\mathrm{Stp}*(SD(PCA))^2}} \quad (1)$$

Here, R_i is the final cost for a given grid cell, PCA is the vector of all PCA scores, and PCA_i is the PCA score for the given grid cell, which will be transformed. Rmax is the maximum resistance value, which was set to the range of PCA values, so that the resulting values would range between one and the absolute range. Thus, when there was a greater difference between climate conditions (i.e. range of PCA scores), there would be a greater cost to traversing the transition zone in either direction. MaxCost is the PCA value that will have the highest associated cost, which was set to the median value of the PCA axis values for the given cost grid and Stp controls the level of steepness (scaled by the standard deviation) as one moves away from MaxCost. We used four different values for Stp (1 SD, 0.5 SD, 0.1 SD, 0.01 SD) resulting in four transition zone cost grids. We determined if resistance was reflective of dispersal patterns over-and-above straight-line distance (resistance derived from an undifferentiated landscape) using a partial mantel's test (999 permutations) as implemented in the *ecodist* package (Goslee & Urban, 2007) in *R*. For all significant results, we also tested the correlation between genetic distance and straight-line distance, while controlling for resistance, which should be nonsignificant (Cushman *et al.*, 2006) and was reported if otherwise.

Changes in climate across transition zone

We determined if there were changes in winter climate patterns across this region by first multiplying loadings of the CV1 axis by the raw yearly winter climate data from 1958–2008 (McKenney *et al.*, 2006) and conducting a per-cell linear

stacked regression to establish the spatial trends through time. In addition, we visually compared climate grids and cost surfaces derived by multiplying CV1 loadings by mean winter climate conditions for the time periods of 1960–1970, 2000–2010, 2041–2070, and 2071–2100. Future climate data were generated under the Canadian General Climate model with an A2 scenario (McKenney *et al*., 2011a). The A2 scenario assumes rapid population growth, deforestation, and increasing GHG emissions (Nakicenovic & Swart, 2000), and provides somewhat more liberal, but qualitatively consistent, projections of future emissions. It is notable that the A2 scenario is used extensively as basis for climate-change projections in biology (La Sorte & Jetz, 2010; Lehodey *et al*., 2010; McKenney *et al*., 2011b) and some evidence has suggested other more conservative scenarios are no longer valid given the current emission rates (Raupach *et al*., 2007; Beaumont *et al*., 2008).

Future snow depth was not calculated using the climate change models and so we built a predictive model for snow depth using the contemporary (2000–2008) environmental data where we had snow depth estimates. We derived the model with the highest predictive power by testing seven different models (Table S1) and determined the model with the lowest AIC_c and highest explained variation in snow depth (R^2). Based on preliminary tests, the relationship between predicted snow depth and modeled snow depth appeared nonlinear and thus we included polynomial terms in our models. The model with all polynomial terms and an interaction between minimum temperature and precipitation had the highest R^2 (0.89) and lowest AICc. We validated the predictive power of this model using historical (1960–1970) climate data, for which we have all climatic variables (snow depth, min and max temperature, and precipitation). Although there were some differences between modeled and predicted snow depth for high values, a linear model demonstrated a relatively high predictive power ($R^2 = 0.88$). Maps of predicted and modeled snow depth were also very similar. Thus, we used this model to predict snow depth for the two future time periods (2041–2070 and 2071–2100).

Predicted effects of climate change on genetic variation

Because of the close relationship between climate and genetic structure (see results), we predicted the effects of future climate projections using individual-based genetic simulations in CDPOP v 1.2.08 (Landguth & Cushman, 2010). CDPOP simulates genetic exchange across a set of *N* individuals based on their life history characteristics and movement parameters (mate searching and dispersal distances). Individual locations for the simulations were set up by generating a regular 20 × 20 km grid of individuals within a polygon that buffered lynx sample locations by 150 km and removed locations in open water (3676 total individuals, Figure S3).

We simplified the simulations by forcing nonoverlapping generations; within each time-step (generation), individuals would search for a mating partner and the resulting offspring would disperse to fill each grid location. Mate searching and dispersal distances were based on an inverse-square probability function (Cushman & Landguth, 2010) with a set maximum resistance. We selected the most appropriate maximum dispersal parameters by replicate simulations and comparing mean simulated to observed values for four genetic summary statistics: (i) genetic differentiation (F_{ST}) between the western region (West) and in the transition zone (Middle); (ii) F_{ST} between the eastern region (East) and Middle; (iii) F_{ST} between East and West; and (iv) the correlation between the first genetic axis in an sPCA with CV1 values. To keep sample sizes consistent between simulated and observed data, we subsampled the full grid and all resistances were based on current climate cost grids, which show the greatest correlation with genetic distance.

We quantified the effect of climate divergence on genetic differentiation by calculating new resistance values from projected climate data (2041–2070) and running five replicate simulations with the dispersal parameters set using the current correlation between climate and genetic structure. For each set of parameter and resistance values, we quantified the expected increase in genetic differentiation by comparing F_{ST} between east and west regions.

Results

Genetic variation

Neither DIC values nor the Q-matrix significantly changed with increasing values of *k* in the spatial Bayesian clustering. This suggested that there was only one single genetic cluster and weak genetic structure across this region. In contrast with these results, (sPCA) on individual genotypes revealed significant, geographically correlated genetic structure [nper = 999, max (t) = 0.005, $P = 0.001$]. Eigenvalue plots further indicated spatial genetic structure in the principal axis, which had more extreme values of explained variation and spatial autocorrelation (hereafter sPCA1; see Figure S4). Along the first principle axis, individuals within the PNO and NAO were the most differentiated (i.e. positive and negative PCA values), with individuals in the middle having less extreme values. We interpret this finding as evidence of a west–east genetic cline (Fig. 2; Figure S4).

Genetic–climate associations

Climate grids derived from winter snow conditions (CV1) displayed strikingly similar geographic variation as our genetic patterns (Fig. 2b and c). The Lagrange Multiplier test revealed significant spatial correlation within the OLS residuals (LMerr = 27.31, $P < 0.001$) of a linear regression between genetic variation and both climate and ecological PCA axes (sPCA1 ~ CV1 + EV1 + EV2). Thus, we used a GLS regression to control for the spatial autocorrelation. A comparison between models found the exclusion of CV1 led to a large drop in

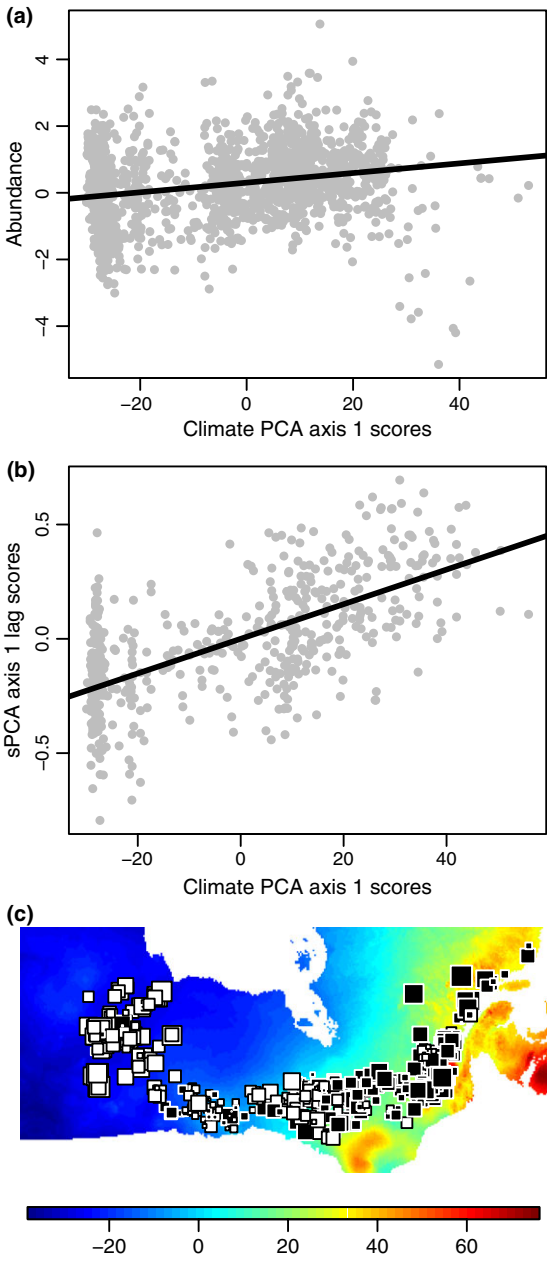

Fig. 2 Correlation between winter climate variation and (a) log (maximum harvest), and (b) genetic variation across the Pacific-North American (PNO) to North Atlantic Oscillation (NAO) climatic systems, for the Canada lynx (*Lynx canadensis*). Genetic variation was represented by lag scores (each value replaced by mean of its neighbors) of the first component of a spatial Principal Component Analysis (sPCA1) on lynx genotypes. Current winter climate conditions were summarized using a PCA with the first component Climate Variation (CV1) shown, (c) A geographic representation of sPCA1 ranging from small (large white squares) to large (large back squares) values, overlaid on a climate grid derived by multiplying CV1 loadings by raw climate data. Low values (blue) represent low winter precipitation and snow depth and high values (red) represent high winter precipitation and snow depth.

AIC_c, while the inclusion of basic ecological variables (EV1 & EV2) led to little improvement in model fit, suggesting that they had negligible influence on genetic variation across this region (Table 1). Although there appeared to be a slight increase in lynx abundance from west-to-east, there was no apparent reduction in abundance (Fig. 2a) through the transition zone.

Using IBR analysis, we found that only pairwise resistance derived from a cost surface in which we assigned higher costs to dispersal across the center of the climatic transition zone (i.e. restricted dispersal from west-to-east and east-to-west) led to a significant correlation with individual pairwise genetic distance while controlling for distance (Fig. 3). Correlation coefficients between genetic distance and resistance decreased as the steepness of the decline in cost away from the middle of the transition zone increased (Fig. 3); this further supported an environmental gradient subtly influencing genetic patterns rather than an actual dispersal barrier. Although the correlation coefficient for PCArev (increased resistance to gene flow within the PNO) was lower and nonsignificant, correlation coefficients were close and had overlapping confidence intervals. Thus, we could not rule out asymmetric gene flow with lower dispersal from east-to-west.

Changes in climate across the transition zone

Regression coefficients from a per-cell linear regression using climate grids derived from the loadings of CV1 (1958–2008), revealed positive and negative regression coefficients east and west of the center of the transition zone, respectively (Figure S5). This implies a decrease in winter precipitation and snow depth in the PNO climate system and the opposite within the NAO climate system. Comparing mean CV1 PCA climate and cost grids from data in four different time periods further

Table 1 Model selection results for a Generalized Least-Squared (GLS) regression showing correlation between genetic variation spatial Principal Components Analysis (sPCA) and both current winter Climate Variation (CV1) and Ecological Variables (EV1 & EV2)

Model	AICc	Delta AIC	Log-Likelihood
sPCA ~ CV1 + EV1	327.80	0.00	−159.86
sPCA ~ CV1	328.43	0.63	−161.19
sPCA ~ CV1 + EV1 + EV2	328.77	0.97	−159.32
sPCA ~ CV1 + EV2	329.63	1.82	−160.77
sPCA ~ EV1	337.90	10.10	−165.93
sPCA ~ EV2	339.11	11.30	−166.53

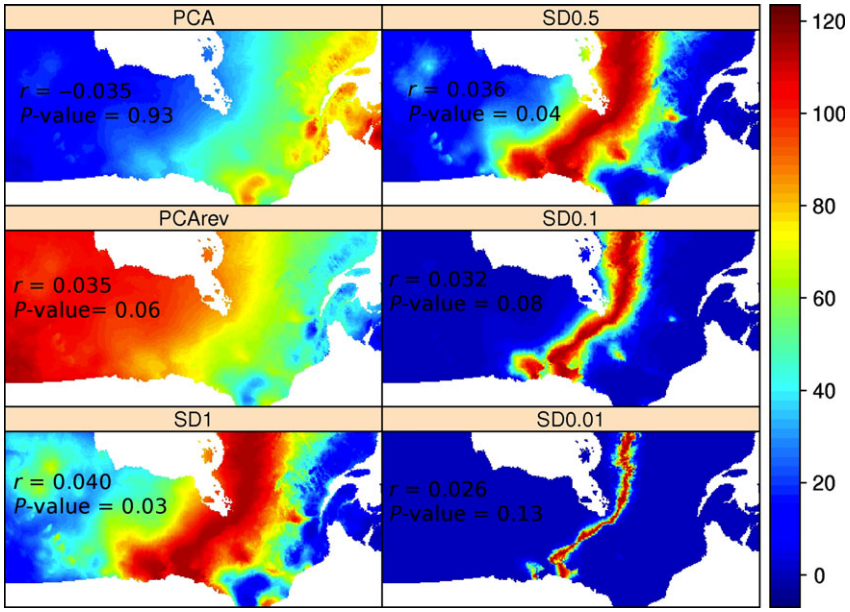

Fig. 3 Partial mantel's correlation coefficients and *P*-values for the correlation between individual pairwise genetic distance (D_{PS}) and resistance, while controlling for distance. Resistance was calculated from six cost grids derived from the loadings of the first principal axis of a PCA summarizing current winter climate variation (CV1). The first two cost surfaces assign high costs to dispersal for high (PCA) and low (PCArev: reverse of PCA values) PCA values. The last four cost surfaces – (SD1, SD0.5, SD0.1, and SD0.01) – were transformed using Eqn (1) to represent the center of PCA distribution providing the highest cost to dispersal with varying levels of steepness away from the center. In all cases, red colors represent high resistance with blue representing low resistance.

supported diverging climate patterns, mainly through an increase in CV1 values (increased winter precipitation and snow depth) within the NAO climate system (Fig. 4; see Figure S6).

Predicted effects of climate change on genetic variation

Resistances used from genetic simulations were calculated from the SD1 cost surface grid (Fig. 3) because these resistance values had the greatest correlation with genetic variation. We originally ran nine different combinations of maximum dispersal and mate search distances (Table S2) and chose three combinations where simulated and observed statistics were most similar (15 max & 60 max; 10 max & 65 max; 10 max & 70 max) (Figure S7). Using these three sets of dispersal distances with resistances derived from future climate projections (2041–2070), we found an increase in genetic divergence between east and west regions that was 2–3 times larger, with nonoverlapping confidence intervals for all but one parameter set (Fig. 4; Figure S8).

Discussion

The presence of clinal genetic differentiation and a lack of correlation with ecological variables point to nonrandom lynx dispersal due to differential snow conditions across eastern North America. Previous studies have similarly found that genetic differentiation between populations in the PNO and NAO climate systems was greater than between populations in other areas of their range (Rueness *et al.*, 2003; Row *et al.*, 2012). Here, however, we combined evenly distributed genetic sampling with abundance and climate data to show that this increased differentiation is not likely due to a distribution gap or differences in habitat quality, but more likely from a reduced flow of dispersing individuals across the climatic transition zone. Given the extent and speed with which climate patterns are expected to change across this region, the spatial link between climate and dispersal found here could have strong implications for lynx and other species ranging across ecological boundaries.

The association between winter climate conditions and genetic variation is perhaps not surprising for lynx. Lynx have a propensity to disperse in the winter months during population crashes (Poole, 1997) and snow conditions can play a role in the capture rate of their main prey, snowshoe hare (Murray & Boutin, 1991). Lynx also have morphological adaptations that afford them advantages over their competitors in deep snow conditions (Murray & Boutin, 1991). Thus, it seems likely the propensity for individuals to disperse into areas with familiar snow conditions could have

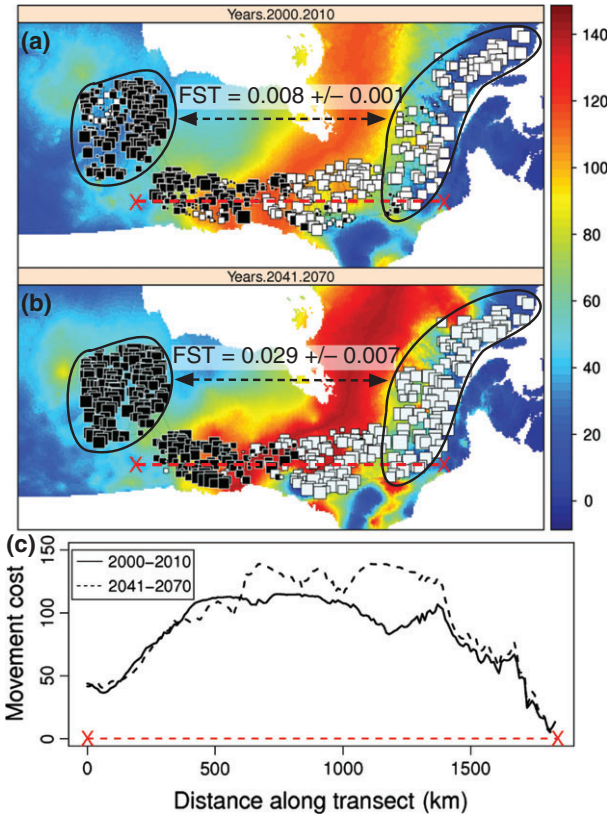

Fig. 4 Climate projections and genetic simulations suggest climate change will lead to a divergence in winter climate conditions and increase genetic differentiation across the Pacific-North American (PNO) to North Atlantic Oscillation (NAO) climatic systems. Current (a) and future (b) winter climate cost grids used in genetic simulations and resulting genetic variation [lag scores of first spatial Principal Components Analysis (sPCA) axis] and differentiation (mean F_{ST} (±SD) between East and West region using five replicates) from simulations are shown. Cost grids represent low (blue) to high (red) resistance to gene flow. For all simulations, maximum mate searching and dispersal distances were set to 54.82 and 237.58 cost units respectively. (c) A transect through the transition zone demonstrates an increased dispersal cost due to diverging climate conditions within climate each system.

strong implications for disperser survival rate. Despite this association, current genetic differentiation between the climatic regions is low, which is consistent with previous studies on lynx population structure (Schwartz *et al.*, 2002; Rueness *et al.*, 2003; Strobeck, 2006; Row *et al.*, 2012). These previous studies, however, did not explicitly include environmental variables and have generally only tested for increasing differentiation with geographic distance. Surely snow conditions are likely to vary in other parts of the lynx distribution and it would be interesting to determine the extent of this variation and whether similar associations emerge.

In addition to their effects on lynx dispersal and population dynamics, snow conditions have a strong influence on the ecology of other northern temperate species (Sweeney & Sweeney, 1984; Telfer & Kelsall, 1984; McKelvey *et al.*, 2011). For example, on a smaller scale than that examined here, Garroway *et al.* (2008), similarly, found that snow conditions influenced dispersal patterns of fisher (*Pekania pennanti*): individuals dispersed away from regions with deep snow. Due to the continental scale of the snow transition zone examined here, it is thus likely that this climatic transition zone will have similar relationships for other species across this region. For species with shorter dispersal distances than lynx, it may be difficult to disentangle the role of this large-scale gradient from more local effects such as habitat fragmentation, roads and other small-scale dispersal barriers.

Other studies across North America have found similar associations between large-scale ecological boundaries and genetic structure, with many suggesting that these patterns are related to habitat imprinting (Geffen *et al.*, 2004; Sacks *et al.*, 2004; Muñoz-Fuentes *et al.*, 2009). Since the term was introduced by Lorenz (1937), there have been both experimental and behavioral evidence suggesting that mammals will imprint upon, and subsequently choose, habitats similar to those in which they were reared (Wecker, 1963; Olson & Horne, 1998; Sacks *et al.*, 2005). Here, our evidence goes beyond simple correlation between genetic variation and snow conditions, we also excluded other landscape variables or differences in habitat quality throughout the transition zone, as driving this pattern. Based on our results, it appears that individuals are less likely to disperse to areas with unfamiliar snow conditions, which is consistent with the habitat imprinting hypothesis. However, other possibilities, such as a direct restriction in gene flow into the PNO climate system, could not be entirely ruled out. It follows that behavioral studies conducted on individuals across this region would be beneficial in further testing the hypothesis.

In addition to impacting dispersal, the strong gradient in snow conditions and the ecological importance of these conditions are likely to result in local adaptation to snow conditions for lynx populations within the PNO and NAO climate systems. In fact, there has been an increasing amount of both theoretical and empirical research that supports ecological and climatic gradients in generating diversity and even speciation events through divergent selection (Doebeli & Dieckmann, 2003; Grahame *et al.*, 2006). Restricted dispersal, however, is often not considered in models exploring selection gradients (e.g., Doebeli & Dieckmann, 2003) across transition zones. Given our results and other recent studies (Sacks *et al.*, 2005), there could be additive

effects of restricted dispersal and local adaptation on genetic variation. Increasingly enhanced genomic tools (Shendure & Ji, 2008) allow for the generation of large amounts of neutral and adaptive genetic data, which could be used to test the prevalence and potential additive effects of restricted dispersal and selection across climatic transition zones.

Most climate change research examining the ecological effects of changing climate patterns have centered on quantifying expected changes in species diversity, distribution, and abundance (Burns *et al*., 2003; Thomas *et al*., 2004; Hoegh-Guldberg & Bruno, 2010). However, the global effects of climate change are expected to vary geographically (Stott *et al*., 2010) and through this variation there is likely to be changes in the extent and geographic location of climatic boundaries (e.g., Rosenfeld & Givati, 2013). Indeed, we found snow conditions within the PNO and NAO climate systems to diverge with climate projections, suggesting greater winter precipitation in the NAO climate system; in contrast, historical data suggested the opposite within the PNO, which will promote drier winter conditions. It is also noteworthy that although we used a single climate model for our projections, studies using multiple models or ensemble approaches have similarly projected that precipitation within the PNO will remain stable or decrease less than within the NAO (Elía & Côté, 2010; McKenney *et al*., 2011b). Our genetic simulations suggest that this climate divergence may dramatically increase genetic differentiation for lynx without any physical changes on the landscape. Thus, in addition to examining how climate change will shift patterns of species diversity, more research should focus on establishing its more subtle effects on climatic boundaries, and quantifying the ecological and evolutionary consequences for species that span such boundaries.

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Supporting Information

Additional Supporting Information may be found in the online version of this article:

Figure S1. Proportion of explained variation for Principal Component Analysis (PCA) axes using current (2000–2010) winter (October–April) climate variables and ecological variables [open (15–40% canopy cover) needle-leaved coniferous forest & broad-leaved deciduous forest; closed (>40% canopy cover) needle-leaved coniferous forest & broad-leaved deciduous forest, anthropogenic habitat disturbance] at lynx sampling locations. (a) Loadings for the first principal component of the climate PCA suggest the axis separated low winter precipitation (loading = 0.96) and less snow depth (loading = 0.23) from high winter precipitation and deep snow; temperature variables were only minor contributors to the axis (loadings < 0.08). (b) Loadings for the first principal component of the ecological variables distinguished between open and closed forest (loadings: open needle-leaved = −0.83; closed broad-leaved = 0.35; closed needle-leaved = 0.43), while the second axis separated between needle-leaved and broad-leaved forest and human influence (loadings: closed broad-leaved = −0.11; human = −0.11; open needle-leaved = 0.41; closed needle-leaved = 0.90).
Figure S2. Spatial autocorrelation correlogram for the correlation between allele frequencies (Moran's I for 14 microsatellite loci) of Canada lynx distributed from Manitoba to Quebec in eastern North America (see Fig. 1). Twenty distance classes were derived to retain an equal number of pairwise comparisons within each distance class and dotted lines show mean permuted values for 999 permutations of individuals randomly shuffled among the 20 distance classes. Observed values and permutations were calculated using SPAGeDI v1.3.
Figure S3. Grid of individuals used in CDPOP genetic simulations (black) and the subset of individuals used in the calculation of genetic summary statistics (red). Subset locations were randomly chosen within each region to represent the same sample size of the observed data.
Figure S4. Results of spatial Principal Components Analysis (sPCA) on Canada lynx (*Lynx canadensis*) genotypes distributed across Manitoba to Quebec. (a) Bar chart representing positive and negative eigenvalues, (b) scree plots for sPCA axis showing the spatial autocorrelation of each PCA axis, and (c) spatial representation of principal axis scores. A permutation test on the individual components found significant, geographically correlated genetic structure (nper = 999, max(t) = 0.005, P = 0.001).
Figure S5. (a) Regression coefficients from per-cell linear regressions for overlaid Principal Component Analysis (PCA) climate grids from 1958–2008. Temporal climate grids were derived by multiplying the loadings of climate variation (CV1) (Figure S3) by the raw climate data in each successive year. (b) Significance levels for per-cell regressions with negative significant change in climate over time in blue, positive significant change in red, and no significant change in gray. Sample locations are indicated with 'x'.
Figure S6. (a) Climate grids summarizing the temporal change in winter climate conditions across the Pacific-North American (PNO) to North Atlantic Oscillation (NAO) climatic systems. Grids were derived by multiplying the loadings from CV1 (Figure S3) by the climate data in each time period. (b) Temporal climate grids were transformed to cost grids using Eqn (1) with a standard deviation of one. Overall patterns suggest that climate conditions are diverging across the PNO-to-NAO transition zone.
Figure S7. Mean (±SD) simulated genetic summary statistics for five replicate simulations with differing maximum mate searching (legend) and dispersal distance (x-axis). Resistance values used in simulations were calculated using CIRCUITSCAPE with SD1 cost grid (Fig. 2). Observed genetic summary statistics (F_{ST}) calculated from Canada lynx subpopulations are shown in red and are generally within the range of values produced by the simulations.
Figure S8. Mean (±SD) simulated genetic summary statistics for five replicate simulations calculated using current (squares, 2000–2010) and future (circles, 2041–2071) climate cost grids (see: Figure S5b). Three different maximum mate searching and dispersal distance combinations are shown with all but one (mate searching 15 of the MaxCost; dispersal 70 of MaxCost) showing a large increase in differentiation.
Table S1. Model selection and results for snow depth prediction using contemporary (2000–2010) winter (October–April) climate variables.
Table S2. Mate searching and dispersal distance parameters for genetic simulations used in CDPOP. Distances were entered as resistances derived from a cost surface with an increased cost to dispersing across a climatic transition zone (Fig. 2; SD1). The percentage of maximum resistance, the actual resistance value, and the resulting average dispersal distance in km are shown.

Anglia HadCRUT temperature data set, based on land station and ship reports[28]. The trends for each 5°×5° grid cell were evaluated by a least-squares fit for the period 1965–2000. The gridded trend values were then smoothed spatially using a Cressman analysis, which effectively determines a pixel value as a weighted sum of contributions from surrounding grid points for which data are available. Weights vary as the inverse fourth power of the distance from the pixel in question. The radius of influence is 500 pixels, or approximately one-quarter the maximum width of the image.

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Competing interests statement

The authors declare that they have no competing financial interests.

Correspondence and requests for materials should be addressed to P.T.D. (e-mail: pdoran@uic.edu).

DNA reveals high dispersal synchronizing the population dynamics of Canada lynx

Michael K. Schwartz*†, L. Scott Mills*, Kevin S. McKelvey†, Leonard F. Ruggiero† & Fred W. Allendorf‡

* *Wildlife Biology Program, School of Forestry, University of Montana, Missoula, Montana 59812, USA*
† *USDA/USFS Rocky Mountain Research Station, 800 E. Beckwith, Missoula, Montana 59801, USA*
‡ *Division of Biological Sciences, University of Montana, Missoula, Montana 59812, USA*

Population dynamics of Canada lynx (*Lynx canadensis*) have been of interest to ecologists for nearly sixty years[1–4]. Two competing hypotheses concerning lynx population dynamics and large-scale spatial synchrony are currently debated. The first suggests that dispersal is substantial among lynx populations[5], and the second proposes that lynx at the periphery of their range exist in small, isolated patches that maintain cycle synchrony via correlation with extrinsic environmental factors[2]. Resolving the nature of lynx population dynamics and dispersal is important both to ecological theory and to the conservation of threatened lynx populations: the lack of knowledge about connectivity between populations at the southern periphery of the lynx's geographic range delayed their legal listing in the United States[6]. We test these competing hypotheses using microsatellite DNA markers and lynx samples from 17 collection sites in the core and periphery of the lynx's geographic range. Here we show high gene flow despite separation by distances greater than 3,100 km, supporting the dispersal hypothesis. We therefore suggest that management actions in the contiguous United States should focus on maintaining connectivity with the core of the lynx's geographic range.

Trapping records show that twentieth-century lynx population dynamics in parts of North America exhibit patterns of lagged synchrony, with irruptions occurring in the centre of the continent 2–3 years before they occur at the periphery of the range[5]. One potential mechanism for this phenomenon is a travelling wave of lynx emanating from the centre of the continent, which synchronizes the lynx populations[4]. If this 'dispersal hypothesis' is correct, then populations at the periphery of their range should be highly influenced by lynx periodically diffusing outwards from the core.

Alternatively, lynx populations at the periphery of their geographic range may be self-sustaining, and largely isolated[7]. Under this 'peripheral isolation hypothesis' there would be few dispersers and the number of dispersers would decline exponentially with distance, leading to lower connectivity at the edge of the geographic range[3]. To support the peripheral isolation hypothesis there are weak correlations between lynx irruptions in Alberta and British Columbia and lynx abundance indices in some southern, peripheral populations, as well as the patchy nature of lynx habitat in southern Canada, Montana, and Washington[5,7]. If populations are relatively isolated, synchrony between peripheral lynx populations could be generated by exogenous density-independent events such as weather[2] (that is, the Moran effect[8]).

We used nine microsatellite loci to estimate gene flow among lynx populations (see Methods). We analysed lynx samples from 17 collection sites in the periphery and core of the lynx's geographic range (Fig. 1). If the dispersal hypothesis is correct, gene flow should be high among populations, including central Canadian populations and the populations on the periphery of the geographic range. Alternatively, if the peripheral isolation hypothesis is correct, then gene flow should be low between peripheral lynx populations and

central Canadian and Alaskan populations, and negligible among populations that are far apart.

The global F_{st}, a measure of population subdivision, was 0.033 (standard error of the mean, s.e.m. ± 0.002). This degree of subdivision is expected if there are on average approximately six dispersers ('migrants' in the genetic sense) entering each population each generation, assuming an island model of migration[9,10]. Furthermore, substantial gene flow was apparent among all populations. The Kenai Peninsula population was genetically most divergent from other populations with a mean pairwise F_{st} of 0.051 (s.e.m. ± 0.003). However, this amount of subdivision still represents approximately four dispersers entering each population per generation, and so the Kenai Peninsula population is probably not biologically different. Despite sampling lynx populations more than 3,100 km apart, we found no evidence for decreased gene flow with increasing geographical distance across western North America (Fig. 2; Mantel's test, $g = 0.117$, $P = 0.42$).

Small F_{st} values can be indicative of high current gene flow between populations or can be caused by populations sharing recent common ancestry[9]. We attribute our results to high current gene flow because many peripheral populations in our study have had small population sizes for long periods. Lynx are known to have low population densities[5,7], especially at cyclic lows that would reduce effective population size (N_e). On the Kenai Peninsula, our estimate of N_e was less than 30 (see Methods). For ideal isolated populations with $N_e = 30$, substantial values of F_{st} would accumulate in only a few generations (t). For example, F_{st} is expected to be greater than the global F_{st} of 0.033 in just two generations for populations with an $N_e = 30$, and in four generations for populations with $N_e = 50$ ($F_{st} = 1 - (1 - 1/(2N_e))^t$ [9–11].

Our F_{st} results are corroborated by assignment test results (see Methods)[12]. Only 40.8% of lynx assigned to the population from which they were captured. Low assignment rates may indicate either high gene flow or low power to assign because of too few markers or too little genetic variation per marker. However, other studies with less overall genetic variation and equal numbers of microsatellites have produced much higher assignment rates[13], so we attribute our low assignment rates to high gene flow.

Radiotelemetry data have shown that lynx regularly travel distances greater than 100 km, and can travel distances up to 1,100 km (refs 14, 15). However, it is unknown whether these movements led to gene flow. Our genetic data suggest that long distance movements are probably common and result in very high levels of gene flow, among the highest yet found for any carnivore. Wolves and coyotes show high levels of gene flow[16], yet wolves still follow an isolation by distance model[17]. North American brown bears also display high gene flow, but have F_{st} values much higher (implying gene flow levels much lower) than are reported here for lynx[18].

Our results for lynx strongly support the dispersal hypothesis rather than the peripheral isolation hypothesis. Peripheral populations in the south, north and west appear to readily exchange dispersers with the core populations. Even the peninsular Kenai population shows high gene flow.

Gene flow has implications for synchrony in lynx cycles across large landscapes. Stenseth *et al.*[2] used lynx fur trade records from Canada's Hudson Bay Company along with time-series data from Statistics Canada to show that density-independent factors (that is, weather) synchronize isolated lynx populations with similar density-dependent structures. Specifically, their models based on climatic regions (Pacific maritime, Continental, and Atlantic maritime) had more support than models subdividing lynx populations based on ecological groupings (western, northern, southern and eastern), provincial boundaries, or Hudson Bay Company administrative regions. Stenseth *et al.*[2] concluded that region-specific variation in climate, probably produced by the North Atlantic Oscillation, coupled with similar density-dependent structures in lynx populations, caused lynx cycling synchrony within climatic regions. A different model[3] explained large-scale spatial synchrony by assuming that dispersal between patches declined exponentially with distance.

We suggest that immediately after the peak of the lynx cycle in the centre of their range, large numbers of lynx disperse long distances creating a wave of immigrants that drive cycle-like synchrony in the western lynx populations. This suggestion is supported by both trapping records[5] and our gene flow results. A dispersal hypothesis is also a more parsimonious explanation of lynx cycle synchrony, negating the reliance on large-scale density-independent events coupled with similar density-dependent population structures[19–22]. Dispersal may also be significant in synchronizing population cycles in other species. For example, initial research on collared lemmings showed that synchrony occurred only in populations separated by as much as 6 km (ref. 23). Because this distance was greater than the

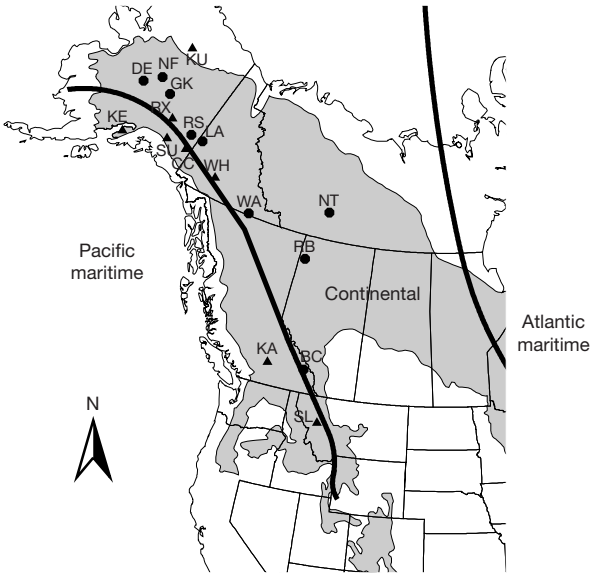

Figure 1 The geographic distribution of lynx (in grey). Each triangle represents a location of a 'peripheral' lynx population and each circle represents a 'core' lynx population. The population abbreviations and sample sizes are as follows: Seeley Lake, Montana (SL, 32); Kuyuktuvuk Creek, Alaska (KU, 7); Kenai Peninsula, Alaska (KE, 115); Ladue River, Yukon/Alaska (LA, 10); Cooper Center, Alaska (CC, 19); North of Fairbanks, Alaska (NF, 19), Fort Province, Northwest Territories (NT, 84); Riverside, Alaska (RS 43); West of Denali, Alaska (DE, 16); Rainbow Lake, Alberta (RB, 18); Watson Lake, Yukon (WA, 27); Whitehorse, Yukon (WH, 52); Kootnay–Banff, British Columbia (BC, 20); Gold King Creek, Alaska (GK, 32); North of Kamloops, British Columbia (BC, 20); Paxson, Alaska (PX, 45); and Susitna Lake, Alaska (SU, 35). The regions Atlantic, Continental and Pacific represent the climatic regions of ref. 2.

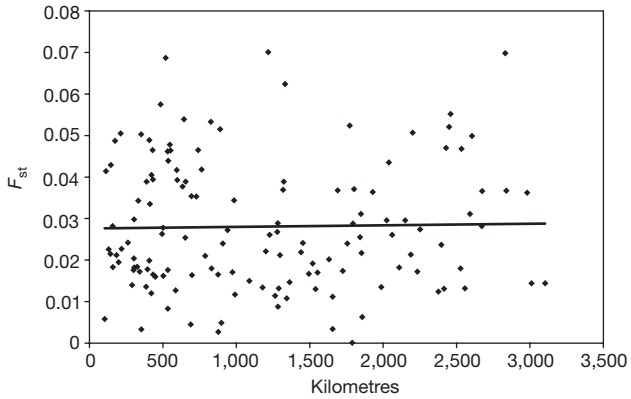

Figure 2 Regression of F_{st} on geographic distance between all pairs of the 17 populations.

maximum observed lemming dispersal distance (3 km) (ref. 24), dispersal was discounted as a synchronizing mechanism. However, recent genetic data revealed that collared lemming disperse distances up to 20 km (ref. 24), suggesting that dispersal may indeed synchronize these populations.

Our results have important implications for lynx conservation. Our data imply that persistence in the contiguous United States depends upon dispersal from larger populations; therefore joint international efforts should be initiated to ensure that connectivity between northern and southern populations is sustained. □

Method

Genetic analysis

We genotyped 599 lynx samples from 17 populations using nine microsatellite DNA markers developed from domestic cats[25,26]. DNA extraction methods, microsatellite DNA amplification conditions, and Hardy–Weinberg (HW) proportions and gametic disequilibrium analyses can be found in ref. 27. Average heterozygosity across all populations and loci was 0.66 (s.e.m. = 0.074). Several populations had one locus out of HW proportions ($P < 0.05$); however, there was no consistency as to which locus. The only population with more than one locus out of HW proportions was the Kenai population that had three of nine loci deviating from HW proportions.

Effective population size

We estimated N_e of the Kenai lynx population using the temporal change in allele frequency method[28]. Our samples were collected 10 years apart, a period representing between two and three lynx generations. Assuming the samples were separated by two generations produced an N_e estimate of 22.1 (s.e.m. = 11.5–49.1); assuming the samples were separated by three generations resulted in an N_e estimate of 28.8 (s.e.m. = 17.6–62.0).

Assignment tests

An assignment test classified an individual to a population where it most probably was born, on the basis of the expected frequency of an individual's genotype in each population[12]. We used the partially bayesian exclusion test of ref. 12, which has been shown to be effective over a wide range of F_{st} values and is robust to slight deviations from Hardy–Weinberg proportions[12,13]. We used the 'leave one out' method when conducting this analysis, which means that each individual was removed from the data set, the allele frequencies were recalculated, and then the individual was assigned to the population.

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Competing interests statement

The authors declare that they have no competing financial interests.

Correspondence and requests for materials should be addressed to M.K.S. (e-mail: mks@selway.umt.edu).

Identification of diploid endosperm in an early angiosperm lineage

Joseph H. Williams*† & William E. Friedman*†

** Department of Environmental, Population and Organismic Biology, University of Colorado, Boulder, Colorado 80309, USA*
† These authors contributed equally to the work

In flowering plants, the developmental and genetic basis for the establishment of an embryo-nourishing tissue differs from all other lineages of seed plants. Among extant nonflowering seed plants (conifers, cycads, *Ginkgo*, Gnetales), a maternally derived haploid tissue (female gametophyte) is responsible for the acquisition of nutrients from the maternal diploid plant, and the ultimate provisioning of the embryo. In flowering plants, a second fertilization event, contemporaneous with the fusion of sperm and egg to yield a zygote, initiates a genetically biparental and typically triploid embryo-nourishing tissue called endosperm. For over a century, triploid biparental endosperm has been viewed as the ancestral condition in extant flowering plants[1–3]. Here we report diploid biparental endosperm in *Nuphar polysepalum*, a basal angiosperm. We show that diploid endosperms are common among early angiosperm lineages and may represent the ancestral condition among flowering plants. If diploid endosperm is plesiomorphic, the triploid endosperms of the vast majority of flowering plants must have evolved from a diploid condition through the developmental modification of the unique fertilization process that initiates endosperm.

In 1999, a series of phylogenetic analyses[4–6] identified a set of

From:	Hecht, Anne
To:	Mary Parkin; Mark McCollough
Cc:	Laury Zicari
Subject:	Fwd: genetic differentiation in Canada lynx
Date:	Monday, August 10, 2015 7:37:10 AM
Attachments:	DNA HighDispersalLynx_Schwartz et al. 2002.pdf GeneFlowHighLynxDispersal_Row et al 2012.pdf SubtleRoleClimatChangeGeneticStructureLynx_Row et al 2013.pdf Rueness et al 2003 Supplementary Info.doc Genetic Structuring Lynx Rueness et al. Nature 2003.pdf

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Hi Mary --

Here, fyi, is the assessment of literature on lynx genetics that I did for Marty last year. Not necessarily the last word on the subject, but I thought it might be good for you to know what ground has already been plowed (however imperfectly).

I will forward another short follow-up email exchange with Mark, along with the 4i letter that Wendi sent to MDIFW in September 2014.

Anne

****

Anne Hecht, Endangered Species Biologist
U.S. Fish and Wildlife Service
73 Weir Hill Road
Sudbury, MA 01776
telephone: 978-443-4325
email: anne_hecht@fws.gov

---------- Forwarded message ----------
From: **Hecht, Anne** <anne_hecht@fws.gov>
Date: Tue, Jul 15, 2014 at 12:06 PM
Subject: genetic differentiation in Canada lynx
To: "Miller, Martin" <martin_miller@fws.gov>
Cc: "McCollough, Mark" <mark_mccollough@fws.gov>, Laury Zicari <Laury_Zicari@fws.gov>, Krishna Gifford <krishna_gifford@fws.gov>, Mary Parkin <mary_parkin@fws.gov>

Sorry about the long-delayed response, Marty. Although it took me a while to respond, it was nice think about something "non-plover" for a change.

In addition to the paper you sent me (Rueness et al. 2003), I looked at 3 other papers, including the one (Schwartz et al. 2002) that the USFWS cited under Issue 4 (DPS determination) in the 2003 FR Notice responding to remanded determination of status. The four papers are attached fyi. I also talked a bit with Mike Schwartz, a geneticist at the USFS Rocky Mountain research station (http://www.fs.fed.us/rmrs/people/profile.php?alias=mkschwartz) who has helped the FWS grapple with a number of DPS-related issues.

The short answer to your question is that these papers do not present evidence that eastern Canada lynx differ markedly from other continental U.S. lynx populations. Row et al. 2012

provides the best overview and captures several of my criticisms of Rueness et al. 2003, including geographic gaps in sampling (including a big gap coinciding with the area of alleged separation) and *a priori* definition of "populations." Mike Schwartz alerted me to concerns about Rueness et al.'s use of mtDNA, which is problematic in felids because of a microsatellite inserted in the control region, hence violating assumptions important to inference of population structure. Even without these methodological concerns, however, I believe that Rueness et al. overstate the biological significance of the genetic distinctiveness that they purport to detect.

I was intrigued by the "subtle" clinal gene flow restriction that Row et al. 2012 and 2013 identify and (thanks, to more complete sampling) delineate more clearly (in the vicinity of the Ontario-Manitoba border) than Rueness et al. 2003. Row et al. 2013 also present information on genetic-climate associations suggesting that this subtle genetic divergence reflects reduced flow of dispersing individuals across a climatic transition zone affecting snow conditions. While genetic differentiation between the climatic regions is currently low, they suggest that predicted effects of climate change could lead to a future increase in divergence. The take-home point, however, is that increasingly powerful genomic tools have potential to detect subtle genetic and ecological divergence that may arise from changing climate patterns.

Although the genetic information explored by Row et al. 2013 may have potential to help us monitor and address threats from climate change to lynx, I don't think it begins to approach evidence of separation or differences connoting discreteness or significance under the DPS policy (especially when unaccompanied by other strong discontinuities or differences). The more salient inference is conveyed by Row et al. 2012, arguing that dispersal and high gene flow in mainland North American lynx support close cooperation among management jurisdictions (excluding Newfoundland), including (but not limited to) directed trapping. Row et al. 2012 also contrast the lack of genetic structure in mainland lynx with greater differentiation and/or higher number of clusters observed for wolves, caribou, and wolverine at comparable scales in North America.

Since we are on the topic, I want to acknowledge that none of these papers included samples from Maine (indeed, except for Schwartz et al., none included any U.S. lynx), but I gleaned no suggestions of high priority conservation issues warranting elucidation through genetic data. I would note for the record, however, that any efforts that might be undertaken to characterize genetics of Maine lynx would be well-served by evaluation in the context of samples from a wide range (such as that employed by Row et al. 2012), as well as Bayesian cluster analysis to test for population differentiation.

Hope this helps,
Anne

****

Anne Hecht, Endangered Species Biologist
U.S. Fish and Wildlife Service
73 Weir Hill Road
Sudbury, MA 01776
telephone: 978-443-4325
email: anne_hecht@fws.gov

On Thu, Apr 24, 2014 at 7:51 AM, Miller, Martin <martin_miller@fws.gov> wrote:

> Anne - could you please look at this paper and tell us whether you think it indicates marked genetic difference of the Northeast U.S./eastern Canada lynx population? A couple of issues:
>
> 1. I know with wide-ranging species we should expect to see some population structure, but I don't know at what point a difference becomes "markedly different" under the DPS policy.
>
> 2. It's unclear to me whether this paper demonstrates discreteness - it describes a geographically invisible barrier (which I take to mean something other than the St Lawrence River), but I can't tell how much breeding separation there is.
>
> 3. Sometimes it doesn't make sense to separate out each discrete population as a DPS. This can be the case when separation is the result of habitat fragmentation. It can also be the case when recovery demands redundancy of populations and/or representation of multiple adaptive capabilities. Is this a case where, even if this population is discrete and genetically different, it's best to treat the separate U.S. populations as part of the larger currently listed entity?
>
> Mark - I'll come up with a tentative response that doesn't require answers to these questions. This issue is not directly relevant to the CH designation, so I don't want to hold up R6 while we look into it.
>
> Mary - I copied you here because of the recovery policy implications.
>
> On Wed, Apr 23, 2014 at 12:46 PM, McCollough, Mark <mark_mccollough@fws.gov> wrote:
>
> > Rueness et al. conducted a rangewide genetics study of lynx. They conclude the genetic differentiation between regions in terms of haplotype frequencies demonstrates that the eastern region (the Atlantic
> > region south of the St. Lawrence) is clearly distinct from all of the other regions. I'm not a genetics expert. Perhaps we could consult one for further interpretation.
> >
> > On Wed, Apr 23, 2014 at 12:18 PM, Miller, Martin <martin_miller@fws.gov> wrote:
> >
> > > Laury/Mark/Krishna - here are my comments on the draft responses. The outstanding question I have is what genetic information we have to indicate whether the Maine/eastern Canada population is markedly genetically different. Let me know what you think. Thanks, Marty
> > >
> > > ---------- Forwarded message ----------
> > > From: **Miller, Martin** <martin_miller@fws.gov>
> > > Date: Wed, Apr 23, 2014 at 10:56 AM
> > > Subject: Re: Copy of draft response to public comments by Maine IFW; Simons comments response to follow
> > > To: "Zicari, Laury" <laury_zicari@fws.gov>
> > > Cc: Jim Zelenak <jim_zelenak@fws.gov>, Krishna Gifford <krishna_gifford@fws.gov>, Mark McCollough <mark_mccollough@fws.gov>

Jim - I would like to review this before you go forward with it. I'll get back to you as soon as I can. Marty

On Tue, Apr 22, 2014 at 3:49 PM, Zicari, Laury <laury_zicari@fws.gov> wrote:

> Jim -- here are our comments in response to Maine IFW's comments on the proposed expanded listing. Mark is working right now on the Simon's peer review comments.
>
> --
>
> Laury Zicari
> Field Supervisor
> Maine Field Office
> 17 Godfrey Drive, Suite 2
> Orono, ME 04473
> 207-866-3344 x 111
> Fax 866-3351
> Cell 207-949-0561

--
Martin Miller, Chief, Division of Endangered Species, Northeast Region, U.S. Fish and Wildlife Service, 300 Westgate Center Drive, Hadley, MA 01035, 413-253-8615

Celebrate the 40th anniversary of the Endangered Species Act!

--
Martin Miller, Chief, Division of Endangered Species, Northeast Region, U.S. Fish and Wildlife Service, 300 Westgate Center Drive, Hadley, MA 01035, 413-253-8615

Celebrate the 40th anniversary of the Endangered Species Act!

--
Mark McCollough, Ph.D.
Endangered Species Specialist
Maine Field Office
U. S. Fish and Wildlife Service
17 Godfrey Drive, Suite 2
Orono, ME 04473
Phone 207 866-3344 x115
Cell Phone: 207 944-5709
mark_mccollough@fws.gov

--
Martin Miller, Chief, Division of Endangered Species, Northeast Region, U.S. Fish and Wildlife Service, 300 Westgate Center Drive, Hadley, MA 01035, 413-253-8615

Celebrate the 40th anniversary of the Endangered Species Act!

Isolation of peripheral populations of Canada lynx

EL Koen[1*], J Bowman[2], and PJ Wilson[1]

[1] Biology Department, Trent University

2140 East Bank Drive, Peterborough, ON, K9J 7B8, Canada

erinkoen@hotmail.com

pauljwilson@me.com

[2] Wildlife Research & Monitoring Section, Ontario Ministry of Natural Resources and Forestry

Trent University DNA Building, 2140 East Bank Drive, Peterborough, ON, K9J 7B8, Canada

jeff.bowman@ontario.ca

*Current address: Cooperative Wildlife Research Laboratory, Southern Illinois University

Mail code 6504, 1125 Lincoln Drive, Carbondale, IL, 62901

Corresponding author: Email: erinkoen@hotmail.com, phone: 618-967-7474

19 **Isolation of peripheral populations of Canada lynx**

20 EL Koen, J Bowman, and PJ Wilson

21

22 **ABSTRACT**

23 Landscape barriers to gene flow, such as rivers, can affect animal populations by limiting the
24 potential for rescue of these isolated populations. We tested the Riverine Barrier Hypothesis,
25 predicting that the St. Lawrence River in eastern Canada would cause genetic divergence of
26 Canada lynx (*Lynx canadensis*, Kerr, 1792) populations by restricting dispersal and gene flow.
27 We sampled 558 lynx from eastern Canada and genotyped these at 14 microsatellite loci. We
28 found 3 genetic clusters, defined by the St. Lawrence River and the Strait of Belle Isle, a
29 waterway separating Newfoundland from mainland Canada. These waterways were not
30 absolute barriers, however: we found 24 individuals that appeared to have crossed. Peripheral
31 populations of lynx are threatened in parts of Canada and the USA, and it is thought that these
32 populations are maintained by immigration from the core. Our findings suggest that in eastern
33 North America, rescue might be less likely because the St. Lawrence River restricts dispersal.
34 We found that ice cover was often sufficient to allow lynx to walk across the ice in winter. If
35 lynx used ice bridges in winter, climate warming could cause a reduction in the extent and
36 longevity of river and sea ice, further isolating these peripheral lynx populations.

37

38 **KEYWORDS** Canada lynx, ice bridge, *Lynx canadensis*, Newfoundland, population structure,
39 Quebec, Riverine Barrier Hypothesis, St. Lawrence River, Strait of Belle Isle

40

INTRODUCTION

Landscape-scale impediments to dispersal, such as mountain ranges (e.g., Reding et al. 2013) and roads (e.g., Epps et al. 2005), can cause a reduction in gene flow that can lead to reduced genetic diversity and extirpation of isolated populations (O'Grady et al. 2006). At the leading edge of a shifting species' distribution, landscape-scale barriers might limit opportunities for the species' range to expand as optimal environmental conditions shift (Kerr and Packer 1998). At the trailing range edge, landscape features that reduce gene flow could lead to reduced genetic diversity (Koen et al. 2014*a*) and a reduced potential for already vulnerable populations to adapt to changing environmental conditions (Pearson et al. 2009). Landscape barriers might also prevent rescue of isolated populations by limiting immigration from core populations (Adams et al. 2011).

The influence of rivers on dispersal, species distributions, and speciation has been of interest for over a century (Wallace 1852; Grinnell 1914; Goldman 1937). The Riverine Barrier Hypothesis (Wallace 1852; Ayres and Clutton-Brock 1992) posits that rivers can act as barriers to dispersal and can limit species ranges. It follows that dispersal rates across rivers would be inversely proportional to river width and flow rate. Despite the number of empirical tests, support for this hypothesis is mixed (Colwell 2000). Rivers have been shown to impede dispersal and gene flow of a diversity of terrestrial species, including reptiles (lizards: Lamborot et al. 2003), birds (Hayes and Sewlal 2004; Voelker et al. 2013), and mammals (mustelids: Garroway et al. 2011, primates: Ayres and Clutton-Brock 1992; Peres et al. 1996). There are also examples of rivers that do not act as barriers (Patton et al. 1994; Fairley et al. 2002; Lougheed et al. 1999; Côté et al. 2012). Equivocal support for the Riverine Barrier Hypothesis might be a

function of the ecology and dispersal abilities of the focal species in relation to the width and flow rate of the river in question (Haffer 1997). In northern regions, seasonal river ice can dampen the isolating effects of rivers by making otherwise isolated regions accessible to non-hibernating terrestrial mammals via ice bridges (Jackson 1920; Banfield 1954; Fuller and Robinson 1982*b*; Gaston et al. 2012).

The distribution of Canada lynx (*Lynx canadensis*, Kerr, 1792) across North America has contracted since European settlement (Laliberte and Ripple 2004), and the southern extent of the range has continued to contract northward in recent decades (Koen et al. 2014*a*). The Canada lynx is federally listed as threatened in the conterminous USA (U.S. Fish and Wildlife Service 2000) and provincially listed as endangered in New Brunswick (New Brunswick Endangered Species Regulation 2013) and Nova Scotia, Canada (Parker 2001). The St. Lawrence River is over 750 km long and 1 - 42 km wide, and runs through the southern extent of lynx range in Quebec, Canada (Fig. 1). Lynx are known to swim across relatively narrow rivers (100 – 300 m; Feierabend and Kielland 2014), but previous research has suggested that lynx movements are impeded by a river as wide as the St. Lawrence (Rueness et al. 2003). Lynx populations at the southern extent of their range may be maintained or supplemented by immigration from core populations (Schwartz et al. 2002), and in eastern North America this would imply that lynx immigrate southward from north of the St. Lawrence River. Indeed, the possibility of rescue of the threatened southern lynx populations via dispersal from core populations is an important component of assessment and recovery plans for lynx (Ruediger et al. 2000; Nordstrom 2005; Nova Scotia Lynx Recovery Team 2007). Thus, understanding the role of the St. Lawrence River in shaping genetic structure of lynx is an important conservation goal

as it could have implications for the recovery of peripheral lynx populations in eastern North America. If the St. Lawrence River is acting as an impediment to lynx movements and gene flow, then there should be genetic divergence between lynx populations on either side of the river. We also estimated temporal trends in ice cover to assess whether an ice bridge across the St. Lawrence River exists and could be crossed by lynx in winter. For context, we compared our results to a known obstacle to lynx gene flow, the Strait of Belle Isle that separates Newfoundland from mainland Labrador and Quebec, Canada.

METHODS

The St. Lawrence River in eastern North America links the Great Lakes to the Atlantic Ocean. The river ranges from 1 km wide in the fluvial sections west of Montreal, Quebec, to an average width of 17 km east of Quebec City, Quebec, and widening to an average of 42 km at the lower estuary (Environment Canada 2013, Fig. 1). Portions of the St. Lawrence River freeze periodically during the winter, and sea ice cover in the Gulf of the St. Lawrence varies annually (Johnston et al. 2005). Variability in freezing is due to a combination of factors, including ambient and water temperature, surface wind, water current, tidal flows, and the North Atlantic Oscillation (NAO, Johnston et al. 2005; Fisheries and Oceans Canada 2012). The Canadian Coast Guard uses icebreakers to keep a channel of the St. Lawrence River open during the winter, from Montreal to Quebec City, for shipping and flood control (Fisheries and Oceans Canada 2001; Dong 2011). For comparison, the Strait of Belle Isle, separating Newfoundland from mainland Labrador and Quebec, Canada, is a 15 - 60 km wide waterway in the Gulf of the St. Lawrence that usually freezes in winter (Fig 1., Fisheries and Oceans Canada 2012).

Sample collection and genetic profiling

We collected skin samples (2.5mm x 2.5mm) from the pelts of Canada lynx harvested in Quebec, Labrador, and Newfoundland, Canada, from fur auctions between 2008 and 2011. Furbearer harvesting in Quebec was reported by administrative units called Unités de Gestion des Animaux à Fourrure (UGAF). Thus, we used the centroid of the UGAF as the sample location (Fig. 1). The average size of the 58 UGAFs for which we had at least one lynx sample was 4356.8 (SD = 7818.0) km^2. We were able to categorize the Newfoundland and Labrador samples as being harvested from mainland (Labrador) or island (Newfoundland) only. In 2010 we obtained tissue samples of 15 incidental lynx mortalities in New Brunswick, Canada from the New Brunswick museum. We grouped these samples into one site. As lynx in New Brunswick tended to occur in the northwest of the province (Parker 2001), we used the centroid of this region as our site coordinates for New Brunswick (Fig. 1). The lynx from Quebec and Newfoundland and Labrador presented by Row et al. (2012) are a subset of what we present here. Furthermore, all lynx samples presented here are a subset of those reported in Koen et al. (2014*b*). We measured pelt length to categorize individuals as adult or juvenile (Quinn and Gardner 1984; Slough 1996).

We genotyped lynx at 14 microsatellite loci (Fca031, Fca035, Fca043, Fca077, Fca090, Fca096, Fca441, Fca391, Fca559, Lc106, Lc109, Lc110, Lc111, Lc118) according to methods described by Row et al. (2012). We manually scored allele sizes using Genemarker 1.7 (Softgenetics). All samples for both species were scored by the same individual using the same criteria, and a second person independently scored a subset of the samples to ensure consistency. We omitted samples that were missing alleles at ≥ 5 of 14 loci. We checked for

errors with software Microchecker 2.2.3 (van Oosterhout et al. 2004) and by examining summary statistics with the adegenet package (version 1.4-2, Jombart 2008) in R (R Development Core team 2014). To determine sex, we amplified the y-chromosome-specific Sry locus and the Zfx fragment on the x-chromosome (Woods et al. 1999; Ortega et al. 2004; Zigouris et al. 2012).

Analysis of genetic data

We grouped lynx samples into 5 sites based on geographic location: north of the St. Lawrence River in Quebec (*n* = 331), south of the St. Lawrence River in Quebec (*n* = 165), New Brunswick (*n* = 15), mainland Labrador (*n* = 18), and Newfoundland (*n* = 29). We used Bonferroni-corrected ($\alpha = 0.0012$) chi-square tests to determine whether allele frequencies were in Hardy-Weinberg equilibrium (HWE), and estimated expected and observed heterozygosity with the adegenet package (Jombart 2008) in R. We used the software Genepop (web version 4.2, Raymond and Rousset 1995; Rousset 2008) to test for linkage disequilibrium (Bonferroni-corrected; $\alpha = 0.0005$). We used software HP-Rare 1.1 (Kalinowski 2005) to estimate the number of alleles per locus (allelic richness), corrected for a sample size of 15 with rarefaction, for our 5 sites. We estimated F_{IS} for each site, and pairwise D_{est} (Jost 2008) and F_{ST} (Weir and Cockerham, 1984) between sites with the R package DiveRsity (Keenan et al. 2013), with 95% confidence intervals on these estimates (999 bootstraps). For lynx sampled in Quebec, we grouped samples as north or south of the St. Lawrence River and within groups, calculated pairwise D_{est} and F_{ST} between UGAF administrative units. We grouped lynx sampled from adjacent UGAFs to increase the sample size in each UGAF (north: 16 sites with an average of 25.7 (SD=16.9) samples/site; south: 7 sites, with an average of 23.1 (SD=16.0) samples/site).

To further evaluate the genetic structure of lynx in our study area, we used an analysis of molecular variance (AMOVA; Excoffier et al. 1992), with 5 sites nested within the three regions delineated by waterways (south of the St. Lawrence River, north of the River, and Newfoundland) with the poppr (Kamvar et al. 2014), adegenet (Jombert 2008), and ade4 (Dray and Dufour 2007) packages in R. We used 999 permutations to assess statistical significance with the ade4 and poppr packages, as described by Excoffier et al. (1992).

We used Bayesian clustering software (Structure version 2.3.4, Pritchard et al. 2000) to identify genetic clusters. We ran 10 repetitions for each of $K = \{1, 2, 3, \ldots, 9\}$ with a burn-in of 500,000 Markov chain Monte Carlo iterations and followed by $1x10^6$ iterations. We used an admixture model without prior location information. We identified the most likely number of genetic clusters with the Evanno method (Evanno et al. 2005) using software Structure Harvester (Earl and vonHoldt 2012). We summarized the 10 replicates with software Clumpp (Jakobsson and Rosenberg 2007) and visualized the results with software Distruct (Rosenberg 2004). We considered individuals to be admixed if they had $0.3 \geq Q \geq 0.7$, where Q represented the proportion of an individual's genome assigned to a population (Pritchard et al. 2000). We conducted a principal component analysis (PCA) of microsatellite genotypes with the ade4 package (Dray and Dufour 2007) in R. We used the PCA as a complementary analysis to program Structure because unlike Structure, PCA does not rely on the assumption that populations are in HWE. We note, however, that Structure appears to be robust to departures from HWE (Hauser et al. 2006, Rodríguez-Ramilo et al. 2009). We estimated pairwise D_{est} (Jost 2008) and F_{ST} (Weir and Cockerham 1984) between clusters (in addition to between sites) with

the R package DiveRsity. For this analysis, we assigned admixed samples to the cluster that accounted for >50% of its ancestry.

Ice cover on the St. Lawrence River and Strait of Belle Isle

We were interested in examining whether the St. Lawrence River and Strait of Belle Isle froze in the winter such that lynx could walk across the ice. We analyzed weekly ice charts for the Eastern Coast region from the Canadian Ice Service Archive (Meteorological Service of Canada, Environment Canada) from Dec 1 – May 15, for each of 8 years (2004 - 2011) to assess temporal trends in ice cover. We restricted our analysis to these years because ice charts prior to 2004 with World Meteorological Organization colour coding were not available and our samples were collected prior to 2011. From these data, we identified how many weeks (not necessarily consecutive) that there was an ice bridge across the St. Lawrence River east of Quebec City and across the narrow reaches of the Strait of Belle Isle near St. Anthony, Newfoundland (Fig. 1). We defined an ice bridge as ice, connecting both banks of the river or strait, with a concentration of ≥ 9. Ice concentration is the proportion of the water surface in a defined area that is covered by ice, on a scale from 1 - 10 (Environment Canada 2005). We considered grey ice (10 – 15 cm thick), grey-white ice (15 – 30 cm thick), and first year ice (> 30 cm thick) to be of sufficient thickness for crossing.

RESULTS

Analysis of genetic data

We successfully genotyped 558 lynx from Quebec (*n* = 331 north of the St. Lawrence River, *n* = 165 south of the river), New Brunswick (*n* = 15), Labrador (*n* = 18), and Newfoundland (*n* = 29;

Table 1). We omitted 7 samples from Quebec and 2 samples from Labrador because they were missing alleles at ≥ 5 of 14 loci. Both Newfoundland lynx and Quebec lynx south of the St. Lawrence River departed from HWE at 6 of 14 loci (NFLD: Lc111, Fca35, Lc109, Fca559, Lc106, Fca77; QC south: Fca441, Fca96, Fca35, Lc106, Lc109, Lc110; $p < 0.0012$), whereas lynx north of the river departed from HWE at one locus only (Fca96). The New Brunswick and Labrador sites were in HWE at all loci. There was evidence of linkage disequilibrium for 4 pairs of loci (Fca96 and Fca559, Fca559 and Fca31, Fca31 and Fca441, and Fca391 and Fca110; $p < 0.0005$).

Allelic richness and private allelic richness in Quebec south of the St. Lawrence River were 16.6% and 67.5% lower than north of the river (Table 2). Allelic richness and private allelic richness in Newfoundland were 38.8% and 51.8% lower than in Labrador (Table 2). Both F_{ST} and D_{est} indicated high genetic differentiation on either side of the St. Lawrence River and the Strait of Belle Isle relative to sites on the same side of the waterway (Table 3). There was greater genetic differentiation between Newfoundland and Labrador than between populations north and south of the St. Lawrence River (Table 3). Within Quebec, gene flow was relatively high between lynx on the same side of the St. Lawrence River: F_{ST} and D_{est} between pairs of UGAFs on the same side of the river were lower (Supplementary Tables 1 and 2) than the values we observed for sites on opposite sides of the river (Table 3). We detected evidence of relatively high inbreeding among lynx in Newfoundland (Table 2).

The likelihood values from our Structure analysis indicated two genetic clusters (Supplementary Fig. 1) separating Newfoundland, Labrador, and Quebec (north of the St. Lawrence River) from New Brunswick and Quebec (south of the river). Our PCA results (Fig. 2), however, suggested 3 genetic clusters, grouping New Brunswick and Quebec (south of the

river) into one cluster, Labrador and Quebec (north of the river) into a second cluster, and Newfoundland as a third cluster. F_{ST} and D_{est} values (Table 3) were consistent with the latter finding that the St. Lawrence River and the Strait of Belle Isle are impediments to gene flow. Furthermore, the 3 clusters themselves were genetically differentiated (Supplementary Table 3). Our AMOVA showed that that while the majority (88.9%) of the variation was within sites ($\Phi = 0.110$, $p<0.001$), a significant proportion (10.4%) of the genetic variation was partitioned among regions separated by waterways (i.e., south of the St. Lawrence River, north of the River, and Newfoundland; $\Phi = 0.104$, $p<0.001$), with less variation attributed to sites nested within regions (0.7%, $\Phi = 0.007$, $p = 0.042$). Visual inspection of our Structure plot also suggested 3 genetic clusters (Fig. 3), and although this is not demonstrated by our likelihood values (Supplementary Fig. 1b), it does agree with our PCA, AMOVA, F_{ST} and D_{est} results, and also with findings from Row et al. (2012) that lynx in Newfoundland are a separate genetic cluster from mainland lynx. As such, and as suggested by Evanno et al. (2005), we have used the weight-of-evidence to interpret our results as three genetic clusters.

Dispersal across the St. Lawrence River. We found 9 (2.7%) lynx (7 adult males, 2 adult females) north of the St. Lawrence River that clustered with lynx south of the river. Likewise, we found 9 (5.4%) lynx (5 adult males, 3 adult females) south of the river that clustered with lynx north of the river: one of these (male of unknown age) was sampled in New Brunswick. We found 1 (6.7%) lynx (adult of unknown sex) in Labrador that clustered with lynx south of the St. Lawrence River (Fig. 4). All of these individuals were likely first generation dispersers ($0.1 > Q > 0.90$). We identified the same 19 individuals with both program Structure and PCA. We identified 4 admixed lynx (sharing DNA between north and south clusters): 2 (adult males) were

found north of the river and 2 were found south of the river in Quebec (adult male) and New Brunswick (female of unknown age) (Fig. 4).

Dispersal across the Strait of Belle Isle. We found 4 (13.8%) lynx (1 adult male, 2 adult females, 1 adult of unknown sex) in Newfoundland that clustered with lynx from Labrador and Quebec (north of river). We also found 1 (0.6%) lynx (adult female) south of the St. Lawrence River in Quebec that was assigned to the Newfoundland cluster (Fig. 4). We estimated that this individual was a first-generation disperser (Q = 0.996), and although we do not know its travel route, the lynx likely crossed both the Strait of Belle Isle and the St. Lawrence River. We identified the same 5 individuals as dispersers with both program Structure and PCA. We found one lynx (female of unknown age) north of the St. Lawrence River in Quebec that was admixed, sharing DNA from the north cluster and Newfoundland (Fig. 4).

Ice cover on the St. Lawrence River and Strait of Belle Isle

Between 2004 and 2011, there was an ice bridge across the St. Lawrence River east of Quebec City every year (Table 4). The number of weeks that an ice bridge was present varied across years, and those weeks were not necessarily consecutive. When an ice bridge was present across the St. Lawrence River, it tended to be composed of relatively thin grey (10 - 15 cm thick) or grey-white (15 – 30 cm thick) ice. There was also an ice bridge across the Strait of Belle Isle every year: it tended to form later in the winter, but was present for longer (Table 4). The ice bridge tended to be composed of thin (30 – 70 cm thick), medium (70 – 120 cm thick), and thick (>120 cm thick) first year ice.

DISCUSSION

The St. Lawrence River appeared to pose an impediment to lynx dispersal and gene flow: we found genetic clustering on either side of the river, as demonstrated by Bayesian clustering, PCA, AMOVA, and pairwise differentiation metrics, supporting the Riverine Barrier Hypothesis. We found only 4 admixed animals, further corroborating that the river restricts lynx gene flow. The St. Lawrence River and Strait of Belle Isle are not absolute barriers, however – we found 24 adult lynx that crossed these waterways. A prediction of the Riverine Barrier Hypothesis is that wider segments of the river near the mouth represent a stronger barrier than narrower segments near the headwater. Although we do not know where along the bank lynx crossed the St. Lawrence River, our results lend some support for this prediction: 13 of the 19 first generation river-crossers were sampled closer to the headwater than the mouth of the river (Fig. 4). The admixed lynx that we sampled must have been the offspring of a river-crossing disperser and an individual that did not cross the river, suggesting that river crossing by lynx has occurred over several generations.

We found greater genetic structure between Newfoundland and Labrador than between the north and south of the St. Lawrence River, implying that the Strait of Belle Isle restricts lynx gene flow more so than the St. Lawrence River does. Previous research has shown that lynx across Canada have relatively low genetic structure owing to high gene flow and the ability of lynx to disperse long distances (Schwartz et al. 2002; Campbell and Strobeck 2006; Row et al. 2012). Our findings add to our understanding of the population structure of this putatively vagile and panmictic species. A comparison of F_{ST} values suggests that the St. Lawrence River (F_{ST} = 0.053) and the Strait of Belle Isle (F_{ST} = 0.179) pose a greater impediment to lynx dispersal than does the Rocky Mountains in western Canada ($F_{ST} \approx 0.016$; Rueness et al.

2003). Likewise, the F_{ST} that we observed in lynx on either side of the St. Lawrence River was an order of magnitude higher than that observed across the entire continent (F_{ST} = 0.007 Alaska to Quebec, Row et al. 2012). The striking genetic structure in this otherwise vagile species underlines the importance of waterways in shaping the past and future genetic composition of the lynx.

We do not know whether the lynx in our study walked across the ice in winter or swam across during ice-free seasons. Lynx can swim across rivers: Feierabend and Kielland (2014) observed 2 lynx repeatedly crossing an unfrozen, 100 - 300 m-wide glacial river in air temperatures of -27°C. The width of the St. Lawrence River ranges from <1 km west of Montreal to >42 km at the river's mouth. It is possible that lynx swim across the narrower sections of the St. Lawrence River, but it seems less likely that lynx would swim across the 15 – 60 km wide Strait of Belle Isle. Our main objective in assessing ice cover, however, was not to determine whether lynx walked or swam across the waterways, but simply to evaluate whether walking was typically possible. The extent of ice cover on the St. Lawrence River was variable within and between years and a channel through much of the river is kept open with icebreakers. Coyotes (*Canis latrans*, Say, 1823) and red fox (*Vulpes vulpes*, L., 1758) will readily cross river ice once shipping lanes have refrozen (Fuller and Robinson 1982*a*), and it is also possible that lynx walked across river ice on the St. Lawrence despite the periodically open channel. The thickness and extent of ice cover on the Strait of Belle Isle tended to be greater than that of the St. Lawrence River, thus it is possible that lynx walked across the 15 – 60 km of sea ice; lynx have been shown to cross up to 50 km of sea ice in the Arctic (Gaston et al. 2012).

303 The timing of juvenile lynx dispersal can be variable: Poole (1997) found that lynx kittens
304 generally dispersed between March and November. In addition to juvenile dispersal, adult lynx
305 make long-distance exploratory movements at various times of the year (Squires and Laurion
306 2000; Squires and Oakleaf 2005; Moen et al. 2010). Lynx are obligate predators of the
307 snowshoe hare (*Lepus americanus*, Erxleben, 1777) and are known to exhibit a 10-year cyclic
308 fluctuation with hares (Elton and Nicholson 1942). Several studies have found dispersal rates of
309 adult lynx to be highest following hare population declines (Ward and Krebs 1985; Slough and
310 Mowat 1996; Poole 1997). In nearby central Ontario, hare population abundance peaked in
311 2007 and reached a low in 2013 (Ontario Ministry of Natural Resources, unpublished data). The
312 adult lynx that crossed the river did so before our sampling occurred (beginning in 2008), and
313 might have been moving in response to the concomitant decline in hare populations. This
314 speculation could explain our finding of few admixed individuals - the influx of first generation
315 dispersers was recent (in response to the recent hare decline).
316 Narrower segments of the St. Lawrence River in southern Ontario are permeable to
317 movement by other mid-sized carnivores. Carr et al. (2007) showed that the St. Lawrence River
318 has not impeded fisher (*Pekania (Martes) pennanti*, Erxleben, 1777) range expansion from the
319 Adirondack region of New York, USA, into eastern Ontario, Canada. Likewise, Cullingham et al.
320 (2009) showed that the St. Lawrence River has allowed gene flow of raccoons (*Procyon lotor*,
321 (L., 1758), and thus did not stop the spread of the raccoon rabies virus from New York into
322 southeastern Ontario, Canada. The Strait of Belle Isle appears to be less permeable to
323 terrestrial mammalian dispersers. It is thought that black bears (*Ursus americanus hamiltoni,*
324 Cameron, 1957; Paetkau and Strobeck 1996; Marshall et al. 2011) colonized Newfoundland

from Labrador across the Strait of Belle Isle, but such migration events by bears are rare (Paetkau and Strobeck 1996). Recent occurrences of wolves (*Canis lupus*, L., 1758) on Newfoundland are thought to be migrants from Labrador (Government of Newfoundland and Labrador 2012), and recent outbreaks of rabies on the island of Newfoundland suggest immigration of arctic (*Alopex lagopus*, L., 1758) or red (*V. vulpes*) fox from Labrador or Quebec (Nadin-Davis et al. 2008). Lynx in Newfoundland are morphologically (Saunders 1964; van Zyll de Jong 1975; Khidas et al. 2013) and genetically (Row et al. 2012) distinct from mainland lynx populations. We found that lynx cross the Strait of Belle Isle from mainland (Labrador and/or Quebec) to Newfoundland and vice versa – this is one of few contemporary examples of mid-sized carnivores crossing the Strait of Belle Isle.

Peripheral populations of lynx are already vulnerable because less suitable environmental conditions tend to be correlated with low gene flow and low genetic diversity (Koen et al. 2014*a*). Similarly, we found that lynx south of the St. Lawrence River and on the island of Newfoundland have relatively low neutral allelic richness. If there is a correlation between neutral and adaptive genetic variation, our results could indicate that these peripheral lynx populations are less likely to adapt to changing environmental conditions.

It is expected that climate change will further limit the distribution of lynx in eastern North America (Carroll 2007). Climate change is also expected to cause a northward shift in bobcat (*L. rufus*, Schreber, 1777) distribution (Anderson and Lovallo 2003; Roberts and Crimmins 2010), increasing the area of sympatry of lynx and bobcat. This interspecies range overlap will threaten lynx population persistence at their southern range extent through competition (Peers et al. 2013) and hybridization (Schwartz et al. 2004; Homyack et al. 2008;

Koen et al. 2014*b*). If the St. Lawrence River impedes bobcat gene flow as it does lynx, it is possible that the river might protect the core of lynx range north of the river by limiting northward range expansion of bobcats from south of the river. It is unclear whether climate warming will reduce the likelihood of ice bridges forming across the river because ice formation in the Gulf of the St. Lawrence is a function of not just temperature, but also wind, water current, tidal flow, and the NAO (Johnston et al 2005; Fisheries and Oceans Canada 2012). Between 1969 and 2002, however, there was a 20 - 40% reduction in sea ice cover during the spring thaw in the Gulf of the St. Lawrence (Johnston et al. 2005).

The St. Lawrence River and the Strait of Belle Isle have important roles in shaping the future distribution of lynx in eastern North America. Lynx populations south of the St. Lawrence River - in New Brunswick, Nova Scotia, and the northeastern United States - are already classified as threatened or provincially endangered. It is thought that peripheral populations of lynx are maintained by immigration of lynx from the core of the range (Schwartz et al. 2002). We showed that the St. Lawrence River and the Strait of Belle Isle act as impediments to gene flow, isolating these populations from the range core. Thus, rescue of these isolated populations by dispersers is less likely than previously thought. If individual lynx are crossing the St. Lawrence River and the Strait of Belle Isle in the winter by walking across the ice, climate warming could reduce the duration and extent of ice bridges across the waterways, further isolating these peripheral lynx populations.

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639

Table 1. Summary statistics for 14 microsatellite loci used to genotype Canada lynx (*Lynx canadensis*) from Quebec (*n* = 496), New Brunswick (*n* = 15), Labrador (*n* = 18), and Newfoundland (*n* = 29).

Locus ID[a]	No. alleles	H_o	H_e
Fca31	8	0.689	0.740
Fca35	21	0.760	0.873
Fca391	7	0.705	0.741
Fca43	6	0.620	0.632
Fca441	7	0.720	0.771
Fca559	18	0.826	0.874
Fca77	7	0.667	0.723
Fca90	6	0.428	0.482
FCA96	9	0.743	0.801
Lc106	8	0.640	0.710
Lc109	8	0.720	0.826
Lc110	9	0.740	0.812
Lc111	8	0.689	0.724
Lc118	8	0.725	0.735

[a] Locus names beginning with Lc were developed from *Lynx canadensis* (Carmichael et al. 2000) and locus names beginning with Fca were developed from *Felis catus* (Menotti-Raymond et al. 1999).

Table 2. Allelic richness[a] and private allelic richness[b] of 558 Canada lynx (*Lynx canadensis*) grouped by sample location[c] and corrected for a sample size of 15 using rarefaction, and inbreeding coefficient estimates (F_{is})[d].

	Allelic richness	Private allelic richness	F_{is}		
			Estimate	95% CI (lower)	95% CI (upper)
QC north	5.19	0.40	0.021	0.005	0.037
QC south	4.33	0.13	0.051	0.022	0.079
NB	4.32	0.20	-0.016	-0.134	0.084
LAB	5.47	0.56	-0.027	-0.102	0.044
NFLD	3.35	0.27	0.127	0.033	0.222

[a] Average number of alleles per locus

[b] Average number of alleles per locus that are unique to a site

[c] We grouped lynx by harvest location: north of the St. Lawrence River in Quebec (QC north; *n* = 331), south of the St. Lawrence River in Quebec (QC south; *n* = 165), New Brunswick (NB; *n* = 15), Labrador mainland (LAB; *n* = 18), and Newfoundland (NFLD; *n* = 29).

[d] F_{IS} and 95% confidence limits (999 bootstraps) estimated with the R package diversity (Keenan et al. 2013)

Table 3. Pairwise F_{ST} (Weir and Cockerham 1994; lower) and D_{est} (Jost 2008; upper), with 95% confidence intervals in brackets, of 558 Canada lynx (*Lynx canadensis*) samples in Canada, grouped by sample location[a].

	QC north	QC south	NB	LAB	NFLD
QC north		0.109 (0.093-0.126)	0.100 (0.068-0.156)	0.020 (0-0.062)	0.177 (0.130-0.218)
QC south	0.053 (0.045-0.060)		0.016 (0-0.052)	0.105 (0.057-0.160)	0.196 (0.145-0.242)
NB	0.045 (0.028-0.068)	0.006 (0-0.029)		0.101 (0.044-0.169)	0.193 (0.130-0.263)
LAB	0.005 (0-0.022)	0.049 (0.028-0.074)	0.046 (0.014-0.082)		0.177 (0.102-0.256)
NFLD	0.154 (0.121-0.181)	0.220 (0.186-0.248)	0.239 (0.188-0.289)	0.179 (0.125-0.230)	

[a] We grouped lynx by harvest location: north of the St. Lawrence River in Quebec (QC north; *n* = 331), south of the St. Lawrence River in Quebec (QC south; *n* = 165), New Brunswick (NB; *n* = 15), Labrador mainland (LAB; *n* = 18), and Newfoundland (NFLD; *n* = 29).

662 Table 4. Presence of an ice bridge[a] across the St. Lawrence River east of Quebec City, Quebec[b]
663 or across the Strait of Belle Isle between Newfoundland and mainland Canada.

Season[c]	St. Lawrence River			Strait of Belle Isle		
	No. weeks[d]	Date of first bridge	Date of last bridge	No. weeks[d]	Date of first bridge	Date of last bridge
2004	6	12/01/2004	01/03/2004	10	10/02/2004	26/04/2004
2005	8	13/12/2004	14/03/2005	10	17/01/2005	28/03/2005
2006	3	26/12/2005	20/02/2006	10	23/01/2006	03/04/2006
2007	3	12/02/2007	19/03/2007	15	29/01/2007	08/05/2007
2008	10	17/12/2007	24/03/2008	12	14/01/2008	28/04/2008
2009	8	22/12/2008	09/03/2009	13	19/01/2009	20/04/2009
2010	5	21/12/2009	01/02/2010	3	8/02/2010	26/04/2010
2011	8	27/12/2010	14/03/2011	3	21/02/2011	28/03/2011

664 [a] We defined an ice bridge as ice (concentration ≥9 and thickness >10cm) connecting both
665 banks of the waterway

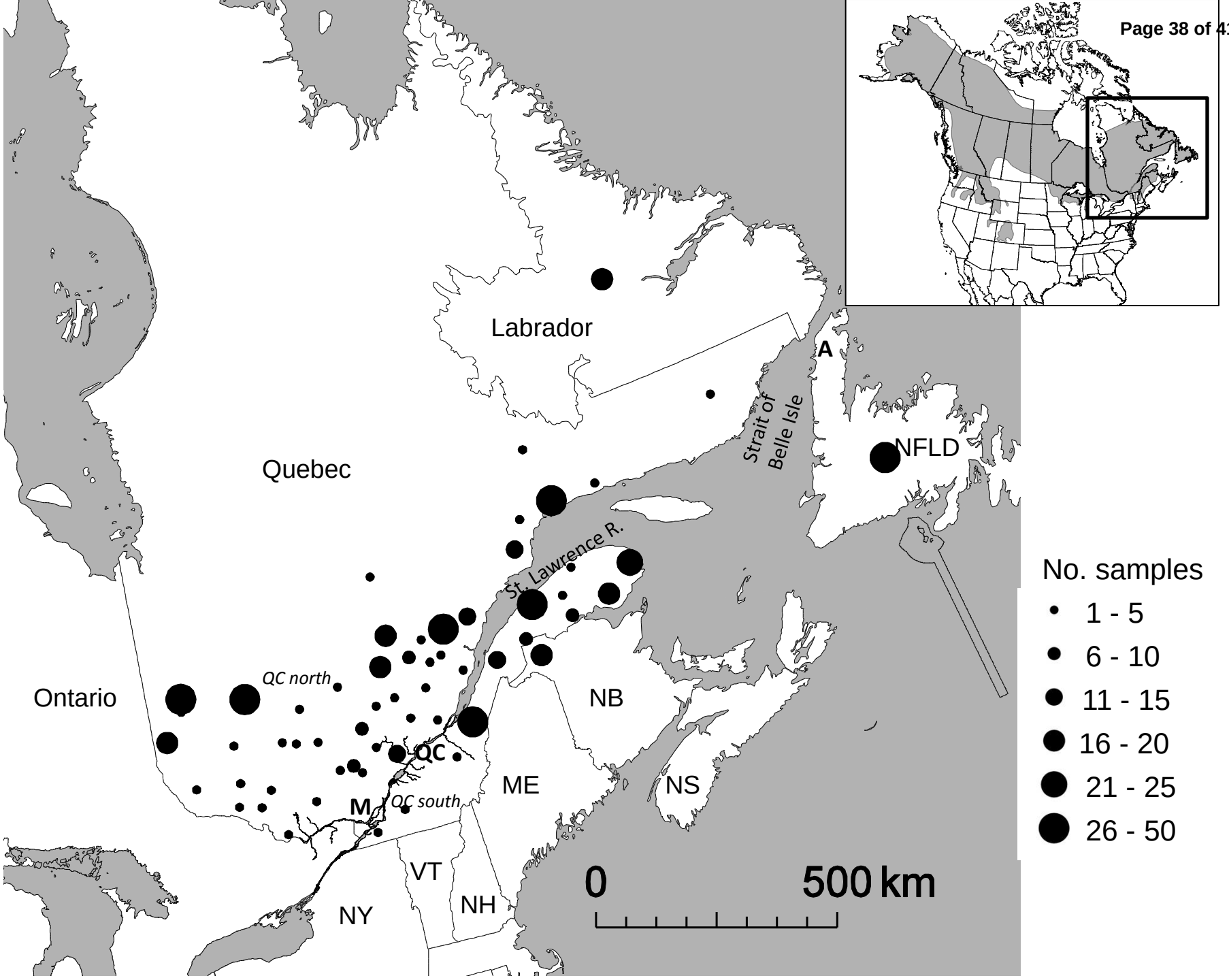
666 [b] Data are from weekly ice charts obtained from the Canadian Ice Service Archive
667 (Meteorological Service of Canada, Environment Canada)

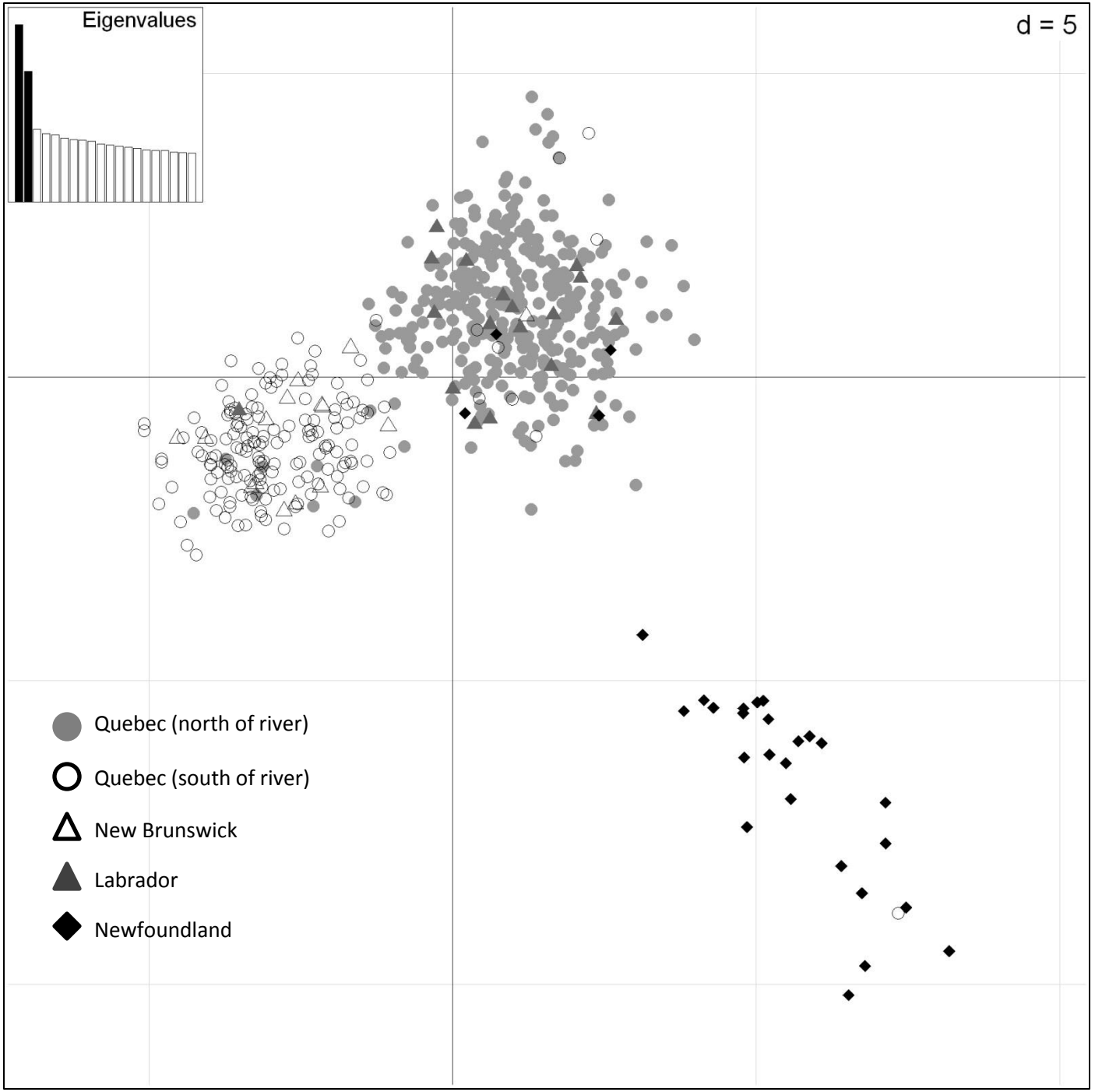
668 [c] We defined a season as 1 Dec – 15 May (24 weeks). For example, 2004 corresponds to 1 Dec
669 2003 – 15 May 2004

670 [d] The number of weeks (not necessarily consecutive) during the season that there was an ice
671 bridge

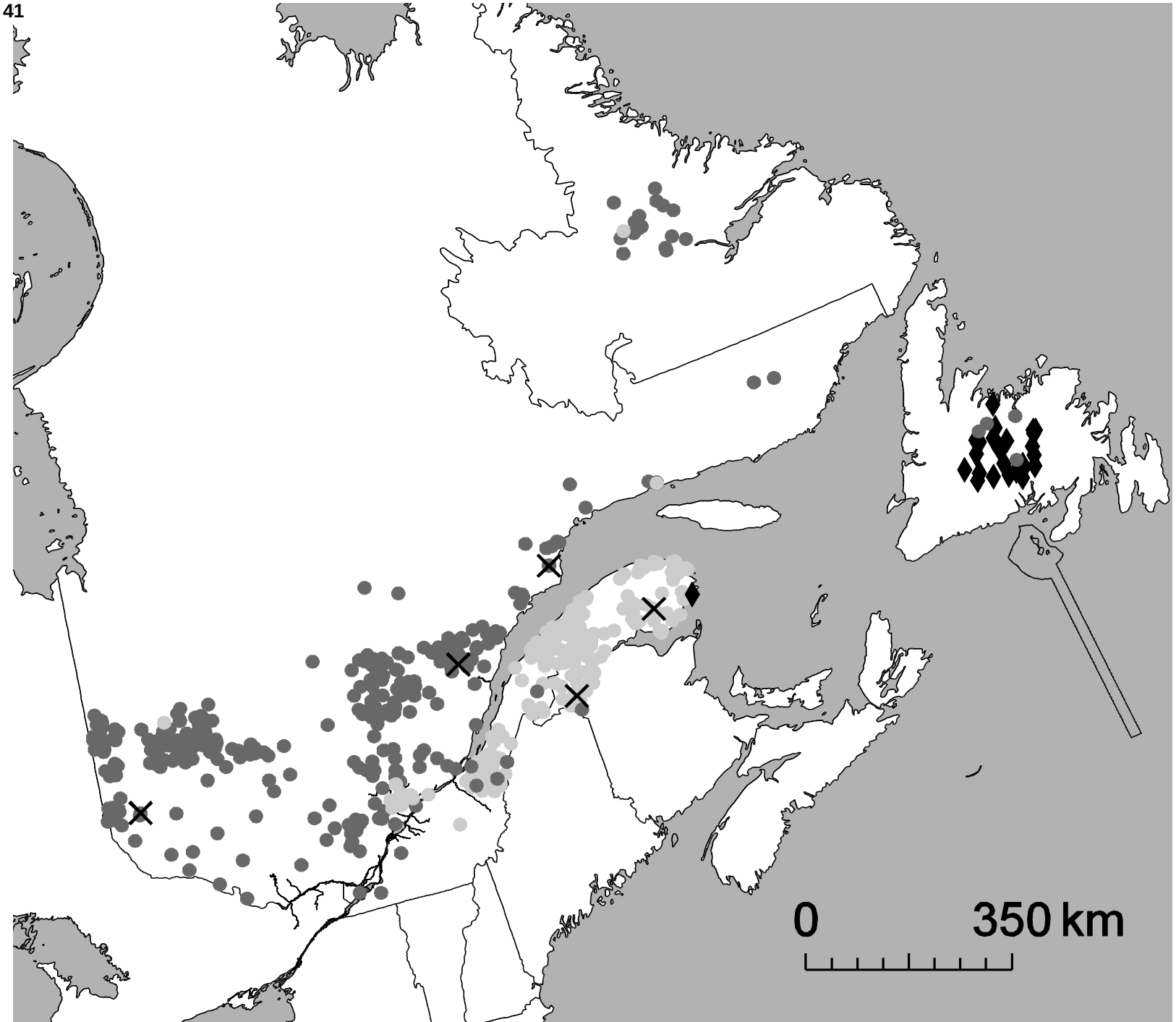
672 Figure 1. Location of 558 Canada lynx (*Lynx canadensis*) samples, with circle radius representing
673 the number of samples collected within each harvest unit (Unités de Gestion des Animaux à
674 Fourrure in Quebec) or province. “QC north” indicates the region of Quebec that is north of the
675 St. Lawrence River, and “QC south” indicates the region of Quebec that is south of the St.
676 Lawrence River. “M” and “QC” represent the location of Montreal and Quebec City,
677 respectively, on the St. Lawrence River. “A” represents St. Anthony on the Strait of Belle Isle.
678 The inset map indicates the study area and current distribution of Canada lynx in North America
679 (grey), reproduced with permission (IUCN 2013). NFLD = Newfoundland, NS = Nova Scotia, NB =
680 New Brunswick, ME = Maine, NH = New Hampshire, VT = Vermont, NY = New York.
681
682 Figure 2. Plot of principal component axes 1 and 2, showing genetic clustering of 558 Canada
683 lynx (*Lynx canadensis*) found north (QC north) and south (QC south) of the St. Lawrence River in
684 Quebec, New Brunswick, Labrador, and Newfoundland, Canada. Symbols represent sample
685 locations.
686
687 Figure 3. Structure plot (Pritchard et al. 2000), representing the proportion of an individual’s
688 genome assigned to one of three populations, based on 10 replicates. Individual lynx (*Lynx*
689 *canadensis*) are grouped based on sample site (QC north = north of the St. Lawrence River in
690 Quebec, QC south = south of the river, NB = New Brunswick, LAB = Labrador, and NFL =
691 Newfoundland), and shading represents cluster assignment.
692

693 Figure 4. Locations of 558 Canada lynx (*Lynx canadensis*) samples representing three genetic
694 clusters: north of the St. Lawrence River (dark grey: Quebec and Labrador), south of the St.
695 Lawrence River (light grey: Quebec and New Brunswick), and Newfoundland (black diamonds),
696 with admixed individuals ($0.3 \leq Q \leq 0.7$) represented by X. We randomly located samples within
697 the respective harvest management units or near the centroid of Newfoundland and Labrador
698 for presentation.





QC (north) QC (south) NB LAB NFL



From: McCollough, Mark
To: Hecht, Anne
Cc: Mary Parkin; Laury Zicari
Subject: Re: genetic differentiation in Canada lynx
Date: Tuesday, August 11, 2015 7:48:26 AM
Attachments: Koen et al 2015 Isolation of peripheral lynx pops.pdf

---

Anne did an excellent job reviewing the lynx genetics information last year. However, there is a new paper specifically addressing lynx genetics in eastern Canada and the Northeast that should be considered. I just received the paper about two weeks ago and am about half way through reading it. It specifically addresses the geographic barriers of the St. Lawrence and Straights of Belle Isle concerning the Newfoundland, eastern Canada, and interior Labrador/Quebec populations. Genetic differences are documents AND amazing information on limited, but recent interchange between these populations. Mark

On Mon, Aug 10, 2015 at 9:36 AM, Hecht, Anne <anne_hecht@fws.gov> wrote:

> Hi Mary --
>
> Here, fyi, is the assessment of literature on lynx genetics that I did for Marty last year. Not necessarily the last word on the subject, but I thought it might be good for you to know what ground has already been plowed (however imperfectly).
>
> I will forward another short follow-up email exchange with Mark, along with the 4i letter that Wendi sent to MDIFW in September 2014.
>
> Anne
>
> **********
> Anne Hecht, Endangered Species Biologist
> U.S. Fish and Wildlife Service
> 73 Weir Hill Road
> Sudbury, MA 01776
> telephone: 978-443-4325
> email: anne_hecht@fws.gov
>
> ---------- Forwarded message ----------
> From: **Hecht, Anne** <anne_hecht@fws.gov>
> Date: Tue, Jul 15, 2014 at 12:06 PM
> Subject: genetic differentiation in Canada lynx
> To: "Miller, Martin" <martin_miller@fws.gov>
> Cc: "McCollough, Mark" <mark_mccollough@fws.gov>, Laury Zicari <Laury_Zicari@fws.gov>, Krishna Gifford <krishna_gifford@fws.gov>, Mary Parkin <mary_parkin@fws.gov>
>
> Sorry about the long-delayed response, Marty. Although it took me a while to respond, it was nice think about something "non-plover" for a change.
>
> In addition to the paper you sent me (Rueness et al. 2003), I looked at 3 other papers, including the one (Schwartz et al. 2002) that the USFWS cited under Issue 4 (DPS determination) in the 2003 FR Notice responding to remanded determination of status. The

four papers are attached fyi. I also talked a bit with Mike Schwartz, a geneticist at the USFS Rocky Mountain research station (http://www.fs.fed.us/rmrs/people/profile.php?alias=mkschwartz) who has helped the FWS grapple with a number of DPS-related issues.

The short answer to your question is that these papers do not present evidence that eastern Canada lynx differ markedly from other continental U.S. lynx populations. Row et al. 2012 provides the best overview and captures several of my criticisms of Rueness et al. 2003, including geographic gaps in sampling (including a big gap coinciding with the area of alleged separation) and *a priori* definition of "populations." Mike Schwartz alerted me to concerns about Rueness et al.'s use of mtDNA, which is problematic in felids because of a microsatellite inserted in the control region, hence violating assumptions important to inference of population structure. Even without these methodological concerns, however, I believe that Rueness et al. overstate the biological significance of the genetic distinctiveness that they purport to detect.

I was intrigued by the "subtle" clinal gene flow restriction that Row et al. 2012 and 2013 identify and (thanks, to more complete sampling) delineate more clearly (in the vicinity of the Ontario-Manitoba border) than Rueness et al. 2003. Row et al. 2013 also present information on genetic-climate associations suggesting that this subtle genetic divergence reflects reduced flow of dispersing individuals across a climatic transition zone affecting snow conditions. While genetic differentiation between the climatic regions is currently low, they suggest that predicted effects of climate change could lead to a future increase in divergence. The take-home point, however, is that increasingly powerful genomic tools have potential to detect subtle genetic and ecological divergence that may arise from changing climate patterns.

Although the genetic information explored by Row et al. 2013 may have potential to help us monitor and address threats from climate change to lynx, I don't think it begins to approach evidence of separation or differences connoting discreteness or significance under the DPS policy (especially when unaccompanied by other strong discontinuities or differences). The more salient inference is conveyed by Row et al. 2012, arguing that dispersal and high gene flow in mainland North American lynx support close cooperation among management jurisdictions (excluding Newfoundland), including (but not limited to) directed trapping. Row et al. 2012 also contrast the lack of genetic structure in mainland lynx with greater differentiation and/or higher number of clusters observed for wolves, caribou, and wolverine at comparable scales in North America.

Since we are on the topic, I want to acknowledge that none of these papers included samples from Maine (indeed, except for Schwartz et al., none included any U.S. lynx), but I gleaned no suggestions of high priority conservation issues warranting elucidation through genetic data. I would note for the record, however, that any efforts that might be undertaken to characterize genetics of Maine lynx would be well-served by evaluation in the context of samples from a wide range (such as that employed by Row et al. 2012), as well as Bayesian cluster analysis to test for population differentiation.

Hope this helps,
Anne

****
Anne Hecht, Endangered Species Biologist

U.S. Fish and Wildlife Service
73 Weir Hill Road
Sudbury, MA 01776
telephone: 978-443-4325
email: anne_hecht@fws.gov

On Thu, Apr 24, 2014 at 7:51 AM, Miller, Martin <martin_miller@fws.gov> wrote:

> Anne - could you please look at this paper and tell us whether you think it indicates marked genetic difference of the Northeast U.S./eastern Canada lynx population? A couple of issues:
>
> 1. I know with wide-ranging species we should expect to see some population structure, but I don't know at what point a difference becomes "markedly different" under the DPS policy.
>
> 2. It's unclear to me whether this paper demonstrates discreteness - it describes a geographically invisible barrier (which I take to mean something other than the St Lawrence River), but I can't tell how much breeding separation there is.
>
> 3. Sometimes it doesn't make sense to separate out each discrete population as a DPS. This can be the case when separation is the result of habitat fragmentation. It can also be the case when recovery demands redundancy of populations and/or representation of multiple adaptive capabilities. Is this a case where, even if this population is discrete and genetically different, it's best to treat the separate U.S. populations as part of the larger currently listed entity?
>
> Mark - I'll come up with a tentative response that doesn't require answers to these questions. This issue is not directly relevant to the CH designation, so I don't want to hold up R6 while we look into it.
>
> Mary - I copied you here because of the recovery policy implications.
>
> On Wed, Apr 23, 2014 at 12:46 PM, McCollough, Mark <mark_mccollough@fws.gov> wrote:
>
> > Rueness et al. conducted a rangewide genetics study of lynx. They conclude the genetic differentiation between regions in terms of haplotype frequencies demonstrates that the eastern region (the Atlantic
> > region south of the St. Lawrence) is clearly distinct from all of the other regions. I'm not a genetics expert. Perhaps we could consult one for further interpretation.
> >
> > On Wed, Apr 23, 2014 at 12:18 PM, Miller, Martin <martin_miller@fws.gov> wrote:
> >
> > > Laury/Mark/Krishna - here are my comments on the draft responses. The outstanding question I have is what genetic information we have to indicate whether the Maine/eastern Canada population is markedly genetically different. Let me know what you think. Thanks, Marty
> > >
> > > ---------- Forwarded message ----------

From: **Miller, Martin** <martin_miller@fws.gov>
Date: Wed, Apr 23, 2014 at 10:56 AM
Subject: Re: Copy of draft response to public comments by Maine IFW; Simons comments response to follow
To: "Zicari, Laury" <laury_zicari@fws.gov>
Cc: Jim Zelenak <jim_zelenak@fws.gov>, Krishna Gifford <krishna_gifford@fws.gov>, Mark McCollough <mark_mccollough@fws.gov>

Jim - I would like to review this before you go forward with it. I'll get back to you as soon as I can. Marty

On Tue, Apr 22, 2014 at 3:49 PM, Zicari, Laury <laury_zicari@fws.gov> wrote:

> Jim -- here are our comments in response to Maine IFW's comments on the proposed expanded listing. Mark is working right now on the Simon's peer review comments.
>
> --
>
> Laury Zicari
> Field Supervisor
> Maine Field Office
> 17 Godfrey Drive, Suite 2
> Orono, ME 04473
> 207-866-3344 x 111
> Fax 866-3351
> Cell 207-949-0561

--
Martin Miller, Chief, Division of Endangered Species, Northeast Region, U.S. Fish and Wildlife Service, 300 Westgate Center Drive, Hadley, MA 01035, 413-253-8615

Celebrate the 40th anniversary of the Endangered Species Act!

--
Martin Miller, Chief, Division of Endangered Species, Northeast Region, U.S. Fish and Wildlife Service, 300 Westgate Center Drive, Hadley, MA 01035, 413-253-8615

Celebrate the 40th anniversary of the Endangered Species Act!

--
Mark McCollough, Ph.D.

> > Endangered Species Specialist
> > Maine Field Office
> > U. S. Fish and Wildlife Service
> > 17 Godfrey Drive, Suite 2
> > Orono, ME 04473
> > Phone 207 866-3344 x115
> > Cell Phone: 207 944-5709
> > mark_mccollough@fws.gov
>
> --
> Martin Miller, Chief, Division of Endangered Species, Northeast Region, U.S. Fish and Wildlife Service, 300 Westgate Center Drive, Hadley, MA 01035, 413-253-8615
>
> Celebrate the 40th anniversary of the Endangered Species Act!

--
Mark McCollough, Ph.D.
Endangered Species Specialist
Maine Field Office
U. S. Fish and Wildlife Service
17 Godfrey Drive, Suite 2
Orono, ME 04473
Phone 207 866-3344 x115
Cell Phone: 207 944-5709
mark_mccollough@fws.gov

From: Johnson, Kurt
To: Zelenak, Jim
Subject: Re: Draft Expert Elicitation Guidance and Criteria
Date: Wednesday, August 12, 2015 7:31:30 AM

Sounds good, Jim. Good luck with everything. I will be out of the office all next week, but available after that.

Kurt

On Tue, Aug 11, 2015 at 5:16 PM, Zelenak, Jim <jim_zelenak@fws.gov> wrote:

> Hey Kurt - thanks.
>
> I'm swamped responding to briefs and "statements of fact" (a misnomer if ever there was one....) from plaintiffs on the critical habitat designation lawsuit, so temporarily pulled away from SSA. I did pass your work along to the Core Team for their review - no comments back yet.
>
> Hope to have time to talk with you about this soon. We will have the next lynx SSA implementation team call on Monday, 1-2 eastern time (we have these, or try to, every Monday - same time), and you are welcome to join us on that call.
>
> If not, I'll be in touch soon. We need to add some of the climate expert candidates to the list of other lynx experts and get that out to the states and maybe other partners very soon.
>
> Thanks again for your help on this.
>
> Jim
>
> On Tue, Aug 11, 2015 at 2:49 PM, Johnson, Kurt <kurt_johnson@fws.gov> wrote:
>
> > Hi Jim,
> >
> > Just checking in to see if you need any further assistance with the lynx SSA. Thanks.
> >
> > Best regards,
> >
> > Kurt
> >
> > On Tue, Aug 4, 2015 at 10:39 AM, Johnson, Kurt <kurt_johnson@fws.gov> wrote:
> >
> > > OK, I am ready to help however I can.
> > >
> > > Kurt
> > >
> > > On Tue, Aug 4, 2015 at 10:32 AM, Zelenak, Jim <jim_zelenak@fws.gov> wrote:
> > >
> > > > Thanks Kurt.
> > > >
> > > > We may need some help narrowing the list of climate candidates for the expert elicitation meeting - we may already be pushing the number or experts that SSA FIT folks and USGS folks are comfortable with for these meetings.

Before doing more work on climate impacts, let me send you what we had in the final CH rule, and let's talk about that first.

However, I've got to prepare now for a monthly FWS coordination call on the lynx SSA. I need to send out a reminder to managers and biologists, and anticipate a short call today to discuss the upcoming expert meeting and what we heard and discussed on the State coordination call last Wed. I'll copy you in case you have time/desire to listen in.

Jim

On Tue, Aug 4, 2015 at 8:01 AM, Johnson, Kurt <kurt_johnson@fws.gov> wrote:

> Thanks for sharing the draft list, Jim. Please feel free to share my list with the SSA Core Team. If you want assistance narrowing the list of climate folks down, please let me know and I can help with that.
>
> Would it be useful for you if I continue the literature review and write-up related to climate change and its potential impacts?
>
> Best regards,
>
> Kurt
>
> On Tue, Aug 4, 2015 at 9:54 AM, Zelenak, Jim <jim_zelenak@fws.gov> wrote:
>
> > Thanks Kurt - very helpful.
> >
> > I've attached the draft expert candidate list that I've been working on with other members of the lynx SSA core team (Mark McCollough in Maine, Tamara Smith in Minnesota, Bryon Holt in north Idaho, and Kurt Broderdorp in Colorado. As you will see, we've contacted most of the lynx experts on your list, except maybe Tanya Shenk for Colorado. We thought of her but thought that either Jake Ivan or Eric Odell, both still with Colorado Parks and Wildlife and both very active with the lynx introduction and now the passive monitoring program, would be best able to give the most up-to-date- current status of lynx there.
> >
> > Anyway, I appreciate you pulling together the document. Do you mind if I share this with the core team and the SSA implementation folks so that we can begin contacting some of the climate change candidates?
> >
> > Many thanks,
> >
> > Jim
> >
> > On Thu, Jul 30, 2015 at 10:11 AM, Johnson, Kurt <kurt_johnson@fws.gov> wrote:
> >
> > > Hi Jim,
> > >
> > > I apologize that this is a bit late, but attached is a document that presents my recommendations for some lynx and climate change experts you might want to consider including in your expert panel for the Lynx SSA. I am sure you already know the lynx experts, but I included them anyway to make this a comprehensive document. I have given a bit of background and contact

information for each individual identified. I hope the document is straightforward. Let me know if you have any questions or would like to discuss any aspects of the recommendations.

Best regards,

Kurt

On Fri, Jul 24, 2015 at 11:29 AM, Johnson, Kurt <kurt_johnson@fws.gov> wrote:

> Thanks for this, Jim. I am working my way through lynx "regions" within the US, identifying key research, literature and experts. I should have a product for you by the middle of next week. Is that still timely?
>
> Have a great weekend.
>
> Best regards,
>
> Kurt
>
> On Thu, Jul 23, 2015 at 12:56 PM, Zelenak, Jim <jim_zelenak@fws.gov> wrote:
>
>> Hi All:
>>
>> Please review the attached DRAFT guidance, which incorporates several previous rounds of comments/edits from David, Jonathan, Mary and myself.
>>
>> Kurt J. - I thought these might be helpful as you/your shop evaluate potential climate change/modeling experts for participation in the expert elicitation meeting/workshop.
>>
>> SSA Core Team - please take a look at these as you reach out informally to prospective experts or have follow-up discussions with those you've already contacted. Also let me know if you see any red flags or have other edits/comments/recommendations.
>>
>> Dave - I've left two of Mary's comments in Appendix 2 that still need to be resolved (one of which I took a stab at addressing - the "ESA" paragraph). I also left in a few potential edits in Track Changes in the APA paragraph that I'd like you and Mary to take another look at. Also would like your thoughts on who else in FWS beyond the Core Team should have these. Should all the Project Leaders who sent letters to State agencies have a look?
>>
>> Thanks.
>>
>> --
>> Jim Zelenak, Biologist
>> U.S. Fish and Wildlife Service
>> Montana Ecological Services Office
>> 585 Shepard Way, Suite 1
>> Helena, MT 59601
>> (406) 449-5225 ext. 220
>> jim_zelenak@fws.gov

--
Jim Zelenak, Biologist
U.S. Fish and Wildlife Service
Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, MT 59601
(406) 449-5225 ext. 220
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(406) 449-5225 ext. 220
jim_zelenak@fws.gov

From: Ivan - DNR, Jake
To: Zelenak, Jim
Subject: Re: Canada lynx status assessment
Date: Monday, August 17, 2015 2:56:05 PM

Thanks for the explanation Jim. Those dates still work for me.

Jake

Jake Ivan
Wildlife Researcher
Mammals Research Section
P 970.472.4310 | F 970.472.4457 | C 970.556.8048
317 W. Prospect Rd., Fort Collins, CO 80526
jake.ivan@state.co.us | cpw.state.co.us

On Mon, Aug 17, 2015 at 2:51 PM, Zelenak, Jim <jim_zelenak@fws.gov> wrote:

> Hi Jake,
>
> My boss here has told me that we will find a way to get the necessary folks to the meeting. I think you are one of those, but we will be sending our draft list of candidates (you and 18-20 other folks to whom we've reached out informally) out to State agency directors and wildlife chiefs later this week for review and possibly suggestion of names not currently on our list. once we've reviewed State input/feedback, we will narrow our list to the minimum number of participants needed to address the most pressing questions on lynx status and likely future viability. Once we've finalized that list, our meeting facilitators will extend formal invitations. I have no reason to believe you wouldn't be on that final list. Anyway, once formal invitations are sent, we will work with folks on travel support needs.
>
> During informal outreach, many candidates expressed their availability for the week before the TWS meeting in Winnipeg, so unless that changes we will likely be holding the expert elicitation workshop Tues Oct. 13 (morning travel, afternoon start to meeting) through the 15th, perhaps with half a day on Friday the 16th. Does that still work for you?
>
> Jim
>
> On Mon, Aug 17, 2015 at 2:39 PM, Ivan - DNR, Jake <jake.ivan@state.co.us> wrote:
>
> > Hi Jim,
> >
> > What are the prospects for help with travel to this? My supervisor just came back and said this probably won't happen unless we can get some help. I've already traveled to the multi-state wolverine monitoring meeting in July and got approval to present at TWS in Winnipeg (another country!!!) this year. So, it appears I've used up all of my travel goodwill for the next decade…
> >
> > Jake
> >
> > **Jake Ivan**
> > **Wildlife Researcher**
> > Mammals Research Section
> > P 970.472.4310 | F 970.472.4457 | C 970.556.8048
> > 317 W. Prospect Rd., Fort Collins, CO 80526

jake.ivan@state.co.us | cpw.state.co.us

On Thu, Jul 23, 2015 at 1:44 PM, Zelenak, Jim <jim_zelenak@fws.gov> wrote:

> Hi Jake,
>
> Thanks for your time on the phone. Sorry to pile on to Kurt's messages and emails, but I wanted to try to get this on your radar quickly. Below is more detail on the SSA and related expert elicitation meeting we are trying to line up for Oct. - Nov. It's looking like most folks are available the week before the TWS meeting, so we are leaning toward that preceding week of Oct. 12 (either 10/13-15 [Tu - Th] or 10/14-16 [W - F]), though the dates are not final yet.
>
> I've also attached the letter that went to CPW and which includes the number and pass code for next Wednesday's coordination call along with a 2-page SSA fact sheet.
>
> The U.S. Fish and Wildlife Service is undertaking a Species Status Assessment (SSA) for the lynx DPS (lower 48 lynx), which is intended to inform recovery planning and the eventual final recovery plan, which we are under court order to complete by Jan. 2018.
>
> The SSA framework is a relatively new (and still-evolving) process intended to result in a report that forms the scientific underpinnings for all or most of the determinations and documents the Service is required to produce in accordance with the ESA.
>
> Given the lack of solid empirical data for many lynx population parameters (e.g., the sizes of the various DPS subpopulations; survival, mortality, recruitment, immigration/emigration rates, etc.) we will need to rely on expert opinion regarding some factors and processes that are necessary to evaluate the likely viability and future health of the DPS.
>
> I'm writing to inquire about your interest and availability to either present research results or participate in a structured lynx "expert elicitation" meeting, or both, that will likely occur in mid-Oct. - mid-Nov., probably in Minneapolis (geographic mid-point of the DPS).
>
> You would contribute importantly to that meeting, where we will also invite other lynx experts from southern Canada and from specific parts of the DPS range in the lower 48, as well as climate change modelers and boreal forest ecologists.
>
> Please let me know if you are interested and potentially available to participate in such a gathering and, if so, whether there are certain dates that absolutely would not work for you. We intend to coordinate with States and other partners throughout this process, but we will need to keep the number of participants at the expert elicitation meeting to a manageable number of folks most able to provide insight on the key variables pertinent to an assessment of the current and likely future status of lynx in the lower 48. In that regard, I welcome your thoughts/ recommendations on other lynx researchers, modelers (climate/forest processes), or managers you think also should be considered for participation at the meeting.
>
> Thanks for considering this request. Please call if you'd like to discuss.
>
> Cheers!
>
> --
> Jim Zelenak, Biologist
> U.S. Fish and Wildlife Service
> Montana Ecological Services Office
> 585 Shepard Way, Suite 1
> Helena, MT 59601
> (406) 449-5225 ext. 220

> > jim_zelenak@fws.gov
>
> --
> Jim Zelenak, Biologist
> U.S. Fish and Wildlife Service
> Montana Ecological Services Office
> 585 Shepard Way, Suite 1
> Helena, MT 59601
> (406) 449-5225 ext. 220
> jim_zelenak@fws.gov

From: Willey, Seth
To: Zelenak, Jim
Subject: Re: Lynx SSA State Agency Contacts
Date: Wednesday, August 19, 2015 9:50:27 AM

Great idea! Thanks!

****
Seth L. Willey
Acting Regional ESA Chief
Mountain-Prairie Region, USFWS
Seth_Willey@fws.gov
303-236-4257
****

On Wed, Aug 19, 2015 at 9:48 AM, Zelenak, Jim <jim_zelenak@fws.gov> wrote:

> Will do. Think we need to start similarly reaching out to some of our other partners - Forest Service, BLM, Park Service, Tribes.....
>
> On Wed, Aug 19, 2015 at 9:41 AM, Willey, Seth <seth_willey@fws.gov> wrote:
>
> > Remind me when this document is "final." I'd like to share with Noreen to show the extent of our efforts.
> >
> > Thanks,
> > Seth
> >
> > **********
> > Seth L. Willey
> > Acting Regional ESA Chief
> > Mountain-Prairie Region, USFWS
> > Seth_Willey@fws.gov
> > 303-236-4257
> > **********
> >
> > On Wed, Aug 19, 2015 at 8:04 AM, Zelenak, Jim <jim_zelenak@fws.gov> wrote:
> >
> > > Hi SSA Core Team,
> > >
> > > I've attached a table that includes all the state agency contacts I have so far for lynx SSA purposes. Please review and fill in any of the blank cells that you can for states in your geographic area of responsibility or have FWS folks from other states do so if possible.
> > >
> > > Later today I will send an email to all state contacts reminding them of next Wednesday's call and providing our list of candidates for the expert elicitation meeting this fall for their review.
> > >
> > > Thanks
> > > --
> > > > > Jim Zelenak, Biologist
> > > U.S. Fish and Wildlife Service
> > > Montana Ecological Services Office
> > > 585 Shepard Way, Suite 1
> > > Helena, MT 59601
> > > (406) 449-5225 ext. 220

> > jim_zelenak@fws.gov
>
>
>
> --
> Jim Zelenak, Biologist
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> Montana Ecological Services Office
> 585 Shepard Way, Suite 1
> Helena, MT 59601
> (406) 449-5225 ext. 220
> jim_zelenak@fws.gov

From: Holt, Bryon
To: Zelenak, Jim
Subject: Re: Lynx SSA State Agency Contacts
Date: Wednesday, August 19, 2015 12:43:49 PM

Hi Jim,

I've talked to both WDFW and WA FWS - no other contacts identified for WA.

I'm still waiting to hear back from our Oregon FWS for any other contacts they might suggest for Oregon.

For Idaho, just a comment. Sam Eaton is an attorney for OSC. I don't think he is a biologist. But, you probably already knew this.

Bryon

On Wed, Aug 19, 2015 at 7:04 AM, Zelenak, Jim <jim_zelenak@fws.gov> wrote:

> Hi SSA Core Team,
>
> I've attached a table that includes all the state agency contacts I have so far for lynx SSA purposes. Please review and fill in any of the blank cells that you can for states in your geographic area of responsibility or have FWS folks from other states do so if possible.
>
> Later today I will send an email to all state contacts reminding them of next Wednesday's call and providing our list of candidates for the expert elicitation meeting this fall for their review.
>
> Thanks
> --
> Jim Zelenak, Biologist
> U.S. Fish and Wildlife Service
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> 585 Shepard Way, Suite 1
> Helena, MT 59601
> (406) 449-5225 ext. 220
> jim_zelenak@fws.gov

--
****
Bryon Holt
U.S. Fish and Wildlife Service
Northern Idaho Field Office, Spokane, WA
Telephone: (509) 893-8014
Fax: (509) 891-6748
email: bryon_holt@fws.gov

****

From: Smith, Tamara
To: Baker, Richard (DNR)
Subject: quick question - DNR contact for lynx SSA
Date: Wednesday, August 19, 2015 3:32:23 PM

Hi Rich -

We are developing a list of relevant state contacts for the lynx SSA for 3 general categories (below). Please let me know if this list needs to be updated and the appropriate contact person for Wildlife Chief (or equivalent).

1- State Agency Director(s) - Tom Landwehr, Director, DNR; Ed Boggess, Director, Division of Fish & Wildlife

2 - Wildlife Chief(s) - ?

3 - State Carnivore/Furbearer Biologist(s) - Rich Baker, Endangered Species Coordinator, Division of Ecological and Water Resources; John Erb, Furbearer Research Biologist

Thanks,
Tam

--
Tamara Smith
U.S. Fish and Wildlife Service
Twin Cities Field Office
4101 American Boulevard East
Bloomington, MN 55425
612-725-3548 ext. 2219
612-600-1599 cell

From: Smith, Tamara
To: Owen Boyle
Subject: quick question - DNR contacts for lynx SSA
Date: Wednesday, August 19, 2015 3:36:06 PM

Hi Owen,

We are developing a list of relevant state contacts for the lynx SSA for 3 general categories (below). Please let me know if this list needs to be updated and the appropriate contact person for state carnivore biologist (or equivalent).

1- State Agency Director(s) - Cathy Stepp, Secretary, DNR; Kurt Thiede, Land Division Coordinator

2 - Wildlife Chief(s) - Sanjay Olson, Division Administrator, Division of Fish, Wildlife, & Parks; Owen Boyle, Section Chief, Division of Fish, Wildlife, & Parks

3 - State Carnivore/Furbearer Biologist(s) - ?

Thanks,
Tam

--
Tamara Smith
U.S. Fish and Wildlife Service
Twin Cities Field Office
4101 American Boulevard East
Bloomington, MN 55425
612-725-3548 ext. 2219
612-600-1599 cell

From: Zelenak, Jim
To: McCollough, Mark
Subject: Re: NH Fish and Game
Date: Thursday, August 20, 2015 12:22:49 PM

Thanks Mark!

On Thu, Aug 20, 2015 at 12:13 PM, McCollough, Mark <mark_mccollough@fws.gov> wrote:

> Jim: Recent emails to Jill Killborn at NH Fish and Wildlife have bounced back. She was the nongame biologist lead for lynx in NH, but I have a suspicion that she no longer works there? John Kanter, her supervisor, is on the list and emails seem to be getting through to him.
>
> Mark
>
> --
> Mark McCollough, Ph.D.
> Endangered Species Specialist
> Maine Field Office
> U. S. Fish and Wildlife Service
> 17 Godfrey Drive, Suite 2
> Orono, ME 04473
> Phone 207 866-3344 x115
> Cell Phone: 207 944-5709
> mark_mccollough@fws.gov

--
Jim Zelenak, Biologist
U.S. Fish and Wildlife Service
Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, MT 59601
(406) 449-5225 ext. 220
jim_zelenak@fws.gov

From: Zelenak, Jim
To: Smith, Tamara
Cc: Mark McCollough; Bryon Holt; Kurt Broderdorp; Mary Parkin; Heather Bell; Seth Willey; Jodi Bush
Subject: Re: Lynx SSA State Agency Contacts
Date: Thursday, August 20, 2015 7:54:13 AM

Thanks very much Tam!

On Thu, Aug 20, 2015 at 7:27 AM, Smith, Tamara <tamara_smith@fws.gov> wrote:

> Hi Jim - My edits are in track changes in the attached. I'll forward next week's meeting reminder to the new additions to the list for WI and MN.
>
> Thanks!
> -Tam
>
> On Wed, Aug 19, 2015 at 2:37 PM, Smith, Tamara <tamara_smith@fws.gov> wrote:
>
> > Hi Jim -- Really quick - fyi - MN DNR's emails have not been working today. If their emails bounce back, I suggest waiting until tomorrow - hopefully the problem will be resolved soon.
> >
> > I'm working on filling in the blanks for WI/MN...
> >
> > THanks,
> > Tam
> >
> > On Wed, Aug 19, 2015 at 9:04 AM, Zelenak, Jim <jim_zelenak@fws.gov> wrote:
> >
> > > Hi SSA Core Team,
> > >
> > > I've attached a table that includes all the state agency contacts I have so far for lynx SSA purposes. Please review and fill in any of the blank cells that you can for states in your geographic area of responsibility or have FWS folks from other states do so if possible.
> > >
> > > Later today I will send an email to all state contacts reminding them of next Wednesday's call and providing our list of candidates for the expert elicitation meeting this fall for their review.
> > >
> > > Thanks
> > > --
> > > Jim Zelenak, Biologist
> > > U.S. Fish and Wildlife Service
> > > Montana Ecological Services Office
> > > 585 Shepard Way, Suite 1
> > > Helena, MT 59601
> > > (406) 449-5225 ext. 220
> > > jim_zelenak@fws.gov
> >
> > --

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(406) 449-5225 ext. 220
jim_zelenak@fws.gov

From:	Baker, Richard (DNR)
To:	Smith, Tamara
Subject:	RE: quick question - DNR contact for lynx SSA
Date:	Thursday, August 20, 2015 8:16:04 AM

Hi Tam,
Our wildlife Chief is Paul Telander. The other names are correct.
I'll forward an email I sent following the last lynx call, fyi.
Rich

<><><><><><><><><><><><><><><><><><>
Richard J. Baker
Minnesota Endangered Species Coordinator
Division of Ecological Resources
Minnesota Department of Natural Resources
500 Lafayette Rd., Box 25
St. Paul, MN 55155
Phone: 651/259-5073
Fax: 651/296-1811
E-mail: richard.baker@state.mn.us
http://www.dnr.state.mn.us/eco/nhnrp
<><><><><><><><><><><><><><><><><><>

From: Smith, Tamara [tamara_smith@fws.gov]
Sent: Thursday, August 20, 2015 7:56 AM
To: Baker, Richard (DNR)
Subject: quick question - DNR contact for lynx SSA

Hi Rich -

We are developing a list of relevant state contacts for the lynx SSA for 3 general categories (below). Please let me know if this list needs to be updated and the appropriate contact person to add for Wildlife Chief (or equivalent).

1- State Agency Director(s) - Tom Landwehr, Director, DNR; Ed Boggess, Director, Division of Fish & Wildlife

2 - Wildlife Chief(s) - ?

3 - State Carnivore/Furbearer Biologist(s) - Rich Baker, Endangered Species Coordinator, Division of Ecological and Water Resources; John Erb, Furbearer Research Biologist

Thanks,
Tam

--
Tamara Smith
U.S. Fish and Wildlife Service
Twin Cities Field Office
4101 American Boulevard East
Bloomington, MN 55425
612-725-3548 ext. 2219
612-600-1599 cell

From: Smith, Tamara
To: Boyle, Owen D - DNR
Subject: Re: quick question - DNR contacts for lynx SSA
Date: Thursday, August 20, 2015 8:16:03 AM

Thank you Owen! The key was helpful too.

Thanks,
Tam

On Wed, Aug 19, 2015 at 4:28 PM, Boyle, Owen D - DNR <Owen.Boyle@wisconsin.gov> wrote:

> Hi Tam,
>
> My answers below… responsibility for mammals is shared between our bureaus of Wildlife Management (game) and Natural Heritage Conservation (non-game), hence the long list. Key to WDNR hierarchy:
>
> Secretary's Office
>
> --Division
>
> ----Bureau
>
> ------Section
>
> **From:** Smith, Tamara [mailto:tamara_smith@fws.gov]
> **Sent:** Wednesday, August 19, 2015 3:36 PM
> **To:** Boyle, Owen D - DNR
> **Subject:** quick question - DNR contacts for lynx SSA
>
> Hi Owen,
>
> We are developing a list of relevant state contacts for the lynx SSA for 3 general categories (below). Please let me know if this list needs to be updated and the appropriate contact person for state carnivore biologist (or equivalent).
>
> 1- State Agency Director(s) -

- Cathy Stepp, Secretary
- Kurt Thiede, Deputy Secretary
- Sanjay Olson, Administrator, Division of Fish, Wildlife, & Parks

2 - Wildlife Chief(s) –

- Tom Hauge, Director, Bureau of Wildlife Management
- Erin Crain-Sullivan, Acting Director, Bureau of Natural Heritage Conservation
- Owen Boyle, Chief, Species Management Section, Bureau of Natural Heritage Conservation

3 - State Carnivore/Furbearer Biologist(s) –

- John Olson, Furbearer Specialist (retiring in October), Bureau of Wildlife Management
- David MacFarland, Carnivore Specialist, Bureau of Wildlife Management
- John Paul White, Mammal Ecologist, Bureau of Natural Heritage Conservation

Thanks,
Tam

--

Tamara Smith

U.S. Fish and Wildlife Service

Twin Cities Field Office

4101 American Boulevard East

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612-725-3548 ext. 2219

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--
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U.S. Fish and Wildlife Service
Twin Cities Field Office
4101 American Boulevard East
Bloomington, MN 55425
612-725-3548 ext. 2219
612-600-1599 cell

From: Smith, Tamara
To: Baker, Richard (DNR)
Subject: Re: quick question - DNR contact for lynx SSA
Date: Thursday, August 20, 2015 8:17:41 AM

Thanks, Rich!

On Thu, Aug 20, 2015 at 8:16 AM, Baker, Richard (DNR) <richard.baker@state.mn.us> wrote:

> Never mind. I see I copied you on it originally...
>
> ---
>
> **From:** Smith, Tamara [tamara_smith@fws.gov]
> **Sent:** Thursday, August 20, 2015 7:56 AM
> **To:** Baker, Richard (DNR)
> **Subject:** quick question - DNR contact for lynx SSA
>
> Hi Rich -
>
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>
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>
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>
> 3 - State Carnivore/Furbearer Biologist(s) - Rich Baker, Endangered Species Coordinator, Division of Ecological and Water Resources; John Erb, Furbearer Research Biologist
>
> Thanks,
> Tam
>
> --
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From: Zelenak, Jim
To: McCollough, Mark
Subject: Re: CBD et al. litigation concerning Maine trapping ITP
Date: Thursday, August 20, 2015 10:14:44 AM

Sorry to hear that, Mark - but thanks for sharing.

On Thu, Aug 20, 2015 at 9:55 AM, McCollough, Mark <mark_mccollough@fws.gov> wrote:

> Jim: FYI as lynx species lead. Earlier this week we received a second lawsuit from CBD and other environmental organizations concerning the Maine Trapping ITP. This suit challenges both ESA and NEPA decisions and is supported by the Vermont School of Law. We are finishing work on the administrative record for the Friends of Animals suit, which is required to go to the court the end of August. I hope we can juggle everything and continue to provide you support on the SSA/recovery plan.
>
> Mark
>
> For Immediate Release, August 17, 2015
>
> Contacts: Mollie Matteson, Center for Biological Diversity, (802) 318-1487 or mmatteson@biologicaldiversity.org
> Daryl DeJoy, Wildlife Alliance of Maine, (207) 479-2252 or daryldejoy@gmail.com
> Amey Owen, Animal Welfare Institute, (202) 446-2128 or amey@awionline.org
> Doug Ruley, Vermont Law School Environmental and Natural Resources Law Clinic, (802) 831-1624 or druley@vermontlaw.edu
>
> **Lawsuit Filed to Protect Canada Lynx From Trapping Deaths, Injuries in Maine**
>
> AUGUSTA, *Maine*— Wildlife conservation and animal welfare organizations filed a lawsuit today against the U.S. Fish and Wildlife Service for allowing trappers in Maine to kill and seriously injure Canada lynx, a federally protected cat. Plaintiffs include the Center for Biological Diversity, Wildlife Alliance of Maine and the Animal Welfare Institute.
>
> Each year Maine trappers targeting coyotes, foxes, mink and other animals unintentionally kill and seriously injure Canada lynx, one of the rarest cats in the United States. Because lynx are protected under the Endangered Species Act, the state cannot authorize such "incidental" harm to lynx without an "incidental take permit" issued by the Fish and Wildlife Service. Today's lawsuit challenges the Service's permit issued to the Maine Department of Inland Fisheries and Wildlife last year covering the state's trapping programs.
>
> "I'm outraged that endangered lynx continue to needlessly suffer and die in cruel traps," said Collette Adkins, an attorney and biologist at the Center for Biological Diversity. "A few common-sense changes could prevent most of this suffering, but the Service refuses to require Maine's trapping programs to make those changes."
>
> The lawsuit argues that Maine's trapping programs violate both the Endangered Species Act, which requires that harm to lynx be minimized and mitigated, and the National Environmental Policy Act, which requires a proper analysis of environmental impacts.
>
> "Sickening reports of lynx deaths and injuries, as well as an unknown number of unreported incidents, show that the state and feds are doing a haphazard job providing lynx the protections required under the law," said Daryl DeJoy, executive director of Wildlife Alliance of Maine. "We hope that this lawsuit brings necessary changes to Maine's trapping programs that will help ensure the lynx's survival in Maine."
>
> The challenged permit allows, over the next 15 years, for three trapped lynx to be killed, nine to suffer severe injury and subsequent rehabilitation, and 183 to suffer "minor" injuries and be immediately released. Since the permit was issued in November 2014, trappers have already reported killing two lynx and capturing more than 20 others. More have likely fallen victim to traps, as the Service reports that 75 percent of trapped lynx are not reported.
>
> "As has unfortunately become commonplace within the Fish and Wildlife Service, the agency's biologists advocated for greater protections for the lynx only to be trumped by agency administrators," said DJ Schubert, wildlife biologist at the Animal Welfare Institute. "The Service must protect lynx from the death and suffering inherent to trapping and not capitulate to a state agency more interested in a handful of trappers than the protection and recovery of the lynx."
>
> The organizations object to, among other things, the use of body-gripping Conibear traps, cable restraints and foothold traps in areas where lynx live. Conibear traps, for example, snap shut in a viselike grip and have killed lynx in Maine on numerous occasions; but the Service's permit does not require simple exclusion devices that are effective in preventing lynx deaths. Today's lawsuit also challenges Maine's plan for mitigating harm to lynx, which largely relies on lynx habitat management, even though the Service's own biologists found that the mitigation habitat would be too small to offset the harm to lynx.
>
> "Instead of enforcing the law, the Fish and Wildlife Service caved by failing to require the measures needed to protect Canada lynx," said Doug Ruley, an attorney with the Environmental and Natural Resources Law Clinic at Vermont Law School.
>
> Plaintiffs are represented by Vermont Law School's Environmental and Natural Resources Law Clinic and local counsel, Sean Mahoney of Conservation Law Foundation Maine. Attorneys with the Center for Biological Diversity also are participating in the case.
>
> *The Center for Biological Diversity is a national, nonprofit conservation organization with more than 900,000 members and online activists dedicated to the protection of endangered species and wild places.*
>
> *The Animal Welfare Institute is a nonprofit charitable organization founded in 1951 and dedicated to reducing animal suffering caused by people. AWI engages policymakers, scientists, industry, and the public to achieve better treatment of animals everywhere—in the laboratory, on the farm, in commerce, at home, and in the wild. For more information, visit www.awionline.org.*
>
> *The Wildlife Alliance of Maine is dedicated to advocate on behalf of Maine's wildlife and to promote a conservation ethic that represents non-consumptive wildlife users.*
>
> --
> Mark McCollough, Ph.D.
> Endangered Species Specialist
> Maine Field Office
> U. S. Fish and Wildlife Service
> 17 Godfrey Drive, Suite 2
> Orono, ME 04473
> Phone 207 866-3344 x115
> Cell Phone: 207 944-5709
> mark_mccollough@fws.gov

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U.S. Fish and Wildlife Service
Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, MT 59601
(406) 449-5225 ext. 220
jim_zelenak@fws.gov

From: McCollough, Mark
To: Jim Zelenak
Subject: NH Fish and Game
Date: Thursday, August 20, 2015 2:13:54 PM

Jim: Recent emails to Jill Killborn at NH Fish and Wildlife have bounced back. She was the nongame biologist lead for lynx in NH, but I have a suspicion that she no longer works there? John Kanter, her supervisor, is on the list and emails seem to be getting through to him.

Mark

--
Mark McCollough, Ph.D.
Endangered Species Specialist
Maine Field Office
U. S. Fish and Wildlife Service
17 Godfrey Drive, Suite 2
Orono, ME 04473
Phone 207 866-3344 x115
Cell Phone: 207 944-5709
mark_mccollough@fws.gov

From: Ivan - DNR, Jake
To: Zelenak, Jim
Subject: Re: Canada lynx status assessment
Date: Friday, August 21, 2015 9:53:20 AM

Hi Jim,

I just got word that the Director approved my travel to the Expert Elicitation as a NO COST trip to us. Let me know when you've finalized the dates, invitees, potential for covering travel, etc. and I'll make plans as necessary, or not. Have a good weekend.

Jake

Jake Ivan
Wildlife Researcher
Mammals Research Section
P 970.472.4310 | F 970.472.4457 | C 970.556.8048
317 W. Prospect Rd., Fort Collins, CO 80526
jake.ivan@state.co.us | cpw.state.co.us

On Mon, Aug 17, 2015 at 2:51 PM, Zelenak, Jim <jim_zelenak@fws.gov> wrote:

> Hi Jake,
>
> My boss here has told me that we will find a way to get the necessary folks to the meeting. I think you are one of those, but we will be sending our draft list of candidates (you and 18-20 other folks to whom we've reached out informally) out to State agency directors and wildlife chiefs later this week for review and possibly suggestion of names not currently on our list. once we've reviewed State input/feedback, we will narrow our list to the minimum number of participants needed to address the most pressing questions on lynx status and likely future viability. Once we've finalized that list, our meeting facilitators will extend formal invitations. I have no reason to believe you wouldn't be on that final list. Anyway, once formal invitations are sent, we will work with folks on travel support needs.
>
> During informal outreach, many candidates expressed their availability for the week before the TWS meeting in Winnipeg, so unless that changes we will likely be holding the expert elicitation workshop Tues Oct. 13 (morning travel, afternoon start to meeting) through the 15th, perhaps with half a day on Friday the 16th. Does that still work for you?
>
> Jim
>
> On Mon, Aug 17, 2015 at 2:39 PM, Ivan - DNR, Jake <jake.ivan@state.co.us> wrote:
>
> > Hi Jim,
> >
> > What are the prospects for help with travel to this? My supervisor just came back and said this probably won't happen unless we can get some help. I've already traveled to the multi-state wolverine monitoring meeting in July and got approval to present at TWS in Winnipeg (another country!!!) this year. So, it appears I've used up all of my travel goodwill for the next decade…
> >
> > Jake

Jake Ivan
Wildlife Researcher
Mammals Research Section
P 970.472.4310 | F 970.472.4457 | C 970.556.8048
317 W. Prospect Rd., Fort Collins, CO 80526
jake.ivan@state.co.us | cpw.state.co.us

On Thu, Jul 23, 2015 at 1:44 PM, Zelenak, Jim <jim_zelenak@fws.gov> wrote:

> Hi Jake,
>
> Thanks for your time on the phone. Sorry to pile on to Kurt's messages and emails, but I wanted to try to get this on your radar quickly. Below is more detail on the SSA and related expert elicitation meeting we are trying to line up for Oct. - Nov. It's looking like most folks are available the week before the TWS meeting, so we are leaning toward that preceding week of Oct. 12 (either 10/13-15 [Tu - Th] or 10/14-16 [W - F]), though the dates are not final yet.
>
> I've also attached the letter that went to CPW and which includes the number and pass code for next Wednesday's coordination call along with a 2-page SSA fact sheet.
>
> The U.S. Fish and Wildlife Service is undertaking a Species Status Assessment (SSA) for the lynx DPS (lower 48 lynx), which is intended to inform recovery planning and the eventual final recovery plan, which we are under court order to complete by Jan. 2018.
>
> The SSA framework is a relatively new (and still-evolving) process intended to result in a report that forms the scientific underpinnings for all or most of the determinations and documents the Service is required to produce in accordance with the ESA.
>
> Given the lack of solid empirical data for many lynx population parameters (e.g., the sizes of the various DPS subpopulations; survival, mortality, recruitment, immigration/emigration rates, etc.) we will need to rely on expert opinion regarding some factors and processes that are necessary to evaluate the likely viability and future health of the DPS.
>
> I'm writing to inquire about your interest and availability to either present research results or participate in a structured lynx "expert elicitation" meeting, or both, that will likely occur in mid-Oct. - mid-Nov., probably in Minneapolis (geographic mid-point of the DPS).
>
> You would contribute importantly to that meeting, where we will also invite other lynx experts from southern Canada and from specific parts of the DPS range in the lower 48, as well as climate change modelers and boreal forest ecologists.
>
> Please let me know if you are interested and potentially available to participate in such a gathering and, if so, whether there are certain dates that absolutely would not work for you. We intend to coordinate with States and other partners throughout this process, but we will need to keep the number of participants at the expert elicitation meeting to a manageable number of folks most able to provide insight on the key variables pertinent to an assessment of the current and likely future status of lynx in the lower 48. In that regard, I welcome your thoughts/ recommendations on other lynx researchers, modelers (climate/forest processes), or managers you think also should be considered for participation at the meeting.
>
> Thanks for considering this request. Please call if you'd like to discuss.
>
> Cheers!
>
> --
> Jim Zelenak, Biologist

U.S. Fish and Wildlife Service
Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, MT 59601
(406) 449-5225 ext. 220
jim_zelenak@fws.gov

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Montana Ecological Services Office
585 Shepard Way, Suite 1
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jim_zelenak@fws.gov

From: Zelenak, Jim
To: McCollough, Mark
Subject: Re: MDIFW changes trapping regulations to protect lynx
Date: Monday, August 24, 2015 3:14:08 PM

Thanks Mark.

Talk to you tomorrow (I hope).

On Mon, Aug 24, 2015 at 2:59 PM, McCollough, Mark <mark_mccollough@fws.gov> wrote:

> MDIFW changed trapping regulations last Friday to require exclusion devices on all conibear traps after two lynx were caught in leaning pole sets last trapping season. Also, MDIFW eliminated use of drag sets for foothold traps in wildlife management districts of the state where lynx occur out of an abundance of concern about injury in these particular sets.
>
> # Maine trappers required to take precautions to avoid Canada lynx
>
> **pressherald.com** /2015/08/21/maine-trappers-required-to-take-precautions-to-avoid-canada-lynx/
>
> By Kevin Miller Staff Writer | @KevinMillerPPH | 207-791-6312
>
> Maine trappers will have to comply with additional restrictions on some devices this fall under new regulations intended to protect Canada lynx, a threatened species at the center of a long-running legal dispute.
>
> The Maine Department of Inland Fisheries and Wildlife announced Friday that trappers throughout the state will be required to use special “exclusion devices” on traps set on dry land to keep lynx from getting caught inadvertently in traps designed to kill an animal. The exclusion devices have openings too small for a lynx to access a trap and are designed to preclude a lynx from inserting a paw into the trap.
>
> Maine trappers are required to take additional measures to avoid trapping Canada lynx. File Photo
> Search photos available for purchase: Photo Store →
>
> The new regulation is an expansion of an emergency policy on trapping in northern Maine that was set last year after two lynx deaths. Additionally, DIFW announced Friday it will require new safeguards on non-lethal foothold traps in an effort to reduce injuries to lynx. Department officials said the new regulations – and particularly the statewide requirement for exclusion devices – were an “overly cautious” approach to a species they say is expanding its range in Maine.
>
> “This was a very difficult decision for the department to make because it is quite a restriction on the trapping community in the southern portion of the state,” said Judy Camuso, wildlife director at DIFW. “But I think everybody agreed that we need to be extra cautious.”
>
> Last December, the department effectively shut down trapping for most above-ground species

in the northern half of the state after two lynx were found dead in legally set traps during a two-week period. The lynx died just weeks after the U.S. Fish and Wildlife Service had issued Maine an “incidental take permit” that shields the state from liability for accidental lynx trappings but requires a state response if too many lynx are caught.

The incidental take permit, which the state had been seeking for years, required Maine to modify its regulations if two lynx were killed in legally set traps over the 15-year permit period and capped the number of lynx inadvertently caught but not killed at 192 during that time.

On Monday, three wildlife conservation groups filed suit in federal court against the U.S. Fish and Wildlife Service accusing the agency of allowing trapping practices in Maine that could harm lynx. The lawsuit – filed in U.S. District court in Bangor by the Wildlife Alliance of Maine, the Center for Biological Diversity and the Animal Welfare Institute – sought to halt the trapping season that begins in October.

DIFW spokesman Mark Latti said the new regulations have been in the works for several months and that the timing of Friday’s announcement and the lawsuit was coincidental.

Canada lynx are protected as a “threatened” species under the federal Endangered Species Act. Maine is home to the East Coast’s only sizable, breeding population of lynx, which are similar in size to common bobcats but have large, padded feet that allow them to pursue snowshoe hares and other prey in the deep snows of northern Maine.

In 2006, the department estimated that Maine had a population of 750 to 1,000 lynx. But the department now says that Maine’s lynx population “is expanding into western and eastern range while remaining stable in their central core range of northern Maine,” based on tracking surveys conducted last winter and confirmed sightings.

--
Mark McCollough, Ph.D.
Endangered Species Specialist
Maine Field Office
U. S. Fish and Wildlife Service
17 Godfrey Drive, Suite 2
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jim_zelenak@fws.gov

From: Jay Kolbe
To: Jim Zelenak
Subject: RE: MDIFW changes trapping regulations to protect lynx
Date: Monday, August 24, 2015 3:49:03 PM

It's interesting--there are significant pockets of snowshoe hare in the upper elevation areas of the Little Belts but the overall amount, and distribution, of that habitat is pretty limited--given the distance from a source population I doubt the area ever did (or would) support a persistent and reproducing lynx population.

I know you're in the thick of all this--and I'm glad that you are. Let me know if and as I can help.

Jay Kolbe
Wildlife Biologist
Region 4, White Sulphur Springs
Montana Fish, Wildlife & Parks
(406) 499-2356

Date: Mon, 24 Aug 2015 15:12:07 -0600
Subject: Fwd: MDIFW changes trapping regulations to protect lynx
From: jim_zelenak@fws.gov
To: jaykolbe@hotmail.com

FYI.

P.S. On July 30, while returning from fishing Belt Creek upstream from Sluice Boxes State Park, me and a buddy saw quite a few (6-8) snowshoe hares on the side of the road between Monarch and Neihart, most in the vicinity of Showdown. Not sure if that unusual or not, as I've not spent much time up there. Earlier that day, just after we came over the pass from Deep Creek, we had two sage grouse cross the road (going south-to-north) right in front of us. Hadn't seen any of those in a long while, and never there before, although again, I haven't spent a whole lot of time over that way.

Really enjoyed Red Ants, sorry we didn't run into you there.

Keep in touch.

---------- Forwarded message ----------
From: **McCollough, Mark** <mark_mccollough@fws.gov>
Date: Mon, Aug 24, 2015 at 2:59 PM
Subject: MDIFW changes trapping regulations to protect lynx
To: Jim Zelenak <jim_zelenak@fws.gov>

MDIFW changed trapping regulations last Friday to require exclusion devices on all conibear traps after two lynx were caught in leaning pole sets last trapping season. Also, MDIFW eliminated use of drag sets for foothold traps in wildlife management districts of the state where lynx occur out of an abundance of concern about injury in these particular sets.

Maine trappers required to take precautions to avoid Canada lynx

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pressherald.com/2015/08/21/maine-trappers-required-to-take-precautions-to-avoid-canada-lynx/

By Kevin Miller Staff Writer | @KevinMillerPPH | 207-791-6312

Maine trappers will have to comply with additional restrictions on some devices this fall under new regulations intended to protect Canada lynx, a threatened species at the center of a long-running legal dispute.

The Maine Department of Inland Fisheries and Wildlife announced Friday that trappers throughout the state will be required to use special “exclusion devices” on traps set on dry land to keep lynx from getting caught inadvertently in traps designed to kill an animal. The exclusion devices have openings too small for a lynx to access a trap and are designed to preclude a lynx from inserting a paw into the trap.

Maine trappers are required to take additional measures to avoid trapping Canada lynx. File Photo
Search photos available for purchase: Photo Store →

The new regulation is an expansion of an emergency policy on trapping in northern Maine that was set last year after two lynx deaths. Additionally, DIFW announced Friday it will require new safeguards on non-lethal foothold traps in an effort to reduce injuries to lynx. Department officials said the new regulations – and particularly the statewide requirement for exclusion devices – were an “overly cautious” approach to a species they say is expanding its range in Maine.

“This was a very difficult decision for the department to make because it is quite a restriction on the trapping community in the southern portion of the state,” said Judy Camuso, wildlife director at DIFW. “But I think everybody agreed that we need to be extra cautious.”

Last December, the department effectively shut down trapping for most above-ground species in the northern half of the state after two lynx were found dead in legally set traps during a two-week period. The lynx died just weeks after the U.S. Fish and Wildlife Service had issued Maine an “incidental take permit” that shields the state from liability for accidental lynx trappings but requires a state response if too many lynx are caught.

The incidental take permit, which the state had been seeking for years, required Maine to modify its regulations if two lynx were killed in legally set traps over the 15-year permit period and capped the number of lynx inadvertently caught but not killed at 192 during that time.

On Monday, three wildlife conservation groups filed suit in federal court against the U.S. Fish and Wildlife Service accusing the agency of allowing trapping practices in Maine that could harm lynx. The lawsuit – filed in U.S. District court in Bangor by the Wildlife Alliance of Maine, the Center for Biological Diversity and the Animal Welfare Institute – sought to halt the trapping season that

begins in October.
DIFW spokesman Mark Latti said the new regulations have been in the works for several months and that the timing of Friday's announcement and the lawsuit was coincidental.
Canada lynx are protected as a "threatened" species under the federal Endangered Species Act. Maine is home to the East Coast's only sizable, breeding population of lynx, which are similar in size to common bobcats but have large, padded feet that allow them to pursue snowshoe hares and other prey in the deep snows of northern Maine.
In 2006, the department estimated that Maine had a population of 750 to 1,000 lynx. But the department now says that Maine's lynx population "is expanding into western and eastern range while remaining stable in their central core range of northern Maine," based on tracking surveys conducted last winter and confirmed sightings.

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Mark McCollough, Ph.D.
Endangered Species Specialist
Maine Field Office
U. S. Fish and Wildlife Service
17 Godfrey Drive, Suite 2
Orono, ME 04473
Phone 207 866-3344 x115
Cell Phone: 207 944-5709
mark_mccollough@fws.gov

--
Jim Zelenak, Biologist
U.S. Fish and Wildlife Service
Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, MT 59601
(406) 449-5225 ext. 220
jim_zelenak@fws.gov

From: McCollough, Mark
To: Jim Zelenak
Subject: Fwd: CPW Lynx Monitoring
Date: Tuesday, August 25, 2015 6:49:40 AM

Hi Jim:

Laury and I reviewed the Maine Inland Fisheries and Wildlife lynx snow tracking survey plan yesterday and have many questions. We understand how snow track surveys can provide distribution information and help to inform an occupancy model to predict lynx distribution over larger areas. However, we still do not understand how these data can be used to estimate populations of lynx.

Last January, you sent the email below about the Colorado lynx snow track survey, that does have an objective to estimate populations. The link contained in the email no longer seems to work. I seem to remember seeing a "methods" paper from the biologist in Colorado explaining the survey design and how data will be used to estimate the Colorado population.

Do you have any info on the Colorado lynx survey that you could share.

Thanks, Mark
---------- Forwarded message ----------
From: **Zelenak, Jim** <jim_zelenak@fws.gov>
Date: Wed, Jan 21, 2015 at 2:57 PM
Subject: CPW Lynx Monitoring
To: Mark McCollough <mark_mccollough@fws.gov>

Hi Mark,

Thought this might be useful for you in your discussions with the State regarding their plans for lynx surveys in Maine. Please share with others there and in R5 as you see fit.

http://dnr.state.co.us/newsapp/press.asp?PressId=9331

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Jim Zelenak, Biologist
U.S. Fish and Wildlife Service
Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, MT 59601
(406) 449-5225 ext. 220
jim_zelenak@fws.gov

--
Mark McCollough, Ph.D.
Endangered Species Specialist
Maine Field Office
U. S. Fish and Wildlife Service

17 Godfrey Drive, Suite 2
Orono, ME 04473
Phone 207 866-3344 x115
Cell Phone: 207 944-5709
mark_mccollough@fws.gov

From: Holt, Bryon
To: Jim Zelenak
Subject: Fwd: Lynx Species Status Assessment
Date: Tuesday, August 25, 2015 7:26:25 AM
Attachments: image001.png

Jim,

Blurb for Keith Aubry.

Bryon

---------- Forwarded message ----------
From: **Holt, Bryon** <bryon_holt@fws.gov>
Date: Mon, Aug 24, 2015 at 2:29 PM
Subject: Re: Lynx Species Status Assessment
To: "Aubry, Keith - FS, Olympia, WA" <kaubry@fs.fed.us>

Thanks Keith. Exactly what the doctor ordered!

Bryon

On Mon, Aug 24, 2015 at 1:57 PM, Aubry, Keith - FS, Olympia, WA <kaubry@fs.fed.us> wrote:

> Hi Bryon,
>
> Will this do??
>
> Dr. Keith B. Aubry is an Emeritus Scientist (formerly Research Wildlife Biologist) with the U.S. Forest Service's Pacific Northwest Research Station in Olympia, WA. He has been conducting research on terrestrial wildlife in the Pacific Northwest for almost 40 years. Recently, his research has focused on generating new information that will enable conservation biologists and resource managers to make more-informed decisions about the conservation status of rare and elusive forest carnivores, including the fisher, Canada lynx, Cascade and Sierra Nevada red foxes, coastal marten, and wolverine. A lack of reliable information on their evolutionary history, current and historical distributions, and ecological relations is often a significant impediment to the conservation of their populations. Dr. Aubry was a member of several national scientific teams, including the Forest Carnivore Conservation Assessment Team, the Lynx Science Team, and the Wolverine Science Team, and was the leader of the Fisher Science Team. He has directed several multi-year field studies of the Canada lynx in the North Cascades of Washington, and has authored or co-authored a number of peer-

reviewed publications on lynx conservation, their distribution in the contiguous U.S., their ecology and population dynamics, and the risk of relying on anecdotal occurrence data for conserving rare or elusive species.

Keith B. Aubry, Ph.D.
Emeritus Scientist
Forest Service

Pacific Northwest Research Station

p: 360-753-7685
c: 360-951-7689
f: 360-753-7737
kaubry@fs.fed.us

3625 93rd Ave. SW
Olympia, WA 98512

Caring for the land and serving people

From: Holt, Bryon [mailto:bryon_holt@fws.gov]
Sent: Wednesday, August 19, 2015 1:47 PM
To: Aubry, Keith - FS, Olympia, WA
Subject: Lynx Species Status Assessment

Hi Keith,

I realize that you have declined to participate on the upcoming lynx expert elicitation meeting/panel, but, we are putting together a document that we will send out to identify who the lynx experts are that will potentially be invited to participate on the lynx expert elicitation meeting/panel. I think people would ask if they did not see your name as one of the experts that we considered. This document will provide a brief summary of the individual's expertise/experience. I've provided an example for Dr. McKelvey below for you. Would you be able to provide a brief blurb? Also, what would you prefer your current professional affiliation to be identified as?

Example expertise paragraph: A Research Ecologist, Dr. McKelvey works to develop methods to evaluate status and trends of organisms across broad spatial and temporal scales, including genetic monitoring techniques to measure population connectivity across complex landscapes. He was a member of the Lynx Science Team and was the Science lead for the National Lynx Survey, which provided reliable presence/absence data for lynx on over 50 national forests, 5 national parks, and numerous other areas managed by the BLM and several Tribal Nations. He has authored and co-authored many peer-reviewed articles on lynx conservation, history and distribution in the Lower 48, and population ecology/dynamics, and on the dangers of relying on anecdotal occurrence data for rare or elusive species.

Thanks,

Bryon

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Bryon Holt

U.S. Fish and Wildlife Service

Northern Idaho Field Office, Spokane, WA

Telephone: (509) 893-8014

Fax: (509) 891-6748

email: bryon_holt@fws.gov

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Bryon Holt
U.S. Fish and Wildlife Service
Northern Idaho Field Office, Spokane, WA
Telephone: (509) 893-8014
Fax: (509) 891-6748
email: bryon_holt@fws.gov

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Bryon Holt
U.S. Fish and Wildlife Service
Northern Idaho Field Office, Spokane, WA
Telephone: (509) 893-8014

Fax: (509) 891-6748
email: bryon_holt@fws.gov

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From:	Zelenak, Jim
To:	Mark McCollough
Subject:	Fwd: Results of winter snow tracking
Date:	Tuesday, August 25, 2015 7:40:30 AM

Here you go Mark. I'll let you know what we hear next, or we can both hopefully pick Jake's brain in Minneapolis in Oct.

Jim

---------- Forwarded message ----------
From: **Ivan - DNR, Jake** <jake.ivan@state.co.us>
Date: Fri, Jul 24, 2015 at 5:36 PM
Subject: Re: Results of winter snow tracking
To: "Broderdorp, Kurt" <kurt_broderdorp@fws.gov>
Cc: Eric Odell <Eric.Odell@state.co.us>, Jim Zelenak <jim_zelenak@fws.gov>

Hi Kurt,

Sorry for the delay - between field work, meetings, vacaction, and now my Dad having an accident (may be flying home soon), this has been a crazy month. I can tell you the following right now off the top of my head. I can also get you more specifics on all of this as soon as I get a second to catch up. What is your deadline for this information?

We initiated the first part of our lynx monitoring project this past fall/winter. This initial effort consisted of estimating lynx occupancy in the San Juans across a sample of 50 75-km2 cells. The project was designed following the Ellis et al. 2013 Conservation Biology paper on wolverines (we re-programmed for lynx in CO) and should give us enough power to detect meaningful changes in occupancy and even abundance in that region. We used snow-tracking surveys everywhere we could (probability of detection is highest with this method) and deployed remote cameras in places we couldn't access via snow machine. We should have initial estimates of occupancy and distribution by the first of September.

In addition to this official monitoring effort, we also had a small crew available to conduct extra surveys in cells that were sampled during our pilot monitoring work in 2010-2011 (but were not selected for the official monitoring program) as well as those where we knew lynx to be present throughout the course of the reintroduction research (and that weren't selected to be a part of the official monitoring program). Between these efforts (speaking strictly anecdotally at the moment), we found lynx tracks in nearly all of the places where they were present in 2010-2011 and/or during the reintroduction research. The places we did not detect them this winter are places that seemed marginal in the past (e.g., we had an individual or 2 there for some years, not others). Also, due to snow conditions this past winter, we weren't able to survey as completely as we would have liked. Furthermore, we've gotten photos of lynx where we didn't get them during the pilot work. So, my initial impression is that the current distribution of lynx is similar to what is always was despite much of overstory in the San Juans being subject to the spruce beetle epidemic.

CPW has collaborated with John Squires on the Lynx-Winter Recreation Study for

the past few years, and fieldwork on that study is now complete. Approximately half of the 13 cats in that sample were Colorado-born cats (most of those had no PIT, collar, or any other CPW marking when they were captured, so they were completely new since we stopped reintroduction research work in 2010). Additionally, we have initiated a new project with him looking at the impacts of spruce beetles on lynx habitat use on the Rio Grande National Forest. At least 2 of those 4 cats were also young cats, completely unmarked, and thus represent recent reproduction. One of these was a young (estimated 2 years old) female who we documented had a litter of 2 kittens right in the middle of some of the worst beetle killed forest in the area. The other female we captured on that project this winter was an original reintroduction cat (14+ years old). She also had 2 kittens this past summer, right in the middle of some heavily impacted beetle kill. Coincidentally, her den this summer was about 500m from the last den we documented from her in 2009.

So, all in all, I would say initial evidence we have from these 2 ongoing projects is that lynx are continuing to do well in Colorado, at least in terms of distribution compared to where they were when we last kept close tabs on them. Also, we have recent evidence of ongoing reproduction. When the monitoring program is fully up and running, we will be gathering more information from mountain ranges across the state, in addition to the San Juans. That's a few years away though, assuming there is continued buy-in to keep up the effort.

Jake

Jake Ivan
Wildlife Researcher
Mammals Research Section
P 970.472.4310 | F 970.472.4457 | C 970.556.8048
317 W. Prospect Rd., Fort Collins, CO 80526
jake.ivan@state.co.us | cpw.state.co.us

On Thu, Jul 9, 2015 at 2:57 PM, Broderdorp, Kurt <kurt_broderdorp@fws.gov> wrote:

> Hey guys, I hope all is well. As you might be aware, the USFWS is working on a species status assessment for Canada lynx. Jim Zelenak asked me about any results from snow tracking last winter, any lynx tracks found, locations, evidence of family groups, etc. Any information you can provide may help us with our task. Thanks.
>
> --
> Kurt Broderdorp
> 445 West Gunnison Avenue
> Suite 240
> Grand Junction, CO 81501-5720
> (970) 628-7186

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Jim Zelenak, Biologist
U.S. Fish and Wildlife Service
Montana Ecological Services Office

585 Shepard Way, Suite 1
Helena, MT 59601
(406) 449-5225 ext. 220
jim_zelenak@fws.gov

From: Zelenak, Jim
To: Holt, Bryon
Subject: Re: Lynx Species Status Assessment
Date: Tuesday, August 25, 2015 8:44:45 AM

No attachment. Please re-send.

Thanks Bryon.

On Tue, Aug 25, 2015 at 8:31 AM, Holt, Bryon <bryon_holt@fws.gov> wrote:

> Jim,
>
> Blurb for Clayton.
>
> Bryon
>
> ---------- Forwarded message ----------
> From: **Holt, Bryon** <bryon_holt@fws.gov>
> Date: Tue, Aug 25, 2015 at 7:31 AM
> Subject: Re: Lynx Species Status Assessment
> To: Clayton Apps <clayapps@telus.net>
>
> Hi Clayton,
>
> Fits the bill perfectly. Thanks for providing your information.
>
> Bryon
>
> On Thu, Aug 20, 2015 at 11:59 PM, Clayton Apps <clayapps@telus.net> wrote:
>
> > Hi Bryon,
> >
> > Much of my work is for or in close association with the BC provincial and the Canadian federal government. However, I work under contract and my direct affiliation is with my own firm Aspen Wildlife Research.
> >
> > Attached is the brief bio which I tailored to focus a bit on my lynx work. I hope that is about the kind of thing you were looking for.
> >
> > Clayton
> >
> > **From:** Holt, Bryon
> > **Sent:** Wednesday, August 19, 2015 2:36 PM
> > **To:** Clayton Apps
> > **Subject:** Lynx Species Status Assessment
> >
> > Hi Clayton,

We are putting together a document that we will send out to identify who the lynx experts are that will potentially be invited to participate on the lynx expert elicitation meeting/panel. This document will provide a brief summary of the individual's expertise/experience. I've provided an example for Dr. McKelvey below for you. Would you be able to provide a brief blurb? Also, what would you prefer your affiliation to be identified as? Right now I have you as "Independent Researcher".

Example expertise paragraph: A Research Ecologist, Dr. McKelvey works to develop methods to evaluate status and trends of organisms across broad spatial and temporal scales, including genetic monitoring techniques to measure population connectivity across complex landscapes. He was a member of the Lynx Science Team and was the Science lead for the National Lynx Survey, which provided reliable presence/absence data for lynx on over 50 national forests, 5 national parks, and numerous other areas managed by the BLM and several Tribal Nations. He has authored and co-authored many peer-reviewed articles on lynx conservation, history and distribution in the Lower 48, and population ecology/dynamics, and on the dangers of relying on anecdotal occurrence data for rare or elusive species.

Thanks,

Bryon

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Bryon Holt
U.S. Fish and Wildlife Service
Northern Idaho Field Office, Spokane, WA
Telephone: (509) 893-8014
Fax: (509) 891-6748
email: bryon_holt@fws.gov

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****
Bryon Holt
U.S. Fish and Wildlife Service
Northern Idaho Field Office, Spokane, WA
Telephone: (509) 893-8014
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email: bryon_holt@fws.gov

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--
****
Bryon Holt
U.S. Fish and Wildlife Service
Northern Idaho Field Office, Spokane, WA

> Telephone: (509) 893-8014
> Fax: (509) 891-6748
> email: bryon_holt@fws.gov
>
> **********

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Jim Zelenak, Biologist
U.S. Fish and Wildlife Service
Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, MT 59601
(406) 449-5225 ext. 220
jim_zelenak@fws.gov

From: McCollough, Mark
To: Jim Zelenak
Subject: Fwd: CPW Lynx Monitoring
Date: Tuesday, August 25, 2015 8:49:37 AM

Hi Jim:

Laury and I reviewed the Maine Inland Fisheries and Wildlife lynx snow tracking survey plan yesterday and have many questions. We understand how snow track surveys can provide distribution information and help to inform an occupancy model to predict lynx distribution over larger areas. However, we still do not understand how these data can be used to estimate populations of lynx.

Last January, you sent the email below about the Colorado lynx snow track survey, that does have an objective to estimate populations. The link contained in the email no longer seems to work. I seem to remember seeing a "methods" paper from the biologist in Colorado explaining the survey design and how data will be used to estimate the Colorado population.

Do you have any info on the Colorado lynx survey that you could share.

Thanks, Mark
---------- Forwarded message ----------
From: **Zelenak, Jim** <jim_zelenak@fws.gov>
Date: Wed, Jan 21, 2015 at 2:57 PM
Subject: CPW Lynx Monitoring
To: Mark McCollough <mark_mccollough@fws.gov>

Hi Mark,

Thought this might be useful for you in your discussions with the State regarding their plans for lynx surveys in Maine. Please share with others there and in R5 as you see fit.

http://dnr.state.co.us/newsapp/press.asp?PressId=9331

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U.S. Fish and Wildlife Service
Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, MT 59601
(406) 449-5225 ext. 220
jim_zelenak@fws.gov

--
Mark McCollough, Ph.D.
Endangered Species Specialist
Maine Field Office
U. S. Fish and Wildlife Service

17 Godfrey Drive, Suite 2
Orono, ME 04473
Phone 207 866-3344 x115
Cell Phone: 207 944-5709
mark_mccollough@fws.gov

From: Holt, Bryon
To: Sue Livingston
Subject: Re: Lynx SSA
Date: Tuesday, August 25, 2015 9:33:04 AM

Hi Sue,

Any word on contacts for Oregon?

Bryon

On Thu, Aug 20, 2015 at 9:46 AM, Sue Livingston <sue_livingston@fws.gov> wrote:

> Hi Bryon,
>
> I'll check in with ODFW to see who else they would like to have as a contact.
>
> Sue
>
> **From:** Holt, Bryon [mailto:bryon_holt@fws.gov]
> **Sent:** Wednesday, August 19, 2015 7:44 AM
> **To:** Sue Livingston
> **Subject:** Lynx SSA
>
> Hi Sue,
>
> We are putting together a table of State/Agency leads/reps for each state that we will notify and that may be interested in participating in our monthly coordination calls. For Oregon we currently have Curt Melcher, Director, ODFW. Should we be contacting any other directors for other agencies, other state agency reps (e.g., Program Chiefs, Program Managers, etc.), someone at the state level, and are there any biologists at the state agency(s) that we should be contacting?
>
> Thanks,
>
> Bryon
>
> --
>
> **********
>
> Bryon Holt

U.S. Fish and Wildlife Service

Northern Idaho Field Office, Spokane, WA

Telephone: (509) 893-8014

Fax: (509) 891-6748

email: bryon_holt@fws.gov

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Bryon Holt
U.S. Fish and Wildlife Service
Northern Idaho Field Office, Spokane, WA
Telephone: (509) 893-8014
Fax: (509) 891-6748
email: bryon_holt@fws.gov

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From: McCollough, Mark
To: Zelenak, Jim
Subject: Re: Colorado lynx survey
Date: Tuesday, August 25, 2015 9:56:42 AM

Thanks Jim.

I am reading Whittington et al. 2014 this morning (Estimating occupancy using spatially and temporally replicated snow surveys for lynx and wolverine in Banff, BC). They used linear snow track (ski) surveys to document the number of 100 km2 cells and 1 km segments having lynx (or wolverine) tracks in occupancy models to estimate proportion of the landscape that is occupied by each species. The models mathematically address serial correlation, i.e. if you detect a lynx track in a 1 km segment, you have have a higher likelihood of detecting a lynx track in the next two to four 1 km segments as you theoretically survey through a lynx home range. Similarly adjacent 100 km2 cells are serially correlated if a lynx home range spans two or more adjacent cells.

They use occupancy models to estimate populations by making assumptions about average lynx and wolverine home ranges, overlap of home ranges, and other assumptions. For example if lynx occupancy models estimated 40% (4,000 km2) of a 10,000 km2 study area was occupied and lynx home ranges ranged from 100 km2 to 400 km2 (from telemetry studies), and lynx home ranges do not overlap (not biologically realistic for lynx, but just for illustrative purposes). In this example, one would estimate 10 to 40 lynx occupied the study area.

Whittington et al.caution against estimating populations using occupancy data because "they are approximate and have inherent limitations." For example, if lynx home ranges straddle multiple, adjacent sample cells, occupancy data would overestimate the area occupied and the minimum number of animals. One would underestimate the minimum number of animals for species whose home range overlaps.

We just reviewed Maine Inland Fisheries and Wildlife's white paper on lynx surveys. They discussed using the snowmobile snow track surveys in an occupancy mode lwith Dr. Eric Blomberg, a new wildlife faculty at UMaine . (Actually Eric sent me the Whittington et al. publication to demonstrate how this could be done.) MDIFW's methods paper indicate they are using the UMaine lynx habitat models and their own staff observation of lynx to identify townships where there is a high probability of lynx for survey "to make the surveys more efficient." This would seem to bias the sampling design that would potentially lead to an overestimate of the population. That is, if MDIFW only estimates occupancy in areas of high habitat quality or where we know we have lynx vs. random sampling townships and avoiding serial correlation by not having two adjacent survey units.

I have more to learn about occupancy modeling, but am concerned that MDIFW's approach may lead to an over-estimation of the population. Perhaps Dr. Blomberg will advise them in an appropriate study design.

The Whittington et al article said that power to detect small changes in occupancy was restricted by the number of 100 km2 cells surveyed. They estimated 100, 100 km2 sample units were required to achieve 80% power to detect a 0.2 decrease in occupancy over a single time period. Colorado seems to be monitoring only "use" and not occupancy (and certainly

not population) because several occupancy model assumptions are violated. Nevertheless, they believe monitoring "use" is a way to indirectly monitor trends in the population, i.e. if the "use" metric declines, they infer population has declined. Based on their previous data determined a sample of 50 units would be needed to survey to be able to detect meaningful trends in lynx use in the San Juan Mountain region. In their 2010-2011 report, Jake indicates "abundance estimation is not feasible logistically and present statistical difficulties even when field logistics can be managed."

Hope this helps both of us better understand...

Mark

On Tue, Aug 25, 2015 at 9:37 AM, Zelenak, Jim <jim_zelenak@fws.gov> wrote:

> Right. Was just about to forward a link there to the 2010-2011 paper by Ivan describing their modeling efforts for the noninvasive monitoring protocol. Definitely looking at occupancy and hoping for enough data to establish/estimate population trend, but no thoughts that they will get meaningful pop. size estimates.
>
> Eric Odell told me they don't know how many lynx they have now and will likely never have an accurate estimate. So they tell the public and new outlets that there are probably 200-300 lynx in the state. I have no idea how they arrived at that number, given that as of 2010, 122 of 218 (56%) released adults were known dead and, as near as I can tell from the annual reports, they had 132 kittens born, with relatively low survival over the first year or two for most cohorts except those born in 2004. E. g., 16 kittens documented in 2003, 10 dead by April 2004; 39 kittens in 2004, 6 of 7 radioed were still alive as of June 2006; 46 kittens in 2005, only 1 of 7 radioed was still alive by June 2007; 11 kittens in 2006, at least 2 alive by spring of 2007; no kittens in 2007 or 2008; then 10 kittens in 2009 and again 2010, but no survival info onthem that I can tell from the reports.
>
> Anyway, I've attached a January 2015 newspaper piece describing the monitoring program, and I will forward some preliminary results/discussion that Jake Ivan was kind enough to share.
>
> Hope one or both may be of some help.
>
> On Tue, Aug 25, 2015 at 7:20 AM, McCollough, Mark <mark_mccollough@fws.gov> wrote:
>
> > Jim: Since sending you an email this morning I was able to find some of Jake Ivan's reports on the CPW website describing the approach they are using to assess lynx occupancy.
> >
> > Do you have any results from Jake from last winter? It would be interesting to see how they are describing results. It seems that they are monitoring percent of the habitat that is occupied, and not estimating populations?
> >
> > thanks, Mark
> >
> > --
> > Mark McCollough, Ph.D.
> > Endangered Species Specialist
> > Maine Field Office
> > U. S. Fish and Wildlife Service
> > 17 Godfrey Drive, Suite 2
> > Orono, ME 04473

> Phone 207 866-3344 x115
> Cell Phone: 207 944-5709
> mark_mccollough@fws.gov
>
> --
> Jim Zelenak, Biologist
> U.S. Fish and Wildlife Service
> Montana Ecological Services Office
> 585 Shepard Way, Suite 1
> Helena, MT 59601
> (406) 449-5225 ext. 220
> jim_zelenak@fws.gov

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U. S. Fish and Wildlife Service
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Date: Tuesday, August 25, 2015 11:56:40 AM

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I am reading Whittington et al. 2014 this morning (Estimating occupancy using spatially and temporally replicated snow surveys for lynx and wolverine in Banff, BC). They used linear snow track (ski) surveys to document the number of 100 km2 cells and 1 km segments having lynx (or wolverine) tracks in occupancy models to estimate proportion of the landscape that is occupied by each species. The models mathematically address serial correlation, i.e. if you detect a lynx track in a 1 km segment, you have have a higher likelihood of detecting a lynx track in the next two to four 1 km segments as you theoretically survey through a lynx home range. Similarly adjacent 100 km2 cells are serially correlated if a lynx home range spans two or more adjacent cells.

They use occupancy models to estimate populations by making assumptions about average lynx and wolverine home ranges, overlap of home ranges, and other assumptions. For example if lynx occupancy models estimated 40% (4,000 km2) of a 10,000 km2 study area was occupied and lynx home ranges ranged from 100 km2 to 400 km2 (from telemetry studies), and lynx home ranges do not overlap (not biologically realistic for lynx, but just for illustrative purposes). In this example, one would estimate 10 to 40 lynx occupied the study area.

Whittington et al.caution against estimating populations using occupancy data because "they are approximate and have inherent limitations." For example, if lynx home ranges straddle multiple, adjacent sample cells, occupancy data would overestimate the area occupied and the minimum number of animals. One would underestimate the minimum number of animals for species whose home range overlaps.

We just reviewed Maine Inland Fisheries and Wildlife's white paper on lynx surveys. They discussed using the snowmobile snow track surveys in an occupancy mode lwith Dr. Eric Blomberg, a new wildlife faculty at UMaine . (Actually Eric sent me the Whittington et al. publication to demonstrate how this could be done.) MDIFW's methods paper indicate they are using the UMaine lynx habitat models and their own staff observation of lynx to identify townships where there is a high probability of lynx for survey "to make the surveys more efficient." This would seem to bias the sampling design that would potentially lead to an overestimate of the population. That is, if MDIFW only estimates occupancy in areas of high habitat quality or where we know we have lynx vs. random sampling townships and avoiding serial correlation by not having two adjacent survey units.

I have more to learn about occupancy modeling, but am concerned that MDIFW's approach may lead to an over-estimation of the population. Perhaps Dr. Blomberg will advise them in an appropriate study design.

The Whittington et al article said that power to detect small changes in occupancy was restricted by the number of 100 km2 cells surveyed. They estimated 100, 100 km2 sample units were required to achieve 80% power to detect a 0.2 decrease in occupancy over a single time period. Colorado seems to be monitoring only "use" and not occupancy (and certainly

not population) because several occupancy model assumptions are violated. Nevertheless, they believe monitoring "use" is a way to indirectly monitor trends in the population, i.e. if the "use" metric declines, they infer population has declined. Based on their previous data determined a sample of 50 units would be needed to survey to be able to detect meaningful trends in lynx use in the San Juan Mountain region. In their 2010-2011 report, Jake indicates "abundance estimation is not feasible logistically and present statistical difficulties even when field logistics can be managed."

Hope this helps both of us better understand...

Mark

On Tue, Aug 25, 2015 at 9:37 AM, Zelenak, Jim <jim_zelenak@fws.gov> wrote:

> Right. Was just about to forward a link there to the 2010-2011 paper by Ivan describing their modeling efforts for the noninvasive monitoring protocol. Definitely looking at occupancy and hoping for enough data to establish/estimate population trend, but no thoughts that they will get meaningful pop. size estimates.
>
> Eric Odell told me they don't know how many lynx they have now and will likely never have an accurate estimate. So they tell the public and new outlets that there are probably 200-300 lynx in the state. I have no idea how they arrived at that number, given that as of 2010, 122 of 218 (56%) released adults were known dead and, as near as I can tell from the annual reports, they had 132 kittens born, with relatively low survival over the first year or two for most cohorts except those born in 2004. E. g., 16 kittens documented in 2003, 10 dead by April 2004; 39 kittens in 2004, 6 of 7 radioed were still alive as of June 2006; 46 kittens in 2005, only 1 of 7 radioed was still alive by June 2007; 11 kittens in 2006, at least 2 alive by spring of 2007; no kittens in 2007 or 2008; then 10 kittens in 2009 and again 2010, but no survival info onthem that I can tell from the reports.
>
> Anyway, I've attached a January 2015 newspaper piece describing the monitoring program, and I will forward some preliminary results/discussion that Jake Ivan was kind enough to share.
>
> Hope one or both may be of some help.
>
> On Tue, Aug 25, 2015 at 7:20 AM, McCollough, Mark <mark_mccollough@fws.gov> wrote:
>
> > Jim: Since sending you an email this morning I was able to find some of Jake Ivan's reports on the CPW website describing the approach they are using to assess lynx occupancy.
> >
> > Do you have any results from Jake from last winter? It would be interesting to see how they are describing results. It seems that they are monitoring percent of the habitat that is occupied, and not estimating populations?
> >
> > thanks, Mark
> >
> > --
> > Mark McCollough, Ph.D.
> > Endangered Species Specialist
> > Maine Field Office
> > U. S. Fish and Wildlife Service
> > 17 Godfrey Drive, Suite 2
> > Orono, ME 04473

> Phone 207 866-3344 x115
> Cell Phone: 207 944-5709
> mark_mccollough@fws.gov
>
> --
> Jim Zelenak, Biologist
> U.S. Fish and Wildlife Service
> Montana Ecological Services Office
> 585 Shepard Way, Suite 1
> Helena, MT 59601
> (406) 449-5225 ext. 220
> jim_zelenak@fws.gov

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Mark McCollough, Ph.D.
Endangered Species Specialist
Maine Field Office
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17 Godfrey Drive, Suite 2
Orono, ME 04473
Phone 207 866-3344 x115
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From: Zelenak, Jim
To: Holt, Bryon
Subject: Re: Lynx SSA
Date: Tuesday, August 25, 2015 12:05:46 PM

Thanks Bryon.

On Tue, Aug 25, 2015 at 12:01 PM, Holt, Bryon <bryon_holt@fws.gov> wrote:

> Jim,
>
> See message from Sue - no word on contacts for Oregon yet.
>
> Bryon
>
> ---------- Forwarded message ----------
> From: **Sue Livingston** <sue_livingston@fws.gov>
> Date: Tue, Aug 25, 2015 at 10:14 AM
> Subject: RE: Lynx SSA
> To: Bryon Holt <bryon_holt@fws.gov>
>
> I sent them an email and have not heard back yet. Will let you know as soon as I do. They are pretty understaffed and I'm guessing lynx is not high on their radar.
>
> **From:** Holt, Bryon [mailto:bryon_holt@fws.gov]
> **Sent:** Tuesday, August 25, 2015 9:33 AM
> **To:** Sue Livingston
> **Subject:** Re: Lynx SSA
>
> Hi Sue,
>
> Any word on contacts for Oregon?
>
> Bryon
>
> On Thu, Aug 20, 2015 at 9:46 AM, Sue Livingston <sue_livingston@fws.gov> wrote:
>
> Hi Bryon,

I'll check in with ODFW to see who else they would like to have as a contact.

Sue

From: Holt, Bryon [mailto:bryon_holt@fws.gov]
Sent: Wednesday, August 19, 2015 7:44 AM
To: Sue Livingston
Subject: Lynx SSA

Hi Sue,

We are putting together a table of State/Agency leads/reps for each state that we will notify and that may be interested in participating in our monthly coordination calls. For Oregon we currently have Curt Melcher, Director, ODFW. Should we be contacting any other directors for other agencies, other state agency reps (e.g., Program Chiefs, Program Managers, etc.), someone at the state level, and are there any biologists at the state agency(s) that we should be contacting?

Thanks,

Bryon

--

****

Bryon Holt

U.S. Fish and Wildlife Service

Northern Idaho Field Office, Spokane, WA

Telephone: (509) 893-8014

Fax: (509) 891-6748

email: bryon_holt@fws.gov

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Jim Zelenak, Biologist
U.S. Fish and Wildlife Service
Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, MT 59601
(406) 449-5225 ext. 220
jim_zelenak@fws.gov

From: Zelenak, Jim
To: Murphy, Kerry M -FS
Subject: Re: Brief bio/lynx blurb?
Date: Tuesday, August 25, 2015 1:01:42 PM

Excellent! Thanks very much Kerry.

Cheers!

Jim

On Tue, Aug 25, 2015 at 12:42 PM, Murphy, Kerry M -FS <kmmurphy02@fs.fed.us> wrote:

> Dr. Kerry Murphy is currently a Zone Wildlife Biologist on the Bridger-Teton National Forest stationed in Jackson, Wyoming. He has extensive experience monitoring, managing, and surveying Canada lynx and their habitat, and in documenting aspects of other carnivore populations. From 2000-2005, Kerry worked in Yellowstone Park cooperatively with the Rocky Mountain Research Laboratory, Missoula, to document lynx presence and distribution (1 publication), and worked with researchers to document snowshoe hare abundance, distribution, and habitat affinities (1 publication) in the Park. On the Bridger-Teton National Forest, Kerry worked to document snowshoe hare abundance and population trends in different forest types, and lynx presence and distribution. Kerry has also assisted the U.S. Fish and Wildlife Service, providing a peer-review of draft federal rules for lynx critical habitat designation.
>
> Hope this does it. Again, I am not sure about attending the expert workshop. I am guessing I will be in an acting Forest Biologist position during this time (short detail) and that they will not want to let me go to Minneapolis. But if you fall short on folks that can attend, please keep me in mind.
>
> Take care Jim.
>
> **From:** Zelenak, Jim [mailto:jim_zelenak@fws.gov]
> **Sent:** Tuesday, August 25, 2015 11:27 AM
> **To:** Murphy, Kerry M -FS
> **Subject:** Brief bio/lynx blurb?
>
> Hi Kerry,
>
> I know you expressed doubt/concern about whether you would be able to participate in a

lynx expert elicitation workshop, but I'm hoping that for purposes of our record (i.e., us demonstrating that we considered/reached out to the right people), that you might be able to provide a brief bio - affiliation and title, research/management focus, and lynx or forest carnivore background.

Here is an example for Kevin McKelvey as an example of the content we're looking for.

"A Research Ecologist, Dr. McKelvey works to develop methods to evaluate status and trends of organisms across broad spatial and temporal scales, including genetic monitoring techniques to measure population connectivity across complex landscapes. He was a member of the Lynx Science Team and was the Science lead for the National Lynx Survey, which provided reliable presence/absence data for lynx on over 50 national forests, 5 national parks, and numerous other areas managed by the BLM and several Tribal Nations. He has authored and co-authored many peer-reviewed articles on lynx conservation, history and distribution in the Lower 48, and population ecology/dynamics, and on the dangers of relying on anecdotal occurrence data for rare or elusive species."

It is looking like the lynx expert workshop will be in Minneapolis, most likely Oct. 13-16.

Call or email if you have questions.

Thanks,

Jim

--

Jim Zelenak, Biologist

U.S. Fish and Wildlife Service

Montana Ecological Services Office

585 Shepard Way, Suite 1

Helena, MT 59601

(406) 449-5225 ext. 220

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Jim Zelenak, Biologist
U.S. Fish and Wildlife Service
Montana Ecological Services Office
585 Shepard Way, Suite 1
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(406) 449-5225 ext. 220
jim_zelenak@fws.gov

From: McCollough, Mark
To: Zelenak, Jim
Subject: Re: Bob Naney to represent Washington?
Date: Tuesday, August 25, 2015 1:02:14 PM

Jim:

I don't think that Bob would meet all of our criteria, unless we considered him an author as one of two primary editors of the LCAS. He is not an academic as many of the other invitees, but wouldn't he have similar qualifications as the Catons(?) invited from Minnesota. Without Bryon there, it would seem some representation from Washington would be better than none.

Yes, your email jogged my memory about Bob's arguments (and perhaps others) about the Kettle Range and uncertainties about lynx status there.

Mark

On Tue, Aug 25, 2015 at 2:11 PM, Zelenak, Jim <jim_zelenak@fws.gov> wrote:

> I thought of Naney, and I believe I even mentioned him to Bryon as a possibility during a phone conversation. If I remember correctly, Bryon agreed that he had good knowledge but did not consider him in the same circle as Koehler, Aubry, and Apps.
>
> I will keep him in mind, and if it looks like we would otherwise have no WA/Northwest representation, consider extending him an invitation - maybe talk to Bryon again about that as a possible back-up plan.
>
> I think it was Naney, though, who pushed for designating the Kettle-Wedge as a "core area" in the recovery outline - even though it clearly did not/does not meet the criteria. Causing headaches now in the CH lawsuits ("...but, but, but it's *CORE AREA*, you said so yourself, how can it not be essential to lynx?").
>
> On Tue, Aug 25, 2015 at 10:31 AM, McCollough, Mark <mark_mccollough@fws.gov> wrote:
>
> > Jim:
> >
> > Any thoughts of extending the invitation to Bob Naney as a substitute expert for Washington? Bob was very involved with the lynx BioTeam from the start, on the small group that developed the recovery plan outline, and recently was editor/writer for the last LCAS update. He is retired now...available? Lots of fire in his area right now. I've been wondering how he is faring. Mark
> >
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mark_mccollough@fws.gov

From:	Zelenak, Jim
To:	Jensen, Paul G (DEC)
Cc:	mark_mccollough@fws.gov; Jodi Bush
Subject:	Re: Lynx Coordination Call
Date:	Tuesday, August 25, 2015 1:03:51 PM

Thanks, Paul - glad to have you on board.

We will definitely include you on the distribution list for lynx-related items/issues.

Cheers!

Jim

On Tue, Aug 25, 2015 at 12:42 PM, Jensen, Paul G (DEC) <paul.jensen@dec.ny.gov> wrote:

> Hi Mark, Jim
>
> Just a heads-up that I'll be participating on the lynx coordination call tomorrow. Please add me to your distribution list for future correspondence. Thank you.
>
> Best regards,
>
> Paul
>
> **Paul G. Jensen, Ph.D. | Senior Wildlife Biologist, Furbearer Specialist**
>
> NYS Department of Environmental Conservation | Division of Fish, Wildlife & Marine Resources
>
> 232 Golf Course Road, Warrensburg, New York 12885-0220
>
> Voice: (518) 623-1242 | Fax: (518) 623-3603 | paul.jensen@dec.ny.gov
>
> http://pgjensen.wix.com/forest-carnivore-monitoring

--
Jim Zelenak, Biologist
U.S. Fish and Wildlife Service
Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, MT 59601

(406) 449-5225 ext. 220
jim_zelenak@fws.gov

From: McCollough, Mark
To: Erin Simons-Legaard; Laury Zicari
Subject: Re: Lynx meeting in Minneapolis Oct 13 to 15, travel expenses
Date: Tuesday, August 25, 2015 2:21:13 PM

Thanks Erin. Laury and I will start looking into "invitational travel" and get back to you as we look into flights. the hotel/conference has not been confirmed yet, but will be as close to the airport as possible.

We are working on the agenda and process for the meeting. As the agenda crystallizes we will have a better idea of what information we will want you to present and/or share. As I understand the meeting thus far, we will likely start on Tuesday afternoon with presentations on the status of lynx, hares, and their habitat in each of the units. There will also likely be presentations by a climate change expert. Otherwise, the experts will be coached on what information/expertise to bring with you. I can envision sharing key power point slides, charts, graphs, etc. during the course of the meetings. More info will be forthcoming!

thanks, Mark

On Tue, Aug 25, 2015 at 3:02 PM, Erin Simons-Legaard <erin.simons@maine.edu> wrote:

> Hi Mark,
>
> Thanks for the update. I would need help with funding in order to attend the meeting.
>
> Best,
> Erin
>
> Erin Simons-Legaard
> Research Assistant Professor
> School of Forest Resources
> 5755 Nutting Hall
> University of Maine
> Orono, ME 04469-5755
> erin.simons@maine.edu
>
> On Tue, Aug 25, 2015 at 2:58 PM, McCollough, Mark <mark_mccollough@fws.gov> wrote:
>
> > Erin, Dan, and Jen:
> >
> > I wanted to let you know that we are still planning a meeting of lynx experts October 13 to 15 in the Minneapolis area. Our sessions will begin Tuesday afternoon and conclude the end of the day Thursday or possibly Friday morning. The list of expert invitees was distributed to state agencies last week and will be discussed with them on a conference call tomorrow. Formal invitations will be distributed to you all on about September 2. More information on the structure of the meetings will be forthcoming at that time.
> >
> > **If any of you are in need of funding for travel and hotel, could you please let me know within the next day or two?** We may have some year-end funds to help with

> travel, but those obligations must be made by this Friday.
>
> Thanks again for your willingness to share your knowledge. This will be a very interesting and important meeting that will provide the basis for future listing and recovery planning for the lynx. We hope that you all still plan on attending.
>
> Sincerely,
>
> Mark McCollough
>
> --
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mark_mccollough@fws.gov

From: McCollough, Mark
To: Zelenak, Jim
Subject: Re: Bob Naney to represent Washington?
Date: Tuesday, August 25, 2015 3:02:12 PM

Jim:

I don't think that Bob would meet all of our criteria, unless we considered him an author as one of two primary editors of the LCAS. He is not an academic as many of the other invitees, but wouldn't he have similar qualifications as the Catons(?) invited from Minnesota. Without Bryon there, it would seem some representation from Washington would be better than none.

Yes, your email jogged my memory about Bob's arguments (and perhaps others) about the Kettle Range and uncertainties about lynx status there.

Mark

On Tue, Aug 25, 2015 at 2:11 PM, Zelenak, Jim <jim_zelenak@fws.gov> wrote:

> I thought of Naney, and I believe I even mentioned him to Bryon as a possibility during a phone conversation. If I remember correctly, Bryon agreed that he had good knowledge but did not consider him in the same circle as Koehler, Aubry, and Apps.
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> I will keep him in mind, and if it looks like we would otherwise have no WA/Northwest representation, consider extending him an invitation - maybe talk to Bryon again about that as a possible back-up plan.
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> > Jim:
> >
> > Any thoughts of extending the invitation to Bob Naney as a substitute expert for Washington? Bob was very involved with the lynx BioTeam from the start, on the small group that developed the recovery plan outline, and recently was editor/writer for the last LCAS update. He is retired now...available? Lots of fire in his area right now. I've been wondering how he is faring. Mark
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Jim Zelenak, Biologist
U.S. Fish and Wildlife Service
Montana Ecological Services Office
585 Shepard Way, Suite 1
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mark_mccollough@fws.gov

From:	Erin Simons-Legaard
To:	McCollough, Mark
Cc:	Laury Zicari
Subject:	Re: Lynx meeting in Minneapolis Oct 13 to 15, travel expenses
Date:	Tuesday, August 25, 2015 3:03:38 PM

Hi Mark,

Thanks for the update. I would need help with funding in order to attend the meeting.

Best,
Erin

Erin Simons-Legaard
Research Assistant Professor
School of Forest Resources
5755 Nutting Hall
University of Maine
Orono, ME 04469-5755
erin.simons@maine.edu

On Tue, Aug 25, 2015 at 2:58 PM, McCollough, Mark <mark_mccollough@fws.gov> wrote:

> Erin, Dan, and Jen:
>
> I wanted to let you know that we are still planning a meeting of lynx experts October 13 to 15 in the Minneapolis area. Our sessions will begin Tuesday afternoon and conclude the end of the day Thursday or possibly Friday morning. The list of expert invitees was distributed to state agencies last week and will be discussed with them on a conference call tomorrow. Formal invitations will be distributed to you all on about September 2. More information on the structure of the meetings will be forthcoming at that time.
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> Sincerely,
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> Mark McCollough
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> --
> Mark McCollough, Ph.D.
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Orono, ME 04473
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Cell Phone: 207 944-5709
mark_mccollough@fws.gov

From:	Vashon, Jennifer
To:	McCollough, Mark; Erin Simons-Legaard; Dan Harrison
Cc:	Laury Zicari
Subject:	RE: Lynx meeting in Minneapolis Oct 13 to 15, travel expenses
Date:	Tuesday, August 25, 2015 4:40:02 PM

Yes, I plan on attending and I should not need travel assistance.

From: McCollough, Mark [mailto:mark_mccollough@fws.gov]
Sent: Tuesday, August 25, 2015 2:58 PM
To: Erin Simons-Legaard; Dan Harrison; Vashon, Jennifer
Cc: Laury Zicari
Subject: Lynx meeting in Minneapolis Oct 13 to 15, travel expenses

Erin, Dan, and Jen:

I wanted to let you know that we are still planning a meeting of lynx experts October 13 to 15 in the Minneapolis area. Our sessions will begin Tuesday afternoon and conclude the end of the day Thursday or possibly Friday morning. The list of expert invitees was distributed to state agencies last week and will be discussed with them on a conference call tomorrow. Formal invitations will be distributed to you all on about September 2. More information on the structure of the meetings will be forthcoming at that time.

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Sincerely,

Mark McCollough

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Phone 207 866-3344 x115
Cell Phone: 207 944-5709
mark_mccollough@fws.gov

From: Zelenak, Jim
To: Mark McCollough
Subject: Fwd: List for SSA update calls
Date: Wednesday, August 26, 2015 7:38:53 AM

FYI.

---------- Forwarded message ----------
From: **Zelenak, Jim** <jim_zelenak@fws.gov>
Date: Wed, Aug 26, 2015 at 7:07 AM
Subject: Re: List for SSA update calls
To: "Connolly, James" <James.Connolly@maine.gov>

Will do, Jim. I'll forward you the information for today's coordination call.

On Wed, Aug 26, 2015 at 6:05 AM, Connolly, James <James.Connolly@maine.gov> wrote:

> Jim, Can you please add me to the list for the call, I have been working with Hadley and the Maine field office on the lynx issue here in Maine and our HCP plan that lead to our ITP permit for our trapping program. Thanks Jim
>
> James M. Connolly
>
> Director, Bureau of Resource Management
>
> Maine Department of Inland Fisheries & Wildlife
>
> 284 State Street
>
> 41 State House Station
>
> Augusta ME 04333-0041
>
> (207) 287-5259
>
> (207) 287-6395 fax
>
>

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Jim Zelenak, Biologist
U.S. Fish and Wildlife Service
Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, MT 59601
(406) 449-5225 ext. 220
jim_zelenak@fws.gov

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Jim Zelenak, Biologist
U.S. Fish and Wildlife Service
Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, MT 59601
(406) 449-5225 ext. 220
jim_zelenak@fws.gov

From: McCollough, Mark
To: Jensen, Paul G (DEC); Jim Zelenak
Subject: Re: Lynx Coordination Call
Date: Wednesday, August 26, 2015 8:03:11 AM

Paul: We are trying to complete our contact list for the Northeast for the Canada lynx status assessment. Can you please provide the name and email address of your NY DEC Wildlife Division chief, or equivalent? We would very much appreciate that.

Can you respond to both Jim and I?

Thank you, Mark McCollough

On Tue, Aug 25, 2015 at 3:38 PM, Jensen, Paul G (DEC) <paul.jensen@dec.ny.gov> wrote:

> Thank you Mark and Jim. Looking forward to the call tomorrow.
>
> Paul
>
> **From:** McCollough, Mark [mailto:mark_mccollough@fws.gov]
> **Sent:** Tuesday, August 25, 2015 3:32 PM
> **To:** Jensen, Paul G (DEC)
> **Cc:** jim_zelenak@fws.gov
> **Subject:** Re: Lynx Coordination Call
>
> Paul: Thank you very much. We welcome your participation on the call tomorrow! I called NY DEC several times last week (wildlife) trying to locate the furbearer biologist, but no one could give me information. I'm glad we found the right person. Mark
>
> On Tue, Aug 25, 2015 at 2:42 PM, Jensen, Paul G (DEC) <paul.jensen@dec.ny.gov> wrote:
>
> > Hi Mark, Jim
> >
> > Just a heads-up that I'll be participating on the lynx coordination call tomorrow. Please add me to your distribution list for future correspondence. Thank you.
> >
> > Best regards,

> Paul
>
> **Paul G. Jensen, Ph.D. | Senior Wildlife Biologist, Furbearer Specialist**
>
> NYS Department of Environmental Conservation | Division of Fish, Wildlife & Marine Resources
>
> 232 Golf Course Road, Warrensburg, New York 12885-0220
>
> Voice: (518) 623-1242 | Fax: (518) 623-3603 | paul.jensen@dec.ny.gov
>
> http://pgjensen.wix.com/forest-carnivore-monitoring

--

Mark McCollough, Ph.D.

Endangered Species Specialist

Maine Field Office

U. S. Fish and Wildlife Service

17 Godfrey Drive, Suite 2

Orono, ME 04473

Phone 207 866-3344 x115

Cell Phone: 207 944-5709

mark_mccollough@fws.gov

--
Mark McCollough, Ph.D.
Endangered Species Specialist
Maine Field Office
U. S. Fish and Wildlife Service
17 Godfrey Drive, Suite 2
Orono, ME 04473
Phone 207 866-3344 x115
Cell Phone: 207 944-5709

mark_mccollough@fws.gov

From: Jensen, Paul G (DEC)
To: McCollough, Mark; Jim Zelenak
Cc: Swift, Bryan (DEC); Schiavone, Michael V (DEC)
Subject: RE: Lynx Coordination Call
Date: Wednesday, August 26, 2015 8:24:47 AM

Hi Mark,

Currently, our Bureau Chief position is vacant (Gordon Batcheller recently retired) but that should be filled in the near future. In the meantime, you can list Bryan Swift (Game Management Section Head) and Mike Schiavone (Small Game Mammal Unit Leader) as contacts, which I've copied here.

I'll also make myself a note to contact you and JIm as soon as our new Bureau Chief has been named.

Best,

Paul

From: McCollough, Mark [mailto:mark_mccollough@fws.gov]
Sent: Wednesday, August 26, 2015 8:03 AM
To: Jensen, Paul G (DEC); Jim Zelenak
Subject: Re: Lynx Coordination Call

Paul: We are trying to complete our contact list for the Northeast for the Canada lynx status assessment. Can you please provide the name and email address of your NY DEC Wildlife Division chief, or equivalent? We would very much appreciate that.

Can you respond to both Jim and I?

Thank you, Mark McCollough

On Tue, Aug 25, 2015 at 3:38 PM, Jensen, Paul G (DEC) <paul.jensen@dec.ny.gov> wrote:

> Thank you Mark and Jim. Looking forward to the call tomorrow.
>
> Paul
>
> **From:** McCollough, Mark [mailto:mark_mccollough@fws.gov]
> **Sent:** Tuesday, August 25, 2015 3:32 PM
> **To:** Jensen, Paul G (DEC)
> **Cc:** jim_zelenak@fws.gov
> **Subject:** Re: Lynx Coordination Call
>
> Paul: Thank you very much. We welcome your participation on the call tomorrow! I called NY DEC several times last week (wildlife) trying to locate the furbearer biologist,

but no one could give me information. I'm glad we found the right person. Mark

On Tue, Aug 25, 2015 at 2:42 PM, Jensen, Paul G (DEC) <paul.jensen@dec.ny.gov> wrote:

> Hi Mark, Jim
>
> Just a heads-up that I'll be participating on the lynx coordination call tomorrow. Please add me to your distribution list for future correspondence. Thank you.
>
> Best regards,
>
> Paul
>
> **Paul G. Jensen, Ph.D. | Senior Wildlife Biologist, Furbearer Specialist**
> NYS Department of Environmental Conservation | Division of Fish, Wildlife & Marine Resources
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> Voice: (518) 623-1242 | Fax: (518) 623-3603 | paul.jensen@dec.ny.gov
> http://pgjensen.wix.com/forest-carnivore-monitoring

--
Mark McCollough, Ph.D.
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Maine Field Office
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Orono, ME 04473
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17 Godfrey Drive, Suite 2
Orono, ME 04473
Phone 207 866-3344 x115
Cell Phone: 207 944-5709
mark_mccollough@fws.gov

From: Bush, Jodi
To: Zelenak, Jim
Cc: McCollough, Mark; Laury Zicari; Sharon Hooley; Kaimy Marks
Subject: Re: Funding for lynx expert meeting
Date: Wednesday, August 26, 2015 9:02:39 AM

Nope. This would be helpful. Thank you! JB

Jodi L. Bush
Field Supervisor
Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, MT 59601
(406) 449-5225, ext.205

On Wed, Aug 26, 2015 at 8:35 AM, Zelenak, Jim <jim_zelenak@fws.gov> wrote:

> Thanks Mark and Laury.
>
> I've copied Jodi and our Administrative Experts here. I'm guessing any help will be welcomed, but will let Sharon or Kaimy reply if they foresee any issues/difficulties with the Maine Field Office paying travel and lodging costs for non-USFWS Maine participants in the Lynx SSA Expert Elicitation Workshop in Minneapolis in mid-Oct.
>
> On Tue, Aug 25, 2015 at 1:07 PM, McCollough, Mark <mark_mccollough@fws.gov> wrote:
>
> > Jim: I just talked to Laury about our call today and sent an email to our three potential invitees from Maine. We have some end-of-year funds that we would like to use. I reminded the Maine invitees that we are still planning the Oct 13-15 meeting and that if they need help with funding to let our field office know by Friday. Laury supports obligating funds for airfare and hotel for the three from Maine (perhaps they could cover their per diem?), if needed.
> >
> > Is this OK with you folks???
> >
> > Mark
> >
> > --
> > Mark McCollough, Ph.D.
> > Endangered Species Specialist
> > Maine Field Office
> > U. S. Fish and Wildlife Service
> > 17 Godfrey Drive, Suite 2
> > Orono, ME 04473
> > Phone 207 866-3344 x115
> > Cell Phone: 207 944-5709
> > mark_mccollough@fws.gov
>
> --

Jim Zelenak, Biologist
U.S. Fish and Wildlife Service
Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, MT 59601
(406) 449-5225 ext. 220
jim_zelenak@fws.gov

From: Zelenak, Jim
To: Mark McCollough
Subject: Fwd: List for SSA update calls
Date: Wednesday, August 26, 2015 9:38:55 AM

FYI.

---------- Forwarded message ----------
From: **Zelenak, Jim** <jim_zelenak@fws.gov>
Date: Wed, Aug 26, 2015 at 7:07 AM
Subject: Re: List for SSA update calls
To: "Connolly, James" <James.Connolly@maine.gov>

Will do, Jim. I'll forward you the information for today's coordination call.

On Wed, Aug 26, 2015 at 6:05 AM, Connolly, James <James.Connolly@maine.gov> wrote:

> Jim, Can you please add me to the list for the call, I have been working with Hadley and the Maine field office on the lynx issue here in Maine and our HCP plan that lead to our ITP permit for our trapping program. Thanks Jim
>
> James M. Connolly
>
> Director, Bureau of Resource Management
>
> Maine Department of Inland Fisheries & Wildlife
>
> 284 State Street
>
> 41 State House Station
>
> Augusta ME 04333-0041
>
> (207) 287-5259
>
> (207) 287-6395 fax
>
>

--
Jim Zelenak, Biologist
U.S. Fish and Wildlife Service
Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, MT 59601
(406) 449-5225 ext. 220
jim_zelenak@fws.gov

--
Jim Zelenak, Biologist
U.S. Fish and Wildlife Service
Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, MT 59601
(406) 449-5225 ext. 220
jim_zelenak@fws.gov

From: Smith, Tamara
To: Zelenak, Jim
Subject: Re: State Contacts
Date: Wednesday, August 26, 2015 10:08:09 AM

Hi Jim - For Michigan, please add ---- Adam Bump, Furbearer Specialist -bumpa@michigan.gov , 517-284-6157 and Dan Kennedy, TE coordinator for MI DNR , kennedyd@michigan.gov, 517-284-6194

On Tue, Aug 25, 2015 at 3:23 PM, Zelenak, Jim <jim_zelenak@fws.gov> wrote:

> Attached is latest with your recent additions.
>
> Still missing Column 2 (Wildlife Chiefs) - NY (Mark), Oregon (Bryon), Utah (Jim), Washington (Bryon)
>
> Still missing column 3 (carnivore/furbearer biologists) - Michigan (Tam), Oregon (Bryon)
>
> --
> Jim Zelenak, Biologist
> U.S. Fish and Wildlife Service
> Montana Ecological Services Office
> 585 Shepard Way, Suite 1
> Helena, MT 59601
> (406) 449-5225 ext. 220
> jim_zelenak@fws.gov

--
Tamara Smith
U.S. Fish and Wildlife Service
Twin Cities Field Office
4101 American Boulevard East
Bloomington, MN 55425
612-725-3548 ext. 2219
612-600-1599 cell

From: Parkin, Mary
To: Smith, Tamara
Cc: Jim Zelenak; Heather Bell; Bryon Holt; Kurt Broderdorp; Mark McCollough; Jonathan Cummings; David Smith
Subject: Re: Mental Modeler
Date: Wednesday, August 26, 2015 10:35:37 AM

Thanks, Tam! These are really interesting to look at.

I also want to alert the team to a question raised about these types of diagrams during the Minneapolis workshop, regarding when to assign a positive or negative relationship between two components. Let's say, for instance, that habitat fragmentation has a negative effect on connectivity, which has a positive effect on "representation". Then what about the sources of the negative effect of fragmentation, like land conversion? In this case, land conversion would be added as a component with an arrow to habitat fragmentation, and the arrow would be given a plus sign, because it has a "positive" effect on fragmentation -- even though the effect on connectivity is negative. This is an accurate portrayal of the direct relationship. Management solutions would then hopefully have a negative effect on the negative effect of fragmentation, leading to a positive effect on connectivity!

What it all comes down to is the net effect on viability. And the significant uncertainties (question marks in mental modeler) will steer the expert elicitation.

Sorry if this is self-evident to you all, but it has been a question with others. I'd also like to invite Jonathan or Dave to correct me if I've misstated anything here.

Cheers,
Mary

Mary

On Tue, Aug 25, 2015 at 12:32 PM, Smith, Tamara <tamara_smith@fws.gov> wrote:

> Hi All - I've attached 2 example draft conceptual models for the RPBB. The context for the RPBB SSA is a listing decision, so we were concentrating on the main drivers effecting viability now and into the future. I find it easier to start looking at these models from the right hand side and move towards the left.
>
> -Tam
>
> On Tue, Aug 25, 2015 at 12:29 PM, Parkin, Mary <mary_parkin@fws.gov> wrote:
>
> > Hi all,
> >
> > Here's the handy-dandy tool we used at the Minneapolis SSA workshop:
> >
> > mentalmodeler.org/online/
> >
> > It's useful for developing influence diagrams for species viability. If you have time to play around with it, here are a couple of basic directions:

First, click on "Add Component" and fill in. Your first component, as you'll see with the example Tam is sending, has to do with long-term viability. Drag that component to the right-hand side of the screen (influence diagrams, as you probably know, are built from right to left).

Again, click on Add Component to insert factors (or "nodes") that most directly affect viability. For SSAs, these tend to be the 3 Rs. For each of these, use the drag the arrow on the bottom of the component to what it affects. You can also indicate whether the effect is positive or negative or unknown, and you can also indicate degree of effect by number of pluses or minuses (you'll get this when you look at the screen). Don't forget to indicate if the effect is unknown.

Repeat for each condition that might affect the preceding node (to the right). These conditions might be natural or managed.

Tam, your bumblebee example will be really helpful. This is a great way to think about causal relationships. Enjoy!

Mary

p.s. I'm dashing this off before hitting the road, so please excuse any fuzziness in the directions.

--
Mary Parkin
Endangered Species Recovery Coordinator, Northeast Region
U.S. Fish and Wildlife Service, Hadley, MA
Remotely located in Escalante, Utah:
Mailing address PO Box 637, Escalante, UT 84726
Street address 145 North Center St, Escalante, UT 84726
Phone 617-417-3331
Email mary_parkin@fws.gov

--
Tamara Smith
U.S. Fish and Wildlife Service
Twin Cities Field Office
4101 American Boulevard East
Bloomington, MN 55425
612-725-3548 ext. 2219
612-600-1599 cell

--
Mary Parkin
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Mailing address PO Box 637, Escalante, UT 84726
Street address 145 North Center St, Escalante, UT 84726
Phone 617-417-3331
Email mary_parkin@fws.gov

From: Bush, Jodi
To: Zelenak, Jim
Cc: McCollough, Mark; Laury Zicari; Sharon Hooley; Kaimy Marks
Subject: Re: Funding for lynx expert meeting
Date: Wednesday, August 26, 2015 11:02:38 AM

Nope. This would be helpful. Thank you! JB

Jodi L. Bush
Field Supervisor
Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, MT 59601
(406) 449-5225, ext.205

On Wed, Aug 26, 2015 at 8:35 AM, Zelenak, Jim <jim_zelenak@fws.gov> wrote:

> Thanks Mark and Laury.
>
> I've copied Jodi and our Administrative Experts here. I'm guessing any help will be welcomed, but will let Sharon or Kaimy reply if they foresee any issues/difficulties with the Maine Field Office paying travel and lodging costs for non-USFWS Maine participants in the Lynx SSA Expert Elicitation Workshop in Minneapolis in mid-Oct.
>
> On Tue, Aug 25, 2015 at 1:07 PM, McCollough, Mark <mark_mccollough@fws.gov> wrote:
>
> > Jim: I just talked to Laury about our call today and sent an email to our three potential invitees from Maine. We have some end-of-year funds that we would like to use. I reminded the Maine invitees that we are still planning the Oct 13-15 meeting and that if they need help with funding to let our field office know by Friday. Laury supports obligating funds for airfare and hotel for the three from Maine (perhaps they could cover their per diem?), if needed.
> >
> > Is this OK with you folks???
> >
> > Mark
> >
> > --
> > Mark McCollough, Ph.D.
> > Endangered Species Specialist
> > Maine Field Office
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> > mark_mccollough@fws.gov
>
> --

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U.S. Fish and Wildlife Service
Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, MT 59601
(406) 449-5225 ext. 220
jim_zelenak@fws.gov

From: Smith, Tamara
To: Hosler, Barbara
Subject: Re: quick question - MI state carnivore biologist contact person?
Date: Wednesday, August 26, 2015 11:06:17 AM

Thanks, Barb!

On Wed, Aug 26, 2015 at 10:26 AM, Hosler, Barbara <barbara_hosler@fws.gov> wrote:

> Adam Bump is the furbearer specialist. His contact info is bumpa@michigan.gov and 517-284-6157. Also, Dan Kennedy, TE coordinator, should be kept in the loop also.
>
> Barb
>
> ---
> Barbara Hosler
> U.S. Fish and Wildlife Service
> East Lansing Field Office
> 2651 Coolidge Road, Ste. 101
> East Lansing, MI 48823
> (517) 351-6326
>
> On Wed, Aug 26, 2015 at 9:44 AM, Smith, Tamara <tamara_smith@fws.gov> wrote:
>
> > Hi Barb,
> >
> > Do you know who would be a good contact for Michigan for a State carnivore/furbearer biologist contact to keep in the loop about the Canada lynx SSA?
> >
> > Thanks,
> > Tam
> >
> > --
> > Tamara Smith
> > U.S. Fish and Wildlife Service
> > Twin Cities Field Office
> > 4101 American Boulevard East
> > Bloomington, MN 55425
> > 612-725-3548 ext. 2219
> > 612-600-1599 cell

--
Tamara Smith
U.S. Fish and Wildlife Service
Twin Cities Field Office
4101 American Boulevard East
Bloomington, MN 55425
612-725-3548 ext. 2219
612-600-1599 cell

From: Smith, Tamara
To: Bush, Jodi
Cc: Zelenak, Jim; Sharon Hooley; Kaimy Marks
Subject: Re: quick question - Mpls meeting space budget
Date: Wednesday, August 26, 2015 11:34:59 AM

Sounds good. Thanks!

On Wed, Aug 26, 2015 at 12:13 PM, Bush, Jodi <jodi_bush@fws.gov> wrote:

> dont have a budget but typically we pay like $500 or so per day.... Once you get a couple of venues. I can have my admin staff work directly with the venue to get what we need....JB
>
> Jodi L. Bush
> Field Supervisor
> Montana Ecological Services Office
> 585 Shepard Way, Suite 1
> Helena, MT 59601
> (406) 449-5225, ext.205
>
> On Wed, Aug 26, 2015 at 10:51 AM, Zelenak, Jim <jim_zelenak@fws.gov> wrote:
>
> > I do not, but I'm copying folks who may know or at least have a better feel for it than I do.
> >
> > On Wed, Aug 26, 2015 at 10:30 AM, Smith, Tamara <tamara_smith@fws.gov> wrote:
> >
> > > Hi Jim - Do you know what the rough budget is for a meeting space for the lynx workshop?
> > >
> > > --
> > > Tamara Smith
> > > U.S. Fish and Wildlife Service
> > > Twin Cities Field Office
> > > 4101 American Boulevard East
> > > Bloomington, MN 55425
> > > 612-725-3548 ext. 2219
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> >
> > --
> > Jim Zelenak, Biologist
> > U.S. Fish and Wildlife Service
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> > jim_zelenak@fws.gov

--

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612-725-3548 ext. 2219
612-600-1599 cell

From: Kurt Broderdorp
To: Jim Zelenak
Cc: Ivy Allen
Subject: Tribal contact
Date: Wednesday, August 26, 2015 1:13:57 PM

Hey Jim, I talked to Ivy Allen, our Tribal Liaison officer in the RO, about extending an invitation to the Tribes in Colorado to participate in the State/Gov't coordination activities. If you have any materials, please send it to Ivy Allen so she can forward to the Tribes. Thanks.

Kurt Broderdorp
US Fish and Wildlife Service
(970) 628-7186

From: Cummings, Jonathan
To: Jim Zelenak
Subject: Climate contacts
Date: Wednesday, August 26, 2015 1:44:06 PM

Hi Jim,

The sources of potential climate experts I'm aware of would be the National Climate Team (https://fishnet.fws.doi.net/nt/nct/SitePages/Home.aspx), and then the USGS Climate Science Centers (https://nccwsc.usgs.gov/about-nccwsc)

I'm probably providing less information than what you already know, but just in case.

Best,
Jonathan
--
Jonathan W. Cummings, PhD
Research Ecologist
USGS - Leetown Science Center (remotely located)
jwcummings@usgs.gov

Remote Contact Info:
802-999-8684 - cell
243 Locust St
Dover, NH 03820

From: Belleman, Ann
To: Zelenak, Jim
Subject: Re: FW: Gary Hanvey - new lynx biologist in the RO
Date: Thursday, August 27, 2015 1:38:38 PM

I think this is Gary's last federal job but it's the one he really wanted. Unfortunately the FNF job offer came first and he had to make a decision. The meat-grinder Forest bio job on the BTNF was burning him out, so he couldn't really say no and risk staying on the BT, although I know he considered retirement at that point.

Maybe I'll see you in Minneapolis in Oct. I don't know if my help might be needed but I'd like to if there's an opportunity, even if it's just logistics or whatever. If so, I'll coordinate with Tam. I still consult on projects w/lynx effects in N Minn. but they seem so much more benign that what was happening in WY. I'm still dabbling in grizz-related litigation in WY too. Can't quite get away from the GYA!

I empathize with your comment re: fun/meaningful (or not) comment. I'm in a similar mode right now, spending time writing BOs for northern long-eared bats on USFS lands ... but the threat isn't forestry (unlike w/lynx!), so it's an exercise in process.

We ended up moving farther north in Minn. near a town called Grand Marais, so that's consumed our summer thus far. Little music or canoeing/kayaking but that'll change in Sept. with a week-long canoe trip planned for Quetico in SW Ontario, and Mountain Stage is coming to town again. I love Sept. and am looking forward to a break from work.

Take care - Ann

Ann Belleman
U.S. Fish and Wildlife Service
Minnesota/Wisconsin Field Office Complex
Twin Cities Field Office
4101 American Blvd. E
Bloomington, MN 55425-1665

ann_belleman@fws.gov

(307) 421-5839 (work cell)
(612) 725-3548 (Bloomington, MN)

On Thu, Aug 27, 2015 at 2:09 PM, Zelenak, Jim <jim_zelenak@fws.gov> wrote:

> Thanks Ann.
>
> Gary barely got settled in on the Flathead. Wonder if he will hang 'em up after this 1-year deal, or if they will extend it or make it permanent. He will be on a lynx habitat field trip next week that I'm unable to attend because of the CH lawsuit.
>
> We've gotten out a little bit but not enough - couple of music festivals (Montana Folk Festival in Butte, Red Ants Music Fest in White Sulphur Springs, and Magic City Blues Fest in Billings), a few family camping trips, and I've gotten out fishing a handful of times with a few good friends. Guess I can't complain, though I hope to sneak in a few more fishing trips before I have to switch into hunting mode.

In the thick of the lynx CH lawsuits, plus the SSA/recovery planning stuff. Hard to remember the last time this was fun or felt meaningful - perhaps I shouldn't have such expectations?

Anyway, hope to see you in Minn. in Oct. Before then, I'll be at NCTC late Sept. for recovery planning course.

Hope all is well there.

On Thu, Aug 27, 2015 at 12:28 PM, Belleman, Ann <ann_belleman@fws.gov> wrote:

> FYI. Hope you're enjoying outdoor time this summer!
>
> Ann
>
> Ann Belleman
> U.S. Fish and Wildlife Service
> Minnesota/Wisconsin Field Office Complex
> Twin Cities Field Office
> 4101 American Blvd. E
> Bloomington, MN 55425-1665
>
> ann_belleman@fws.gov
>
> (307) 421-5839 (work cell)
> (612) 725-3548 (Bloomington, MN)
>
> ---------- Forwarded message ----------
> From: **Hanvey, Gary -FS** <ghanvey@fs.fed.us>
> Date: Thu, Aug 27, 2015 at 1:08 PM
> Subject: FW: Gary Hanvey - new lynx biologist in the RO
> To: "Ann_Belleman@fws.gov" <Ann_Belleman@fws.gov>
>
> Start Oct 5th…….
>
> **********
>
> Gary Hanvey
>
> Forest Wildlife Biologist
>
> Flathead National Forest
>
> Supervisors Office – Kalispell, MT
>
> Office Phone: 406.758.5255

Cell Phone: 406.781.1765

ghanvey@fs.fed.us

From: Johnston, Eric -FS
Sent: Thursday, August 27, 2015 11:28 AM
To: Fletcher, Tammy -FS; Tomasik, Eric J -FS; Shelly, Steve -FS; Thomas, Cameron A -FS; Rinehart, Susan -FS; Swisher, Kristi -FS; Archer, Vincent A -FS; Jensen, Amy A -FS; Bollenbacher, Barry -FS; Staab, Cara - FS; Spaulding, Scott -FS; Henderson, Eric B -FS; Manning, Mary E -FS; Jackson, Scott - FS; Mollander, Karen -FS; Riber, Julia -FS; Benz, Kathryn - FS; Smith, Ray G -FS; Zimmerman, Peter N -FS; Hoang, Linh -FS; Dawe, Christine -FS; Carlin, Rob -FS; Hanvey, Gary -FS; Schmid, David -FS; Campbell, Alan - OGC; Everett, Christine - OGC; Ortega, Jolyn -FS; Glossa, Melany I -FS; Dunn, Alex -FS; Erickson, Mary C -FS; Barndt, Scott A -FS; Martin, Thomas H -FS; Avey, William -FS; Strathy, Robin -FS; Weber, Chip -FS; Savage, Christopher S -FS; Carver, Quinn -FS; Farnsworth, Mary -FS; Herrera, Macario -FS; Dekome, Shanda F -FS; Rau, Ralph E -FS; Probert, Cheryl -FS; Windsor, Michele A -FS; King, Julie K -FS; Gale, Gilbert B -FS; Garcia, Timothy P -FS; Gustina, Gregory W -FS; Dawe, Christine -FS; Squires, John -FS; McKelvey, Kevin -FS; Schwartz, Michael K -FS; Pearson, Dean -FS; Niccolucci, Michael -FS; Simon, Jed A -FS
Subject: Gary Hanvey - new lynx biologist in the RO

As many of you know, we recently advertised an NTE 1 year position that will be focused on lynx management issues. Among a group of highly competitive candidates, Gary Hanvey has been selected and has accepted the position. Gary has a wealth of lynx experience dating back to the national lynx survey. He's worked in the Region previously before serving as the forest wildlife biologist on the Bridger-Teton and then coming back to the Region as the Flathead as their Forest biologist. Gary will start in the position the beginning of October.

Eric Johnston

Assistant Director RRM

USFS Northern Region

(406) 329-3164

--
Jim Zelenak, Biologist
U.S. Fish and Wildlife Service
Montana Ecological Services Office
585 Shepard Way, Suite 1

Helena, MT 59601
(406) 449-5225 ext. 220
jim_zelenak@fws.gov

From: Miller, Martin
To: Willey, Seth
Subject: Re: Mech letter
Date: Thursday, August 27, 2015 10:31:27 AM

I guess I was thinking our analysis would include more on how the connectivity (rate of dispersal from Canada into the U.S.) would affect the risk of extirpation in the U.S. - apart from maintaining genetic health. It seems to me that, if regular dispersal is occurring from Canada, then genetics wouldn't be an issue. If the NRM had a population size of one wolf, genetics wouldn't be our concern. We would want to know how many wolves we need in the NRM to achieve a low risk of the number going to zero simply from demographic stochasticicty and human threats. The only question is how much does dispersal help to maintain a population size that achievves a low risk of extirpation (genetics is only one pice of that equation). Maybe dispersal is at a level too low to affect risk of extirpation from demographic stochasticity and human threats, but I haven't seen that analysis. Maybe I missed it.

On Wed, Aug 26, 2015 at 10:56 AM, Willey, Seth <seth_willey@fws.gov> wrote:

> Here is some pertinent text in Response 8 to our most recent wolf delisting determination (currently under review in the appeals court, on different issues).
>
> http://www.fws.gov/mountain-prairie/es/species/mammals/wolf/77FR55530.pdf
>
> "Although numerous comments offered alternative recovery goals, we do not find the information presented to be persuasive, and do not feel revision to the recovery goals is warranted at this time. Most of these comments indicated a need for an effective population of at least 500 breeding individuals long term and a total population of ~1,500 to 6,000 individuals long term either within the NRM DPS or the western United States. However, these comments were based upon minimum viable population theories and models that assume an isolated population. This underlying premise is inappropriate within the NRM region, because NRM wolves are not isolated and are instead genetically connected to vast wolf populations north of the United States-Canadian border.
>
> Specifically, the NRM DPS represents a 650-km (400-mi) southern range extension of a vast contiguous wolf population that numbers over 12,000 wolves in western Canada and about 65,000 wolves across all of Canada and Alaska (Committee on the Status of Endangered Wildlife in Canada 2001, pp. iii, v–vi, 13, 21–22, 30–32, 38, 42, 44–46; Boitani 2003, p. 322). This connectivity is demonstrated by the fact that recovery in the NRM DPS began when wolves from Canada naturally dispersed into the northwestern Montana recovery area and recolonized this area (Ream et al. 1989; Boyd et al. 1995; Pletscher et al. 1997; Boyd and Pletscher 1999). Routine dispersal of wolves has been documented among NRM wolves and adjacent Canadian populations since then demonstrating that wolves in these areas are demographically and genetically linked (Pletscher et al. 1991, pp. 547–548; Boyd and Pletscher 1999, pp. 1105–1106; Sime 2007; vonHoldt et al. 2010, p. 4412; Jimenez et al. In review, entire). Connectivity to the GYA is discussed in more detail below, but is also sufficient to demonstrate and maintain the region's metapopulation structure.

Taking into account connectivity to adjoining Canadian populations, the effective population targets mentioned above have been greatly exceeded. While some contend that these effective population targets should be achieved strictly within the NRM DPS or the western United States, we conclude that it is biologically appropriate to consider the contribution of these connected wolf populations to the NRM DPS's long term viability. Connectivity to Canadian wolf populations has long been a central consideration in developing, revising, and validating our recovery goals (Service 1994, pp. 41–42 of appendix 9; Bangs 2002, p. 3)."

****

Seth L. Willey
Acting Regional ESA Chief
Mountain-Prairie Region, USFWS
Seth_Willey@fws.gov
303-236-4257
****

On Wed, Aug 26, 2015 at 7:13 AM, Miller, Martin <martin_miller@fws.gov> wrote:

> Wow - somehow I missed that in my reading. I'll go look for it. I'm also wondering how this was addressed for WGL. Should be easier to make sure we address this consistently for lynx pops since lynx is still a single listed entity being assessed in a single effort.
>
> On Mon, Aug 24, 2015 at 5:38 PM, Willey, Seth <seth_willey@fws.gov> wrote:
>
> > Hey Marty,
> >
> > We definitely did consider wolves in Canada in assessing NRM pop health. That is why our recovery goals could be so low (300 total in pretty conservative; only OK because it was a 400 miles extension of a population of 12,000 wolves in adjacent parts of Canada and connected to the 65,000 wolves or so across all areas north of the NRM). I don't think we erred. I think we did just that in our rules, explicitly in multiple places.
> >
> > but, glad to discuss this and how it plays into Lynx.
> >
> > Seth
> >
> > **********
> >
> > Seth L. Willey
> > Acting Regional ESA Chief
> > Mountain-Prairie Region, USFWS
> > Seth_Willey@fws.gov
> > 303-236-4257
> > **********
> >
> > On Mon, Aug 24, 2015 at 3:15 PM, Miller, Martin <martin_miller@fws.gov> wrote:
> >
> > > Hi Seth - I saw this letter in Fall 2014 edition of Wildlife Professional and thought about the conversation at the wolf SDM years ago. I remember commenting on how the Service erred in acknowledging the connection of the NRM wolf population with Canada only when we assessed genetic threats and not in assessing population demographics. Mech is making this same point (although he seems to wrongly imply that the requirements for delisting necessarily prohibit us from acknowledging such a connection).

> > I bring this up because it seems to me this issue is relevant to the lynx review and plan.
> >
> > Hope all's well with you.
> > Marty
> >
> > --
> > Martin Miller, Chief, Division of Endangered Species, Northeast Region, U.S. Fish and Wildlife Service, 300 Westgate Center Drive, Hadley, MA 01035, 413-253-8615
>
> --
> Martin Miller, Chief, Division of Endangered Species, Northeast Region, U.S. Fish and Wildlife Service, 300 Westgate Center Drive, Hadley, MA 01035, 413-253-8615

--
Martin Miller, Chief, Division of Endangered Species, Northeast Region, U.S. Fish and Wildlife Service, 300 Westgate Center Drive, Hadley, MA 01035, 413-253-8615

From:	Lewis, Jeffrey C (DFW)
To:	Zelenak, Jim
Subject:	RE: Reminder: Lynx SSA Coordination Call
Date:	Friday, August 28, 2015 12:20:47 PM

Hey Jim: I kind of figured, and I would expect no less from her. She is always bossing me around, but she's been pretty helpful too, so I don't mind too much. Best to you both, Jeff

---

From: Zelenak, Jim [jim_zelenak@fws.gov]
Sent: Friday, August 28, 2015 11:15 AM
To: Lewis, Jeffrey C (DFW)
Subject: Re: Reminder: Lynx SSA Coordination Call

Thanks Jeff.

And I assume you understood that Jodi was teasing, yes?

On Fri, Aug 28, 2015 at 12:10 PM, Lewis, Jeffrey C (DFW) <Jeffrey.Lewis@dfw.wa.gov> wrote:

> Can do
>
> ---
>
> **From:** Zelenak, Jim [jim_zelenak@fws.gov]
> **Sent:** Wednesday, August 26, 2015 12:45 PM
> **To:** Lewis, Jeffrey C (DFW)
> **Cc:** jodi_bush@fws.gov
> **Subject:** Re: Reminder: Lynx SSA Coordination Call
>
> Thanks Jeff!
>
> Jodi says: "Tell him to add it to the list and return it...."
>
> It would be great if you could fill in some info on Dr. Lawler on the table but, if not, I can do so at some point.
>
> Jim
>
> On Wed, Aug 26, 2015 at 1:27 PM, Lewis, Jeffrey C (DFW) <Jeffrey.Lewis@dfw.wa.gov> wrote:
>
> > Hi Jim: Per your request for others to consider for the expert panel, I wanted to mention Dr. Josh Lawler (Univ. Washington) who may have already been on your radar as a climate change/wildlife expert. Josh is very busy and highly sought after, but would be extremely valuable for the project and may be interested in helping if he can fit it into his schedule. Good luck with your assembly process. Best, Jeff
>
> --
> Jim Zelenak, Biologist
> U.S. Fish and Wildlife Service
> Montana Ecological Services Office
> 585 Shepard Way, Suite 1
> Helena, MT 59601
> (406) 449-5225 ext. 220
> jim_zelenak@fws.gov

--
Jim Zelenak, Biologist
U.S. Fish and Wildlife Service
Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, MT 59601
(406) 449-5225 ext. 220
jim_zelenak@fws.gov

From:	lynxdan@gmail.com
To:	Alexej Siren
Cc:	Mark McCollough; Vashon, Jennifer; Sabrina Morano; Sheryn Olson; Sheryn Olson
Subject:	Re: current hare populations
Date:	Monday, August 31, 2015 9:57:03 AM

Hi Alexej,

We were thinking that hares were pulsing upwards based on a slight increase from 0.89 hares/ha in our 18 regenerating stands (21-42 years post-harvest) in spring 2012 to 0.97 hares/ha in 2013, followed by preliminary results (from Sheryn's spreadsheets) that suggested a much bigger jump in spring 2014. Since those preliminary impressions I have had a Research Associate (Sabrina Morano) developing an Access database for the entire time series and she has rechecked and re-ran all of the previous numbers. We discovered that the previous estimate for 2014 had an error in the number of days elapsed since clearing for the spring 2014 data point and the estimate now stands at 0.77 hares/ha for spring 2014. Preliminary numbers for 2015 are nearly the same as for 2014, so we have no evidence of ongoing trends in hare populations in our best habitats. We will be doing some more advanced modeling to account for stand maturity before finalizing our trends-based conclusions, so I am asking that these preliminary findings not be cited at this point.

Cheers- Dan

Daniel J. Harrison
Professor and Chair - Department of Wildlife, Fisheries, and Conservation Biology
Cooperating Professor of Sustainable Forestry
The University of Maine
5755 Nutting Hall, Room 210
Orono, ME 04469-5755
(207) 581-2867
harrison@maine.edu

On Sat, Aug 29, 2015 at 2:42 PM, Alexej Siren <alexejpksiren@gmail.com> wrote:

> Hello Dan,
>
> I'm writing up a summary report for the spring 2015 counts and was curious what the trends were in Maine for the past couple years. Did you record higher numbers this past spring than spring 2014?
>
> I hope all is well.
>
> Alexej

From: Ivan - DNR, Jake
To: Broderdorp, Kurt
Subject: Lynx Collar Found
Date: Monday, August 31, 2015 2:00:04 PM

Hi Kurt,

Just wanted to give you a heads-up that we had a hiker from New Mexico call us last week (8/27). He was hiking out by Rio Grande Reservoir and found a radio collar with John Squires' name and address on it. He said it looked to have been cut off. We think this is one of the animals we "lost" during the Lynx-Winter Rec study that took place in Silverton/Telluride a few years ago (other collars currently out on the Rio Grande Project have been accounted for). There were a couple of animals that disappeared on us and we were never able to locate the collars after they blew off...which brings up another explanation - I suppose it's possible this person doesn't know what they're looking at and the collar blew of like normal and he is just saying it was "cut".

At any rate, the hiker was going to send the collar back to John. I'll let you know if John feels like it had been cut or if it just blew off like it should have. If it was cut, then it seems likely that someone shot or trapped a lynx and dumped the collar.

Let me know if you need anything more from me at the moment.

Jake Ivan
Wildlife Researcher
Mammals Research Section
P 970.472.4310 | F 970.472.4457 | C 970.556.8048
317 W. Prospect Rd., Fort Collins, CO 80526
jake.ivan@state.co.us | cpw.state.co.us

From: Parkin, Mary
To: Willey, Seth
Cc: Bell, Heather; Zelenak, Jim
Subject: Re: Missed call
Date: Tuesday, September 01, 2015 7:05:35 AM

Hi all,

I hope you all had a chance to talk, and sorry I couldn't respond -- just got my online connection back last night. Thanks for the monthly FWS call reminder, Jim, and I'll tune in then. Please let me know if there's anything I can add to the mix at this point.

Mary

On Mon, Aug 31, 2015 at 1:38 PM, Willey, Seth <seth_willey@fws.gov> wrote:

> OK. me too
>
> **********
> Seth L. Willey
> Acting Regional ESA Chief
> Mountain-Prairie Region, USFWS
> Seth_Willey@fws.gov
> 303-236-4257
> **********
>
> On Mon, Aug 31, 2015 at 11:36 AM, Bell, Heather <heather_bell@fws.gov> wrote:
>
> > i could do now.
> >
> > Heather Bell
> > Ecological Services HQ
> > Branch of Conservation Integration
> > SSA Framework Team Lead
> > Remotely Located at
> > 134 S. Union Blvd
> > Lakewood, CO 80228
> > 303-236-4514
> >
> > Check it out! SSA Framework - Google Site for Staff
> > at https://sites.google.com/a/fws.gov/ssa/ and the REV Google
> > Site: https://sites.google.com/a/fws.gov/rev/
> >
> > On Mon, Aug 31, 2015 at 11:35 AM, Zelenak, Jim <jim_zelenak@fws.gov> wrote:
> >
> > > Sorry all - I was scrambling to get some answers to DOJ on the lynx CH lawsuits and spaced the SSA FIT call.
> > >
> > > Anyone available for quick call now or later today?
> > >
> > > --
> > > Jim Zelenak, Biologist
> > > U.S. Fish and Wildlife Service

Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, MT 59601
(406) 449-5225 ext. 220
jim_zelenak@fws.gov

--
Mary Parkin
Endangered Species Recovery Coordinator, Northeast Region
U.S. Fish and Wildlife Service, Hadley, MA
Remotely located in Escalante, Utah:
Mailing address PO Box 637, Escalante, UT 84726
Street address 145 North Center St, Escalante, UT 84726
Phone 617-417-3331
Email mary_parkin@fws.gov

From: Belleman, Ann
To: Zelenak, Jim
Subject: Re: [Update] Reminder - Monthly Internal FWS Lynx SSA Coordination Call
Date: Tuesday, September 01, 2015 11:01:06 AM

Thanks a lot Jim. I think Tam had another meeting that conflicted. Hope the SSA work is keeping on schedule and progressing smoothly (wishful thinking perhaps!).

Ann

Ann Belleman
U.S. Fish and Wildlife Service
Minnesota/Wisconsin Field Office Complex
Twin Cities Field Office
4101 American Blvd. E
Bloomington, MN 55425-1665

ann_belleman@fws.gov

(307) 421-5839 (work cell)
(612) 725-3548 (Bloomington, MN)

On Tue, Sep 1, 2015 at 11:58 AM, Zelenak, Jim <jim_zelenak@fws.gov> wrote:

> I don't think Tam was on either. Nothing too important - general update, expert meeting lining up for Oct. 13-15 or 16 in Minneapolis (Tam working on venue near the airport, neutral, and for 30-40 attendees [hopefully fewer, but we may need that much room]), deadline this Friday for State input on our draft list of lynx experts for the workshop and for climate modelers, etc., with invitation letters to go out from MTFO next week.
>
> SSA coordination calls with the States are last Wed. of each month at 1 - 2:30 Mountain Time - latest was last Wed. Aug. 26; next is Sept. 30.
>
> Internal FWS SSA coordination calls are first Tues. of each month (today) 10 - 11 Mountain Time; next is Oct. 6
>
> On Tue, Sep 1, 2015 at 10:48 AM, Belleman, Ann <ann_belleman@fws.gov> wrote:
>
> > Sorry to bother you but I got sidetracked on something else and missed the SSA call. Don't know if Tam made it or not (haven't heard back from her yet). If Tam wasn't on it, could you just let me know if there were some important updates, etc. and if so, I can give you a very quick call. If she was on it, then she must be away from her desk.
> >
> > Also, there's a lynx SSA state coordination call showing up on my Bison calendar today (Tues.) at 1 pm MDT. I believe this is incorrect, unless it's an internal call?? I thought the lynx SSA state coord. call was the last Wed. of each month.
> >
> > Ann Belleman
> > U.S. Fish and Wildlife Service
> > Minnesota/Wisconsin Field Office Complex
> > Twin Cities Field Office
> > 4101 American Blvd. E

Bloomington, MN 55425-1665

ann_belleman@fws.gov

(307) 421-5839 (work cell)
(612) 725-3548 (Bloomington, MN)

On Mon, Aug 31, 2015 at 4:29 PM, <jim_zelenak@fws.gov> wrote:

> Monthly Internal FWS Lynx SSA Coordination Call
>
> Sept. 1, 10-11 AM Mountain Time
>
> **(No Subject)**
>
> When Tue Sep 1, 2015 10am – 11am Mountain Time
>
> Video call https://plus.google.com/hangouts/_/doi.gov/jim-zelenak
>
> Who
> - jim_zelenak@fws.gov - organizer

--
Jim Zelenak, Biologist
U.S. Fish and Wildlife Service
Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, MT 59601
(406) 449-5225 ext. 220
jim_zelenak@fws.gov

From: McCollough, Mark
To: Jim Zelenak
Subject: today"s lynx recovery meeting
Date: Tuesday, September 01, 2015 11:50:27 AM

My apologies for missing today's lynx recovery meeting. Please let me know if there is anything I need to do to help.

Mark

--
Mark McCollough, Ph.D.
Endangered Species Specialist
Maine Field Office
U. S. Fish and Wildlife Service
17 Godfrey Drive, Suite 2
Orono, ME 04473
Phone 207 866-3344 x115
Cell Phone: 207 944-5709
mark_mccollough@fws.gov

From: McCollough, Mark
To: Jim Zelenak
Subject: today"s lynx recovery meeting
Date: Tuesday, September 01, 2015 1:50:25 PM

My apologies for missing today's lynx recovery meeting. Please let me know if there is anything I need to do to help.

Mark

--
Mark McCollough, Ph.D.
Endangered Species Specialist
Maine Field Office
U. S. Fish and Wildlife Service
17 Godfrey Drive, Suite 2
Orono, ME 04473
Phone 207 866-3344 x115
Cell Phone: 207 944-5709
mark_mccollough@fws.gov

From: Bush, Jodi
To: Smith, Tamara
Cc: Sharon Hooley; Jim Zelenak
Subject: Re: Venue options for the October lynx SSA expert meeting
Date: Tuesday, September 01, 2015 1:57:19 PM

Thanks Tam. We'll get folks on it. JB

Jodi L. Bush
Field Supervisor
Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, MT 59601
(406) 449-5225, ext.205

On Tue, Sep 1, 2015 at 1:26 PM, Smith, Tamara <tamara_smith@fws.gov> wrote:

> Hi Jim, Jodi, Sharon and Kaimy,
>
> I searched out a few options for the lynx SSA expert elicitation meeting. I've attached a spreadsheet of some options and a few maps that show most venues. Sorry, I did not have time to check into meeting room prices at most of these places.
>
> Based on our needs and wants - I thought that a hotel in downtown Minneapolis would serve us well. The downtown hotels are near the light rail blue line which runs every 10-15 minutes to the airport (~20 minute ride costing $1.75 to 2.25). There are many restaurants within walking distance and there are lots of walk-able options for "things to do" in the evenings (near the Mississippi River trails, historic mill ruins, theatre district, local breweries, etc.).
>
> Another option would be historic downtown (Lowertown) St. Paul. The hotels may be cheaper here but the ride to the airport is longer (~25 minutes via #54 bus - same cost as above, less likely to have free hotel shuttles to the airport). There are lots of walk-able food options and things to do - near the Mississippi River, Science Museum, etc.
>
> A third option that might work would be to use a hotel near the Mall of America (MOA)- which is close the airport (also via the light rail blue line - same cost, some hotels have airport shuttles) but is not really walkable to anything except the MOA. There are restaurants in the MOA, of course. There are a couple of options near the MN Valley NWR (noted on the spreadsheet) - those aren't within walking distance of any restaurants (~1mile to MOA). I just got a message from Radisson Blu MOA - who seemed interested in accommodating us.
>
> Please let me know if I can assist in any way.
>
> Thanks,
> Tam
>
> Tamara Smith
> --

U.S. Fish and Wildlife Service
Twin Cities Field Office
4101 American Boulevard East
Bloomington, MN 55425
612-725-3548 ext. 2219
612-600-1599 cell

From: Zelenak, Jim
To: Smith, Tamara
Cc: Jodi Bush; Kaimy Marks; Sharon Hooley
Subject: Re: Venue options for the October lynx SSA expert meeting
Date: Wednesday, September 02, 2015 8:42:11 AM

Thanks Tam!

On Tue, Sep 1, 2015 at 1:26 PM, Smith, Tamara <tamara_smith@fws.gov> wrote:

> Hi Jim, Jodi, Sharon and Kaimy,
>
> I searched out a few options for the lynx SSA expert elicitation meeting. I've attached a spreadsheet of some options and a few maps that show most venues. Sorry, I did not have time to check into meeting room prices at most of these places.
>
> Based on our needs and wants - I thought that a hotel in downtown Minneapolis would serve us well. The downtown hotels are near the light rail blue line which runs every 10-15 minutes to the airport (~20 minute ride costing $1.75 to 2.25). There are many restaurants within walking distance and there are lots of walk-able options for "things to do" in the evenings (near the Mississippi River trails, historic mill ruins, theatre district, local breweries, etc.).
>
> Another option would be historic downtown (Lowertown) St. Paul. The hotels may be cheaper here but the ride to the airport is longer (~25 minutes via #54 bus - same cost as above, less likely to have free hotel shuttles to the airport). There are lots of walk-able food options and things to do - near the Mississippi River, Science Museum, etc.
>
> A third option that might work would be to use a hotel near the Mall of America (MOA)- which is close the airport (also via the light rail blue line - same cost, some hotels have airport shuttles) but is not really walkable to anything except the MOA. There are restaurants in the MOA, of course. There are a couple of options near the MN Valley NWR (noted on the spreadsheet) - those aren't within walking distance of any restaurants (~1mile to MOA). I just got a message from Radisson Blu MOA - who seemed interested in accommodating us.
>
> Please let me know if I can assist in any way.
>
> Thanks,
> Tam
>
> Tamara Smith
> --
> U.S. Fish and Wildlife Service
> Twin Cities Field Office
> 4101 American Boulevard East
> Bloomington, MN 55425
> 612-725-3548 ext. 2219
> 612-600-1599 cell

--
Jim Zelenak, Biologist
U.S. Fish and Wildlife Service
Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, MT 59601
(406) 449-5225 ext. 220
jim_zelenak@fws.gov

From: lynxdan@gmail.com
To: McCollough, Mark
Subject: Re: willingness to give Maine overview of lynx, hare, habitat at lynx meeting?
Date: Wednesday, September 02, 2015 12:32:33 PM

Hi Mark,

I am certainly willing to work with you to put this together and will need some information from your files re: threats. How will airline reservations work as this will be one leg of 3 trips that I am linking together from different funding sources and need to get going with the airlines? Can I book something and then get reimbursed or does gov travel need to be involved (arghhh!!).

Please advise.

Dan

Daniel J. Harrison
Professor and Chair - Department of Wildlife, Fisheries, and Conservation Biology
Cooperating Professor of Sustainable Forestry
The University of Maine
5755 Nutting Hall, Room 210
Orono, ME 04469-5755
(207) 581-2867
harrison@maine.edu

On Wed, Aug 26, 2015 at 9:59 AM, McCollough, Mark <mark_mccollough@fws.gov> wrote:

> Dan:
>
> The Service and USGS are working on process and agenda for the upcoming lynx-hare expert meeting in Minneapolis Oct 13 - 16. Official invitations will be made in about a week, and we will share much more information on how the Species Status Assessment workshop will work.
>
> Jim Zelenak in our Helena Field Office is the national lynx lead biologist. We want to start the workshop Tuesday afternoon with a brief (~30 min) overview of the status of lynx, hare, and their habitat, and threats in each of the lynx units. Jim asked that we select one of the experts from Maine to give the overview. We will request that each presenter follow an outline, which we will provide, so presentations cover similar material. We want objective appraisals of the science and uncertainties for each unit.
>
> Would you be willing to do the overview for Maine? You presented a well-received overview several years ago at the Northeast Region biologist conference in Baltimore. We are thinking that Moen would present MN, Squires MT, Ivan CO, and Koehler WA. I would be willing to work with you, Jen, and Erin to put this together.
>
> I expect the outline will require that all units address topics like brief lynx history (baseline pre-European contact conditions), current status/populations/distribution, connection with

Canadian populations and status in adjacent Canada, habitat/climate requirements, hare status and fluctuations/cycles, habitat modeling and forestry issues, threats - forest policy and regulation/silvicultural systems, lack of planning, climate, etc., and status of conservation efforts.

There may be some sensitivity and uncertainty about some of these topics. If you are willing to take this on, I would be glad to talk with you over lunch some day.

Thanks for considering this role.

Mark

--
Mark McCollough, Ph.D.
Endangered Species Specialist
Maine Field Office
U. S. Fish and Wildlife Service
17 Godfrey Drive, Suite 2
Orono, ME 04473
Phone 207 866-3344 x115
Cell Phone: 207 944-5709
mark_mccollough@fws.gov

From: lynxdan@gmail.com
To: McCollough, Mark
Subject: Re: Lynx meeting in Minneapolis Oct 13 to 15, travel expenses
Date: Wednesday, September 02, 2015 12:43:35 PM

Hi Mark,

Disregard the message I sent 10 minutes ago. If you would need to fund this out of your Maine office budget and that will be a hassle, then I will just book my ticket to TWS in Winnipeg via Minneapolis and will cost share a portion of that, including hotel out of our existing FWS lynx project. Will be easier for all of us that way.

Let's have lunch late next week to plan a strategy for the summary presentation.

Cheers- Dan

Daniel J. Harrison
Professor and Chair - Department of Wildlife, Fisheries, and Conservation Biology
Cooperating Professor of Sustainable Forestry
The University of Maine
5755 Nutting Hall, Room 210
Orono, ME 04469-5755
(207) 581-2867
harrison@maine.edu

On Tue, Aug 25, 2015 at 2:58 PM, McCollough, Mark <mark_mccollough@fws.gov> wrote:

> Erin, Dan, and Jen:
>
> I wanted to let you know that we are still planning a meeting of lynx experts October 13 to 15 in the Minneapolis area. Our sessions will begin Tuesday afternoon and conclude the end of the day Thursday or possibly Friday morning. The list of expert invitees was distributed to state agencies last week and will be discussed with them on a conference call tomorrow. Formal invitations will be distributed to you all on about September 2. More information on the structure of the meetings will be forthcoming at that time.
>
> **If any of you are in need of funding for travel and hotel, could you please let me know within the next day or two?** We may have some year-end funds to help with travel, but those obligations must be made by this Friday.
>
> Thanks again for your willingness to share your knowledge. This will be a very interesting and important meeting that will provide the basis for future listing and recovery planning for the lynx. We hope that you all still plan on attending.
>
> Sincerely,
>
> Mark McCollough
>
> --

Mark McCollough, Ph.D.
Endangered Species Specialist
Maine Field Office
U. S. Fish and Wildlife Service
17 Godfrey Drive, Suite 2
Orono, ME 04473
Phone 207 866-3344 x115
Cell Phone: 207 944-5709
mark_mccollough@fws.gov

From: Zelenak, Jim
To: Parkin, Mary
Subject: Re: Notes from Nathan that might be helpful in drafting formal lynx EE invitation
Date: Wednesday, September 02, 2015 1:00:31 PM

No. Thanks for sending. I cannot spend time on them now, but I will as soon as I am able. Keep 'em coming!

On Wed, Sep 2, 2015 at 12:35 PM, Parkin, Mary <mary_parkin@fws.gov> wrote:

> Hi Jim,
>
> I hope these emails aren't distracting you from your task at hand. Just received this from Nathan (I'm on the ABB mailing list) and thought the verbiage might help in communicating why we need to limit numbers for the lynx meeting.
>
> Again, I'm copying the text below for your convenience.
>
> Cheers,
> Mary
>
> Drafted by Nathan 9-2-15
>
> These notes are to outline the purpose of the expert meeting for the American burying beetle (ABB) species status assessment (SSA) being planned for October 8-9, 2015.
>
> We have invited specific people to help us with the assessment to be consistent with the purpose of the SSA. We did not invite everyone with any knowledge of ABB to the meeting, as this is not necessary.
>
> The purpose of the ABB SSA effort is to analyze all available scientific information in a way that allows us to assess the current condition of the species and forecast the future condition of the species under a range of plausible scenarios. The ABB SSA is a scientific endeavor that is not intended to answer policy-related questions under the Endangered Species Act (ESA) but serves as the biological basis on which ESA policy decisions are made. Therefore, it is important to distinguish between the scientific work (SSA with expert input) and the ESA policy decisions (reserved for the Fish and Wildlife Service).
>
> With that in mind, the expert meeting is intended to be an important part of the SSA analysis process where we can ensure we have the best available ABB information and ask experts to help us address key areas of uncertainty with expert opinion. In order to foster healthy group dynamics, we limited the size of this meeting by inviting only primary species experts with on-the-ground knowledge of the species biology and ecology and biologists in the state agencies that would have

information to contribute.

Due to these limitations we are not able to invite everyone with an interest in ABB management and conservation to this particular meeting, nor are we able to invite stakeholders to participate. Additional information from others is always welcomed through written or verbal input by contacting the species lead, Kevin Stubbs.

--
Mary Parkin
Endangered Species Recovery Coordinator, Northeast Region
U.S. Fish and Wildlife Service, Hadley, MA
Remotely located in Escalante, Utah:
Mailing address PO Box 637, Escalante, UT 84726
Street address 145 North Center St, Escalante, UT 84726
Phone 617-417-3331
Email mary_parkin@fws.gov

--
Jim Zelenak, Biologist
U.S. Fish and Wildlife Service
Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, MT 59601
(406) 449-5225 ext. 220
jim_zelenak@fws.gov

From:	Bell, Heather
To:	Parkin, Mary
Cc:	Jim Zelenak; Jonathan Cummings; Seth Willey
Subject:	Re: example of expert meeting agenda that we might be able to adapt for the lynx
Date:	Thursday, September 03, 2015 7:54:42 AM

Mary, I know Nathan is out for the next couple of days, but feel free to contact him directly! perhaps we could set up a meeting with him to have us tell him how this has been going, that way we all could learn. i know they are doing a number of these this year.

Heather Bell
Ecological Services HQ
Branch of Conservation Integration
SSA Framework Team Lead
Remotely Located at
134 S. Union Blvd
Lakewood, CO 80228
303-236-4514

Check it out! SSA Framework - Google Site for Staff
at https://sites.google.com/a/fws.gov/ssa/ and the REV Google Site: https://sites.google.com/a/fws.gov/rev/

On Wed, Sep 2, 2015 at 11:56 AM, Parkin, Mary <mary_parkin@fws.gov> wrote:

> Hi folks,
>
> I just saw this from Nathan, and it might provide a starting point for the lynx meeting agenda. I'm copying it below for your convenience.
>
> Note the time frame, 1.5 days. We've talked about 2.5-3 days for the lynx, and given that the American burying beetle also has some significant uncertainties/ complexities, this makes me feel good that 2.5 is probably adequate for the lynx.
>
> I see that Seth is on the address list for the ABB SSA. Seth, if you have any insights about on how planning is going for the their expert meeting, we'd love to hear them. Or Heather?
>
> Cheers,
> Mary
>
> **Rough Draft Agenda**
> ABB SSA Expert Mtg
> Oct 8-9, 2015
>
> Thursday, October 8, Begin at 8am ends at 5pm
> Friday, October 9, Begin at 8am end at Noon.
>
> **Introductions**
>
> **Meeting Purpose and Objectives**

SSA analysis to inform ESA decisions
- ABB Information Sharing
- Address key areas of uncertainty with expert opinion

Discussion of Expectations: Why SSA and how does this meeting fit into the overall process?

Background

What we think we know:
life history and ecology
historic range
current range

What we'd like to know:
genetic diversity
population delineation
population abundance and trends
threats (environmental stressors and species responses)

Application to Analysis:
population measures (resiliency)
rangewide diversity (genetic and/or ecological)
forecasting future sources of threats
forecasting future species responses

How we're going to use this information?

--
Mary Parkin
Endangered Species Recovery Coordinator, Northeast Region
U.S. Fish and Wildlife Service, Hadley, MA
Remotely located in Escalante, Utah:
Mailing address PO Box 637, Escalante, UT 84726
Street address 145 North Center St, Escalante, UT 84726
Phone 617-417-3331
Email mary_parkin@fws.gov

From: Ivan - DNR, Jake
To: Kurt Broderdorp
Subject: Re: Lynx Collar Found
Date: Thursday, September 03, 2015 1:02:13 PM

Yep. Lucretia was downloading and looking at it as I was talking with John. He said the data were 'crazy'. Not sure what that means. Hopefully the collar worked and the movement pattern was interesting. Always a possibility he meant that the locations indicated some kind of collar failure.

Jake Ivan
Wildlife Researcher
Mammals Research Section
P 970.472.4310 | F 970.472.4457 | C 970.556.8048
317 W. Prospect Rd., Fort Collins, CO 80526
jake.ivan@state.co.us | cpw.state.co.us

On Thu, Sep 3, 2015 at 12:37 PM, Kurt Broderdorp <Kurt_Broderdorp@fws.gov> wrote:

> No kidding. Is the data still viable?
>
> Kurt Broderdorp
>
> US Fish and Wildlife Service
>
> (970) 628-7186
>
> **From:** Ivan - DNR, Jake [mailto:jake.ivan@state.co.us]
> **Sent:** Thursday, September 03, 2015 12:08 PM
> **To:** Kurt Broderdorp
> **Subject:** Re: Lynx Collar Found
>
> Yes. That's the missing "Breckenridge Female". Pretty lucky to get that back. Insanely lucky, actually.
>
> **Jake Ivan**
>
> **Wildlife Researcher**
>
> Mammals Research Section
>
> P 970.472.4310 | F 970.472.4457 | C 970.556.8048

317 W. Prospect Rd., Fort Collins, CO 80526

jake.ivan@state.co.us | cpw.state.co.us

On Thu, Sep 3, 2015 at 11:33 AM, Kurt Broderdorp <Kurt_Broderdorp@fws.gov> wrote:

Thanks for the information, I am interested to know if the collar was on the "Breckenridge" female?

Kurt Broderdorp

US Fish and Wildlife Service

(970) 628-7186

From: Ivan - DNR, Jake [mailto:jake.ivan@state.co.us]
Sent: Thursday, September 03, 2015 11:03 AM
To: Broderdorp, Kurt
Subject: Fwd: Lynx Collar Found

Hi Kurt,

Here is the latest news on the lynx collar that was retrieved near Rio Grande Reservoir. Let me know if you have questions.

Jake

Jake Ivan

Wildlife Researcher

Mammals Research Section

P 970.472.4310 | F 970.472.4457 | C 970.556.8048

317 W. Prospect Rd., Fort Collins, CO 80526

jake.ivan@state.co.us | cpw.state.co.us

---------- Forwarded message ----------
From: **Ivan - DNR, Jake** <jake.ivan@state.co.us>
Date: Thu, Sep 3, 2015 at 11:02 AM
Subject: Re: Lynx Collar Found
To: "Woodward - DNR, Brent" <brent.woodward@state.co.us>
Cc: Eric Odell - DNR <eric.odell@state.co.us>, Scott Wait - DNR <scott.wait@state.co.us>, Chuck Anderson - DNR <chuck.anderson@state.co.us>, Rick Basagoitia - DNR <rick.basagoitia@state.co.us>, Stephanie Ferrero - DNR <stephanie.ferrero@state.co.us>

Hi Brent,

John received the collar. Turns out it was deployed on a female cat on 3/11/2011; capture location was near Vail Pass! So, it was indeed from the Lynx-Winter Rec Project, but not from Silverton/Telluride like we thought.

Also, those collars had rot-off material sewn into them (we did that because the first year we had some issues with blow-offs not working properly). It looks to me like the collar finally rotted off like it should have. However, John is a little leery of that conclusion because it appears to him that the rot-off piece is indeed gone, but so is a good chunk of the leather collar itself. Not sure why that would be - Someone did cut out a chunk? Rodents chewed on it while it laid there for however long?

Anyway, I attached a few pictures of the collar. John is sending the collar back to us so I can get it to you to examine first hand if you want.

Jake

lynx collar 1

lynx collar2

Jake Ivan

Wildlife Researcher

Mammals Research Section

P 970.472.4310 | F 970.472.4457 | C 970.556.8048

317 W. Prospect Rd., Fort Collins, CO 80526

jake.ivan@state.co.us | cpw.state.co.us

On Mon, Aug 31, 2015 at 5:00 PM, Woodward - DNR, Brent <brent.woodward@state.co.us> wrote:

Thanks Jake! Let me know what John thinks happened and I can do some nosing around. Do you have a good location where the collar was found?

Brent Woodward

District Wildlife Manager - Creede

Area 17 - San Luis Valley

P 719.850.6366 | F 719.587.6934

0722 S. Rd. 1E, Monte Vista, CO 81144

brent.woodward@state.co.us | cpw.state.co.us

Turn in a Poacher 1.877.COLO.OGT

On Mon, Aug 31, 2015 at 1:57 PM, Ivan - DNR, Jake <jake.ivan@state.co.us> wrote:

Hi Brent,

Just wanted to give you a heads-up that we had a hiker from New Mexico call us last week (8/27). He was hiking out by Rio Grande Reservoir and found a radio collar with John Squires' name and address on it. He said it looked to have been cut off, presumably with a knife or scissors or something like that. We think this is one of the animals we "lost" during the Lynx-Winter Rec study that took place in Silverton/Telluride a few years ago (other collars currently out on the Rio Grande Project have been accounted for). There were a couple of animals that disappeared on us and we were never able to locate the collars after they blew off...which brings up another explanation - I suppose it's possible this person doesn't know what they're looking at and the collar blew of like normal and he is just saying it was "cut".

At any rate, the hiker was going to send the collar back to John. I'll let you know if John feels like it had been cut or if it just blew off like it should have. If it was cut, then it seems likely that someone shot or trapped a lynx and dumped the collar in your District.

Not sure if there is more we should or can do about anything at the moment. I was going to let USFWS know so they aren't caught off guard if/when the story gets back to them. Let me know if you want more from me.

Jake

Jake Ivan

Wildlife Researcher

Mammals Research Section

P 970.472.4310 | F 970.472.4457 | C 970.556.8048

317 W. Prospect Rd., Fort Collins, CO 80526

jake.ivan@state.co.us | cpw.state.co.us

From: McDonald, Ken
To: Bush, Jodi
Subject: RE: Reminder: Lynx SSA Coordination Call
Date: Thursday, September 03, 2015 1:18:12 PM

Jodi,

We have concerns about the magnitude of the influence of the Rocky Mountain Research Station on the expert panel, their bias, and the limited state representation. Idaho and Wyoming both have expertise that should be represented, and both of these states expressed interest in having representation when we met a couple weeks ago. I will forward your note below to my counterparts and ask that they send you suggested names.

Thanks,

Ken McDonald
Wildlife Chief
Montana Fish, Wildlife and Parks
P.O. Box 200701
Helena, MT 59620
406-444-5645
kmcdonald@mt.gov

From: Bush, Jodi [jodi_bush@fws.gov]
Sent: Thursday, September 03, 2015 12:46 PM
To: bob.broscheid@state.co.us; Odell, Eric; virgil.moore@idfg.idaho.gov; Sallabanks,Rex; Chandler.woodcock@maine.gov; Jake Ivan - DNR; Sam Eaton; dustin.miller@osc.idaho.gov; moritzw@michigan.gov; commissioner.dnr@state.mn.us; Ed.Boggess@state.mn.us; Baker, Richard (DNR); john.erb@state.mn.us; Tubbs, John; Hagener, Jeff; McDonald, Ken; Kolbe, Jay; Lexi J., Sandoval; glenn.normandeau@wildlife.nh.gov; Joshua Uriarte; Inman, Bob; DNR-Wildlife@michigan.gov; curt.melcher@state.or.us; Kimberly Hersey; Greg Sheehan; mark scott; cpl@dnr.wa.gov; director@dfw.wa.gov; Lewis, Jeffrey C (DFW); louis.porter@state.vt.us; Bernier, Chris; kurt.thiede@wisconsin.gov; scott.talbot@wyo.gov; Bob Lanka; Nichole Cudworth; Zack Walker; cathy.stepp@wisconsin.gov; Vashon, Jennifer; Jonathan Mawdsley; patricia.riexinger@dec.ny.gov
Cc: Heather Bell; Mary Parkin; Mark McCollough; David Smith; Tamara Smith; Seth Willey; Bryon Holt; Kurt Broderdorp; Jonathan Cummings; Nick.Wiley@myfwc.com; Zelenak, Jim
Subject: Re: Reminder: Lynx SSA Coordination Call

Good afternoon folks. This is a reminder that we remain interested in your input on our list of candidates that we are considering for the Expert Elicitation Panel in October. Because we need to notify these folks soon, we ask that you get any comments or additions to us ASAP but no later than COB tomorrow, September 4, 2015. Thank you. JB

Jodi L. Bush
Field Supervisor
Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, MT 59601

(406) 449-5225, ext.205

The Service is in the process of identifying candidates to participate in an expert elicitation workshop that will likely be held in mid-Oct., tentatively in Minneapolis, Minnesota. Please review the attached DRAFT (in progress) list of Canada lynx experts we've identified as candidates for participation in the workshop. The overarching objective of the workshop is to assess the current and likely future status of each of the lynx populations in the DPS (contiguous U.S.).

If you believe we have overlooked any lynx experts crucial to achieving that objective, please add their names, affiliations, and areas of expertise, and email me the revised table at your earliest convenience. We intend to extend formal invitation as soon as possible.

We will need to limit the number of experts to facilitate open dialog and candid discussion, and simply for logistical reasons. We will consider any candidates you put forth, but the Service will make the final decision on which experts will be formally invited to participate in the workshop.

Let me know if you have questions or need more information.

Cheers!

Jim

--
Jim Zelenak, Biologist
U.S. Fish and Wildlife Service
Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, MT 59601
(406) 449-5225 ext. 220
jim_zelenak@fws.gov

From: Zelenak, Jim
To: Bush, Jodi
Cc: Ivan - DNR, Jake
Subject: Re: Reminder: Lynx SSA Coordination Call
Date: Thursday, September 03, 2015 1:52:47 PM

Hi Jake,

We definitely considered Tanya and agree with your assessment of her expertise, but we want the most up-to-date information on the status of each of the DPS subpopulations (as well as thoughts/projections on how they will likely fare into the future), and we thought you would be in a better position to provide that given your ongoing work, especially the monitoring work you have underway there.

Jim

On Thu, Sep 3, 2015 at 1:34 PM, Bush, Jodi <jodi_bush@fws.gov> wrote:

> Thanks Jake I will forward your question on to my lead lynx Bio, Jim Zelenak, so he can respond. JB
>
> Jodi L. Bush
> Field Supervisor
> Montana Ecological Services Office
> 585 Shepard Way, Suite 1
> Helena, MT 59601
> (406) 449-5225, ext.205
>
> On Thu, Sep 3, 2015 at 1:05 PM, Ivan - DNR, Jake <jake.ivan@state.co.us> wrote:
>
> > Did you ever extend an invitation to Tanya Shenk, now with NPS? She ran the Colorado project for many years and is a co-author on several papers. She would not have data or results on Colorado beyond what I have (I'm in her position now), but would certainly be considered an expert on lynx.
> >
> > Jake
> >
> > **Jake Ivan**
> > **Wildlife Researcher**
> > Mammals Research Section
> > P 970.472.4310 | F 970.472.4457 | C 970.556.8048
> > 317 W. Prospect Rd., Fort Collins, CO 80526
> > jake.ivan@state.co.us | cpw.state.co.us
> >
> > On Thu, Sep 3, 2015 at 12:46 PM, Bush, Jodi <jodi_bush@fws.gov> wrote:
> >
> > > Good afternoon folks. This is a reminder that we remain interested in your input on our list of candidates that we are considering for the Expert Elicitation Panel in October. Because we need to notify these folks soon, we ask that you get any comments or additions to us ASAP but no later than COB tomorrow, September 4, 2015. Thank you. JB
> > >
> > > Jodi L. Bush
> > > Field Supervisor

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(406) 449-5225, ext.205

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We will need to limit the number of experts to facilitate open dialog and candid discussion, and simply for logistical reasons. We will consider any candidates you put forth, but the Service will make the final decision on which experts will be formally invited to participate in the workshop.

Let me know if you have questions or need more information.

Cheers!

Jim

--
Jim Zelenak, Biologist
U.S. Fish and Wildlife Service
Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, MT 59601
(406) 449-5225 ext. 220
jim_zelenak@fws.gov

--
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585 Shepard Way, Suite 1
Helena, MT 59601
(406) 449-5225 ext. 220
jim_zelenak@fws.gov

From: Bush, Jodi
To: Jim Zelenak
Subject: Fwd: Reminder: Lynx SSA Coordination Call
Date: Thursday, September 03, 2015 3:45:29 PM

---

abatzaglou was awesome. JB

Jodi L. Bush
Field Supervisor
Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, MT 59601
(406) 449-5225, ext.205

---------- Forwarded message ----------
From: **Sallabanks,Rex** <rex.sallabanks@idfg.idaho.gov>
Date: Thu, Sep 3, 2015 at 3:42 PM
Subject: RE: Reminder: Lynx SSA Coordination Call
To: "Bush, Jodi" <jodi_bush@fws.gov>, "jim_zelenak@fws.gov" <jim_zelenak@fws.gov>
Cc: "Moore,Virgil" <virgil.moore@idfg.idaho.gov>, "Gould,Jeff" <jeff.gould@idfg.idaho.gov>, "Svancara,Leona" <leona.svancara@idfg.idaho.gov>, "Dustin Miller (dustin.miller@osc.idaho.gov)" <dustin.miller@osc.idaho.gov>

Jodi & Jim,

Idaho offers the following suggestions for your consideration. We focused on candidates that could offer expertise on climate science/climate modeling, including our own staff person, Dr. Leona Svancara.

Expert Candidate	Geographic Area	Affiliation	Expertise
Solomon Dobrowski	Western US/Canada	Univ of Montana - Climate ecologist	Focuses on understanding effects of climate on species
Daniel Thornton	Western US/Canada	Washington State Univ - Climate ecologist	Focuses on understanding effects of environmental change (including climate) on species
John Abatzoglou	Global, with specific expertise in West & PNW	Univ of Idaho - Climate modeler	Focuses on science describing current, historical, and future climates
			Focuses on application of climate

Leona Svancara	Idaho/PNW	Idaho Fish and Game - Spatial ecologist	information in species management

Thank you.

Rex Sallabanks, PhD, CPM

Wildlife Diversity Program Manager

Idaho Department of Fish and Game

---

208 287 2754 (direct)

208 921 6932 (mobile)

208 334 2920 (office)

From: Bush, Jodi [mailto:jodi_bush@fws.gov]
Sent: Thursday, September 03, 2015 12:47 PM
To: bob.broscheid@state.co.us; Odell, Eric; Moore,Virgil; Sallabanks,Rex; Chandler.woodcock@maine.gov; Jake Ivan - DNR; Sam Eaton; dustin.miller@osc.idaho.gov; moritzw@michigan.gov; commissioner.dnr@state.mn.us; Ed.Boggess@state.mn.us; Baker, Richard (DNR); john.erb@state.mn.us; Tubbs, John; Hagener, Jeff; McDonald, Ken; Jay Kolbe; Lexi J., Sandoval; glenn.normandeau@wildlife.nh.gov; Joshua Uriarte; Inman, Bob; DNR-Wildlife@michigan.gov; curt.melcher@state.or.us; Kimberly Hersey; Greg Sheehan; mark scott; cpl@dnr.wa.gov; director@dfw.wa.gov; Lewis, Jeffrey C (DFW); louis.porter@state.vt.us; Bernier, Chris; kurt.thiede@wisconsin.gov; scott.talbot@wyo.gov; Bob Lanka; Nichole Cudworth; Zack Walker; cathy.stepp@wisconsin.gov; Vashon, Jennifer; Jonathan Mawdsley; patricia.riexinger@dec.ny.gov
Cc: Heather Bell; Mary Parkin; Mark McCollough; David Smith; Tamara Smith; Seth Willey; Bryon Holt; Kurt Broderdorp; Jonathan Cummings; Nick.Wiley@myfwc.com; Zelenak, Jim
Subject: Re: Reminder: Lynx SSA Coordination Call

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Jodi L. Bush

Field Supervisor

Montana Ecological Services Office

585 Shepard Way, Suite 1

Helena, MT 59601

(406) 449-5225, ext.205

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Let me know if you have questions or need more information.

Cheers!

Jim

--

Jim Zelenak, Biologist

U.S. Fish and Wildlife Service

Montana Ecological Services Office

585 Shepard Way, Suite 1

Helena, MT 59601

(406) 449-5225 ext. 220

jim_zelenak@fws.gov

From: Zelenak, Jim
To: Sallabanks,Rex
Cc: Bush, Jodi; Moore,Virgil; Gould,Jeff; Svancara,Leona; Dustin Miller (dustin.miller@osc.idaho.gov)
Subject: Re: Reminder: Lynx SSA Coordination Call
Date: Thursday, September 03, 2015 3:55:01 PM

Thanks Rex!

On Thu, Sep 3, 2015 at 3:42 PM, Sallabanks,Rex <rex.sallabanks@idfg.idaho.gov> wrote:

> Jodi & Jim,
>
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> Thank you.
>
> ---
>
> Rex Sallabanks, PhD, CPM
>
> Wildlife Diversity Program Manager

Idaho Department of Fish and Game

---

208 287 2754 (direct)

208 921 6932 (mobile)

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Cc: Heather Bell; Mary Parkin; Mark McCollough; David Smith; Tamara Smith; Seth Willey; Bryon Holt; Kurt Broderdorp; Jonathan Cummings; Nick.Wiley@myfwc.com; Zelenak, Jim
Subject: Re: Reminder: Lynx SSA Coordination Call

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Field Supervisor

Montana Ecological Services Office

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Cheers!

Jim

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Jim Zelenak, Biologist

U.S. Fish and Wildlife Service

Montana Ecological Services Office

585 Shepard Way, Suite 1

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> jim_zelenak@fws.gov

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Jim Zelenak, Biologist
U.S. Fish and Wildlife Service
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(406) 449-5225 ext. 220
jim_zelenak@fws.gov

From:	Zelenak, Jim
To:	Mark McCollough; Tamara Smith; Bryon Holt; Kurt Broderdorp; Mary Parkin; Heather Bell; Seth Willey; David Smith; Jonathan Cummings
Subject:	Fwd: Reminder: Lynx SSA Coordination Call
Date:	Thursday, September 03, 2015 3:57:12 PM

FYI.

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Subject: RE: Reminder: Lynx SSA Coordination Call
To: "Bush, Jodi" <jodi_bush@fws.gov>, "jim_zelenak@fws.gov" <jim_zelenak@fws.gov>
Cc: "Moore,Virgil" <virgil.moore@idfg.idaho.gov>, "Gould,Jeff" <jeff.gould@idfg.idaho.gov>, "Svancara,Leona" <leona.svancara@idfg.idaho.gov>, "Dustin Miller (dustin.miller@osc.idaho.gov)" <dustin.miller@osc.idaho.gov>

Jodi & Jim,

Idaho offers the following suggestions for your consideration. We focused on candidates that could offer expertise on climate science/climate modeling, including our own staff person, Dr. Leona Svancara.

Expert Candidate	Geographic Area	Affiliation	Expertise
Solomon Dobrowski	Western US/Canada	Univ of Montana - Climate ecologist	Focuses on understanding effects of climate on species
Daniel Thornton	Western US/Canada	Washington State Univ - Climate ecologist	Focuses on understanding effects of environmental change (including climate) on species
John Abatzoglou	Global, with specific expertise in West & PNW	Univ of Idaho - Climate modeler	Focuses on science describing current, historical, and future climates
Leona Svancara	Idaho/PNW	Idaho Fish and Game - Spatial ecologist	Focuses on application of climate information in species management

Thank you.

Rex Sallabanks, PhD, CPM

Wildlife Diversity Program Manager

Idaho Department of Fish and Game

---

208 287 2754 (direct)

208 921 6932 (mobile)

208 334 2920 (office)

From: Bush, Jodi [mailto:jodi_bush@fws.gov]
Sent: Thursday, September 03, 2015 12:47 PM
To: bob.broscheid@state.co.us; Odell, Eric; Moore,Virgil; Sallabanks,Rex; Chandler.woodcock@maine.gov; Jake Ivan - DNR; Sam Eaton; dustin.miller@osc.idaho.gov; moritzw@michigan.gov; commissioner.dnr@state.mn.us; Ed.Boggess@state.mn.us; Baker, Richard (DNR); john.erb@state.mn.us; Tubbs, John; Hagener, Jeff; McDonald, Ken; Jay Kolbe; Lexi J., Sandoval; glenn.normandeau@wildlife.nh.gov; Joshua Uriarte; Inman, Bob; DNR-Wildlife@michigan.gov; curt.melcher@state.or.us; Kimberly Hersey; Greg Sheehan; mark scott; cpl@dnr.wa.gov; director@dfw.wa.gov; Lewis, Jeffrey C (DFW); louis.porter@state.vt.us; Bernier, Chris; kurt.thiede@wisconsin.gov; scott.talbot@wyo.gov; Bob Lanka; Nichole Cudworth; Zack Walker; cathy.stepp@wisconsin.gov; Vashon, Jennifer; Jonathan Mawdsley; patricia.riexinger@dec.ny.gov
Cc: Heather Bell; Mary Parkin; Mark McCollough; David Smith; Tamara Smith; Seth Willey; Bryon Holt; Kurt Broderdorp; Jonathan Cummings; Nick.Wiley@myfwc.com; Zelenak, Jim
Subject: Re: Reminder: Lynx SSA Coordination Call

Good afternoon folks. This is a reminder that we remain interested in your input on our list of candidates that we are considering for the Expert Elicitation Panel in October. Because we need to notify these folks soon, we ask that you get any comments or additions to us ASAP but no later than COB tomorrow, September 4, 2015. Thank you. JB

Jodi L. Bush

Field Supervisor

Montana Ecological Services Office

585 Shepard Way, Suite 1

Helena, MT 59601

(406) 449-5225, ext.205

The Service is in the process of identifying candidates to participate in an expert elicitation workshop that will likely be held in mid-Oct., tentatively in Minneapolis, Minnesota. Please review the attached DRAFT (in progress) list of Canada lynx experts we've identified as candidates for participation in the workshop. The overarching objective of the workshop is to assess the current and likely future status of each of the lynx populations in the DPS (contiguous U.S.).

If you believe we have overlooked any lynx experts crucial to achieving that objective, please add their names, affiliations, and areas of expertise, and email me the revised table at your earliest convenience. We intend to extend formal invitation as soon as possible.

We will need to limit the number of experts to facilitate open dialog and candid discussion, and simply for logistical reasons. We will consider any candidates you put forth, but the Service will make the final decision on which experts will be formally invited to participate in the workshop.

Let me know if you have questions or need more information.

Cheers!

Jim

--

Jim Zelenak, Biologist

U.S. Fish and Wildlife Service

Montana Ecological Services Office

585 Shepard Way, Suite 1

Helena, MT 59601

(406) 449-5225 ext. 220

jim_zelenak@fws.gov

--
Jim Zelenak, Biologist
U.S. Fish and Wildlife Service
Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, MT 59601
(406) 449-5225 ext. 220
jim_zelenak@fws.gov

From:	Zelenak, Jim
To:	Mark McCollough; Tamara Smith; Bryon Holt; Kurt Broderdorp; Mary Parkin; Heather Bell; Seth Willey; David Smith; Jonathan Cummings
Subject:	Fwd: Reminder: Lynx SSA Coordination Call
Date:	Thursday, September 03, 2015 5:57:14 PM

FYI.

---------- Forwarded message ----------
From: **Sallabanks,Rex** <rex.sallabanks@idfg.idaho.gov>
Date: Thu, Sep 3, 2015 at 3:42 PM
Subject: RE: Reminder: Lynx SSA Coordination Call
To: "Bush, Jodi" <jodi_bush@fws.gov>, "jim_zelenak@fws.gov" <jim_zelenak@fws.gov>
Cc: "Moore,Virgil" <virgil.moore@idfg.idaho.gov>, "Gould,Jeff" <jeff.gould@idfg.idaho.gov>, "Svancara,Leona" <leona.svancara@idfg.idaho.gov>, "Dustin Miller (dustin.miller@osc.idaho.gov)" <dustin.miller@osc.idaho.gov>

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Wildlife Diversity Program Manager

Idaho Department of Fish and Game

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Cc: Heather Bell; Mary Parkin; Mark McCollough; David Smith; Tamara Smith; Seth Willey; Bryon Holt; Kurt Broderdorp; Jonathan Cummings; Nick.Wiley@myfwc.com; Zelenak, Jim
Subject: Re: Reminder: Lynx SSA Coordination Call

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Field Supervisor

Montana Ecological Services Office

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Cheers!

Jim

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U.S. Fish and Wildlife Service

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jim_zelenak@fws.gov

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U.S. Fish and Wildlife Service
Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, MT 59601
(406) 449-5225 ext. 220
jim_zelenak@fws.gov

From: Parkin, Mary
To: Zelenak, Jim
Cc: Heather Bell
Subject: Re: webinar possibility for next Tuesday"s core team call?
Date: Friday, September 04, 2015 8:45:14 AM

I was thinking the same thing, Jim: that a pre-core team call on Tuesday would be good. I'm available anytime (always happy for an excuse to forego ES staff meeting!). Let's set a time that works best for you.

If you think it'd help, I'd be happy to contact Brent to see if your webinar is now functioning. But if that just means you'd have to hassle with it on Tuesday, we should go to plan B.

I know how hard our attorneys (most of 'em anyway) work, so I think they do earn those big bucks. But I also think we should get commensurate hazard pay when we have to deal with them.

Sorry to hear your Labor Day weekend is going to be consumed by, well, labor. It makes me think that support of our relict unions is both more deserved and more needed than ever. BTW, we were in NYC one year for the Labor Day parade -- what a hoot that was! Oh, and the rain sounds like a good thing all the way around.

Hope you get some relief soon,
Mary

On Fri, Sep 4, 2015 at 10:07 AM, Zelenak, Jim <jim_zelenak@fws.gov> wrote:

> I will likely still be drafting responses to plaintiffs' lynx critical habitat lawsuit assertions and DOJ's questions on them on Monday (and Sat. and Sun.) - at least it's supposed to be cold and rainy here for the holiday weekend.....
>
> I don't know if I can conduct a webinar from here yet or not, and I likely won't have time to check today. And I see Heather is scheduled off today. Any chance we could try Tues. AM before the Core Team call? I know that doesn't leave us much time, but I'm really under the gun with lawyers getting madder at me by the day (I suspect they believe our jobs are easy compared to theirs - based on the differences in salaries, that seems reasonable but I contend it is not true....)
>
> On Fri, Sep 4, 2015 at 7:41 AM, Parkin, Mary <mary_parkin@fws.gov> wrote:
>
> > Hi both,
> >
> > Since we won't be having our coordination call on Monday (unless you don't have anything else planned for the holiday!), I just wanted to check and see if we can do a webinar via your office's account, Jim.
> >
> > I'm happy to ask Tam if she's willing to construct the diagram based on core team input during the call. If we could devote even half an hour to it, that'd be a good start for folks. Then we could use the other half hour for other topics as needed.
> >
> > If your webex still isn't functioning, Jim, I have a question for Heather. Should we use the back-up method Seth showed you for sharing screens? If we do that, we'd need some brief directions from either you or Seth.
> >
> > Thanks,
> > Mary

--
Mary Parkin
Endangered Species Recovery Coordinator, Northeast Region
U.S. Fish and Wildlife Service, Hadley, MA
Remotely located in Escalante, Utah:
Mailing address PO Box 637, Escalante, UT 84726
Street address 145 North Center St, Escalante, UT 84726
Phone 617-417-3331
Email mary_parkin@fws.gov

--
Jim Zelenak, Biologist
U.S. Fish and Wildlife Service
Montana Ecological Services Office
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Helena, MT 59601
(406) 449-5225 ext. 220
jim_zelenak@fws.gov

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Phone 617-417-3331
Email mary_parkin@fws.gov

From: Bush, Jodi
To: Connolly, James
Cc: Zelenak, Jim
Subject: Re: Canada Lynx Working Group
Date: Friday, September 04, 2015 1:55:44 PM

Thank you Jim. We appreciate your feedback and we will keep you posted on next steps. JB

Jodi L. Bush
Field Supervisor
Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, MT 59601
(406) 449-5225, ext.205

On Fri, Sep 4, 2015 at 12:00 PM, Connolly, James <James.Connolly@maine.gov> wrote:

> The Maine Dept. of Inland Fisheries and Wildlife strongly suggests that Jennifer Vashon of our agency should be a part of the working group participating in the Canada Lynx SSA discussion. Jen has a unique perspective based on her extensive work with Canada Lynx previously and currently as IFW's Lynx Biologist that is crucial from our perspective in understanding Canada Lynx in the Northeast. Jen brings the historical perspective of IFW's lynx research study, as well as work with incidentally captured lynx and ongoing lynx survey work in Maine.
>
> From a climate change perspective we suggest either Brian Olsen or Andy Whitman of the University of Maine and the Climate Change Institute as having a Northeast perspective on lynx and climate change that can be brought into the discussions. I believe these individuals or perhaps a small group could probably be pulled together as a group or external resource for the SSA working group to address this issue.
>
> Jim Connolly
>
> James M. Connolly
>
> Director, Bureau of Resource Management
>
> Maine Department of Inland Fisheries & Wildlife
>
> 284 State Street
>
> 41 State House Station
>
> Augusta ME 04333-0041

(207) 287-5259

(207) 287-6395 fax

Correspondence to and from this office is considered a public record and may be subject to a request under the Maine Freedom of Access Act. Information that you wish to keep confidential should not be included in email correspondence.

From:	Zelenak, Jim
Bcc:	McKelvey, Kevin -FS; Schwartz, Michael K -FS; Dan Harrison; Erin Simons-Legaard; Vashon, Jennifer; Ron Moen; scatton@fs.fed.us; Squires, John -FS; Jay Kolbe; Jake Ivan - DNR; Hodges, Karen; Bowman, Jeff (MNRF); Dennis Murray; clayapps@telus.net; Jackson, Scott -FS
Subject:	Canada Lynx Expert Elicitation Workshop
Date:	Friday, September 04, 2015 3:47:34 PM

Greetings!

You have been identified by your peers, the U.S Fish and Wildlife Service, and our State, Federal, and Academic partners as a candidate to participate in a structured expert elicitation workshop that is a crucial part of our Species Status Assessment for the contiguous United States Distinct Population Segment (DPS) of Canada lynx.

The objective of the workshop is to assess the current status of and threats to the various DPS populations and to evaluate the DPS's viability under a range of future threat, habitat condition, and climate scenarios.

The workshop will be held in Minneapolis, Minnesota on Oct. 13-15, 2015.

This is not a formal invitation to participate in the workshop; it is a request to let me know at your earliest convenience whether or not you would be able to attend the workshop on those dates. We hope to finalize the list of invitees and send out formal invitations in the next week or so.

In addition to lynx experts, we are assembling a list of candidates for workshop presentations on boreal forest ecology (distribution, insects, fires, and likely future condition), climate change/ modeling, and the regulatory environment as it pertains to lynx in the Lower 48 states and southern Canada. If you have recommendations for experts on those topics, please also provide them to me with you response.

Thanks for your consideration of and prompt reply to this request.

Cheers!

Jim

--

Jim Zelenak, Biologist
U.S. Fish and Wildlife Service
Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, MT 59601
(406) 449-5225 ext. 220
jim_zelenak@fws.gov

From: Ivan - DNR, Jake
To: Zelenak, Jim
Subject: Re: Canada Lynx Expert Elicitation Workshop
Date: Friday, September 04, 2015 3:51:53 PM

Hi Jim,

I could attend the workshop in Minneapolis on those dates.

Jake Ivan
Wildlife Researcher
Mammals Research Section
P 970.472.4310 | F 970.472.4457 | C 970.556.8048
317 W. Prospect Rd., Fort Collins, CO 80526
jake.ivan@state.co.us | cpw.state.co.us

On Fri, Sep 4, 2015 at 3:47 PM, Zelenak, Jim <jim_zelenak@fws.gov> wrote:

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>
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> Cheers!
>
> Jim
>
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> Montana Ecological Services Office
> 585 Shepard Way, Suite 1
> Helena, MT 59601
> (406) 449-5225 ext. 220
> jim_zelenak@fws.gov

From: Hodges, Karen
To: Zelenak, Jim
Subject: RE: Canada Lynx Expert Elicitation Workshop
Date: Friday, September 04, 2015 5:20:04 PM

Hi Jim,

Yes, I'd be happy to attend & can make those dates work.

Karen

Dr. Karen E. Hodges
Associate Professor
Department of Biology
University of British Columbia Okanagan
Science Building, 1177 Research Road
Kelowna, BC V1V 1V7

http://biol.ok.ubc.ca/faculty/hodges.html

From: Zelenak, Jim [jim_zelenak@fws.gov]
Sent: September-04-15 2:47 PM
Subject: Canada Lynx Expert Elicitation Workshop

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Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, MT 59601

(406) 449-5225 ext. 220
jim_zelenak@fws.gov

From:	Ron Moen
To:	Zelenak, Jim
Subject:	Re: Canada Lynx Expert Elicitation Workshop
Date:	Sunday, September 06, 2015 7:52:39 AM

Hi Jim,

It is making me miss 2 classes, I teach on Tuesday and Thursday at 11. I may try to do something remote on Tuesday. Thursday was supposed to be a review so I'll need to figure something out.

Ron

On 5 Sep 2015 at 12:20, Zelenak, Jim wrote:

Date sent: Sat, 5 Sep 2015 12:20:07 -0600
Subject: Re: Canada Lynx Expert Elicitation Workshop
From: "Zelenak, Jim" <jim_zelenak@fws.gov>
To: Ron Moen <rmoen@d.umn.edu>

> Great Ron! Thanks.
>
> Formal agenda is not yet completed, but I anticipate we will get
> underway at 1 PM on Tues. Oct. 13, then have full-day discussions on
> Wed., 10/14 and Thurs. 10/15, wrapping up and sending folks on their
> ways by 5 or so on Thurs.
>
> Hope that will work for you and, as I said in previous, we hope to
> have formal invitations out soon (next week if I can get through the
> critical habitat litigation stuff, which is why I'm in the office on a
> holiday weekend....).
>
> Jim
>
> On Sat, Sep 5, 2015 at 3:05 AM, Ron Moen <rmoen@d.umn.edu> wrote:
>
> > Hi Jim,
> >
> > I could do it. I would need to get gues lectures for a class
> > since it
> > is T and Th, if it is all day on both days.
> >
> > Ron
> >
> > On 4 Sep 2015 at 15:47, Zelenak, Jim wrote:
> >
> > Date sent: *Fri, 4 Sep 2015 15:47:34 -0600*
> > Subject: *Canada Lynx Expert Elicitation
> > Workshop* From: *"Zelenak, Jim"
> > <jim_zelenak@fws.gov <jim_zelenak@fws.gov>>* To:
> > *undisclosed-recipients:;*
> >
> > Greetings!
> >
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> > Service, and our State, Federal, and Academic partners as a
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> >
> > Jim
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> > --
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> > jim_zelenak@fws.gov
> >
> > --
> > Ron Moen
> > Center for Water and Environment, Natural Resources Research
> > Institute Biology Department, Swenson College of Science and
> > Engineering University of Minnesota Duluth www.d.umn.edu/~rmoen,
> > www.nrri.umn.edu/lynx, www.nrri.umn.edu/moose Voice: 218-720-4372
> > Fax: 218-720-4328
> >
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>
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> U.S. Fish and Wildlife Service
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Ron Moen
Center for Water and Environment, Natural Resources Research Institute
Biology Department, Swenson College of Science and Engineering
University of Minnesota Duluth
www.d.umn.edu/~rmoen, www.nrri.umn.edu/lynx, www.nrri.umn.edu/moose
Voice: 218-720-4372
Fax: 218-720-4328

From: Clayton Apps
To: Zelenak, Jim
Subject: Re: Canada Lynx Expert Elicitation Workshop
Date: Sunday, September 06, 2015 10:23:11 AM

Hi Jim,

Those days are a tad problematic for me, but I think I can switch things around a bit and make it work. Also, I am expecting I would be required to travel on the Monday, which happens to be our Thanksgiving holiday here in Canada and we have some family plans. Again, I can make it work, but if you are considering the possibility of different dates, a different week would definitely be better for me.

best,
Clayton

CLAYTON APPS, PhD, RPBio
ASPEN WILDLIFE RESEARCH INC.
Phone: 778-786-3773 or 403-270-8663

From: Zelenak, Jim
Sent: Friday, September 4, 2015 3:47 PM
To: undisclosed-recipients:
Subject: Canada Lynx Expert Elicitation Workshop

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(406) 449-5225 ext. 220
jim_zelenak@fws.gov

From:	McCollough, Mark
To:	Jim Zelenak
Subject:	Fwd: AP Big Story: Landowners managing habitat to help Canada lynx in Maine
Date:	Tuesday, September 08, 2015 8:23:35 AM

FYI. Mark
---------- Forwarded message ----------
From: **Sharp, David** <DSharp@ap.org>
Date: Mon, Sep 7, 2015 at 1:34 PM
Subject: AP Big Story: Landowners managing habitat to help Canada lynx in Maine
To: "mark_mccollough@fws.gov" <mark_mccollough@fws.gov>, Jim Zelenak <jim_zelenak@fws.gov>, Kyle Lima <kylelemur21@gmail.com>, Don Lima <don_lima@fws.gov>

All:

Thanks for your help on the lynx story. You can see the story and Kyle's wonderful photo by following the link below.

Let me know if there are concerns.

Best,

David

Landowners managing habitat to help Canada lynx in Maine.

TOWNSHIP 4 RANGE 11, Maine (AP) — The kind of clear-cutting that made the woods of Maine an ideal hunting ground for Canada lynx is a thing of the past, but wildlife experts are trying to recreate enough of that habitat to secure the thick-furred cat's future.

http://bigstory.ap.org/article/b6d8724d09a64b819189031c0e6883ff/landowners-managing-habitat-help-canada-lynx-maine

Sent from my iPhone

msk dccc60c6d2c3a6438f0cf467d9a4938

--
Mark McCollough, Ph.D.
Endangered Species Specialist
Maine Field Office
U. S. Fish and Wildlife Service
17 Godfrey Drive, Suite 2
Orono, ME 04473
Phone 207 866-3344 x115
Cell Phone: 207 944-5709
mark_mccollough@fws.gov

From: Ron Moen
To: Zelenak, Jim
Subject: Re: Canada Lynx Expert Elicitation Workshop
Date: Tuesday, September 08, 2015 9:23:16 AM

Sounds fine. I might not be able to get there until 2:00 on Tuesday, unless I have someone else do my class. I'll see what I can do.

On 5 Sep 2015 at 12:20, Zelenak, Jim wrote:

Date sent: Sat, 5 Sep 2015 12:20:07 -0600
Subject: Re: Canada Lynx Expert Elicitation Workshop
From: "Zelenak, Jim" <jim_zelenak@fws.gov>
To: Ron Moen <rmoen@d.umn.edu>

> Great Ron! Thanks.
>
> Formal agenda is not yet completed, but I anticipate we will get
> underway at 1 PM on Tues. Oct. 13, then have full-day discussions on
> Wed., 10/14 and Thurs. 10/15, wrapping up and sending folks on their
> ways by 5 or so on Thurs.
>
> Hope that will work for you and, as I said in previous, we hope to
> have formal invitations out soon (next week if I can get through the
> critical habitat litigation stuff, which is why I'm in the office on a
> holiday weekend....).
>
> Jim
>
> On Sat, Sep 5, 2015 at 3:05 AM, Ron Moen <rmoen@d.umn.edu> wrote:
>
> > Hi Jim,
> >
> > I could do it. I would need to get gues lectures for a class
> > since it
> > is T and Th, if it is all day on both days.
> >
> > Ron
> >
> > On 4 Sep 2015 at 15:47, Zelenak, Jim wrote:
> >
> > Date sent: *Fri, 4 Sep 2015 15:47:34 -0600*
> > Subject: *Canada Lynx Expert Elicitation
> > Workshop* From: *"Zelenak, Jim"
> > <jim_zelenak@fws.gov <jim_zelenak@fws.gov>>* To:
> > *undisclosed-recipients:;*
> >
> > Greetings!
> >
> > You have been identified by your peers, the U.S Fish and Wildlife
> > Service, and our State, Federal, and Academic partners as a
> > candidate to participate in a structured expert elicitation workshop
> > that is a crucial part of our Species Status Assessment for the
> > contiguous United States Distinct Population Segment (DPS) of Canada
> > lynx.
> >

> > The objective of the workshop is to assess the current status of and
> > threats to the various DPS populations and to evaluate the DPS's
> > viability under a range of future threat, habitat condition, and
> > climate scenarios.
> >
> > The workshop will be held in Minneapolis, Minnesota on Oct. 13-15,
> > 2015.
> >
> > This is not a formal invitation to participate in the workshop; it
> > is a request to let me know at your earliest convenience whether or
> > not you would be able to attend the workshop on those dates. We
> > hope to finalize the list of invitees and send out formal
> > invitations in the next week or so.
> >
> > In addition to lynx experts, we are assembling a list of candidates
> > for workshop presentations on boreal forest ecology (distribution,
> > insects, fires, and likely future condition), climate change/
> > modeling, and the regulatory environment as it pertains to lynx in
> > the Lower 48 states and southern Canada. If you have
> > recommendations for experts on those topics, please also provide
> > them to me with you response.
> >
> > Thanks for your consideration of and prompt reply to this request.
> >
> > Cheers!
> >
> > Jim
> >
> > --
> > Jim Zelenak, Biologist
> > U.S. Fish and Wildlife Service
> > Montana Ecological Services Office
> > 585 Shepard Way, Suite 1
> > Helena, MT 59601
> > (406) 449-5225 ext. 220
> > jim_zelenak@fws.gov
> >
> > --
> > Ron Moen
> > Center for Water and Environment, Natural Resources Research
> > Institute Biology Department, Swenson College of Science and
> > Engineering University of Minnesota Duluth www.d.umn.edu/~rmoen,
> > www.nrri.umn.edu/lynx, www.nrri.umn.edu/moose Voice: 218-720-4372
> > Fax: 218-720-4328
> >
>
>
>
> --
> Jim Zelenak, Biologist
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> Montana Ecological Services Office
> 585 Shepard Way, Suite 1
> Helena, MT 59601
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>

--
Ron Moen
Center for Water and Environment, Natural Resources Research Institute
Biology Department, Swenson College of Science and Engineering
University of Minnesota Duluth
www.d.umn.edu/~rmoen, www.nrri.umn.edu/lynx, www.nrri.umn.edu/moose
Voice: 218-720-4372
Fax: 218-720-4328

From: Bowman, Jeff (MNRF)
To: Zelenak, Jim
Subject: RE: Canada Lynx Expert Elicitation Workshop
Date: Tuesday, September 08, 2015 9:34:13 AM

Hi Jim,

I am still available to attend the workshop on the proposed dates.

Regards,

Jeff

Jeff Bowman
Research Scientist
Wildlife Research & Monitoring Section
Ontario Ministry of Natural Resources & Forestry
Trent University DNA Building
2140 East Bank Drive
Peterborough, ON, K9J 7B8
705-755-1555, 705-755-1559 (fax)
jeff.bowman@ontario.ca
http://people.trentu.ca/jebowman

From: Zelenak, Jim [mailto:jim_zelenak@fws.gov]
Sent: September 4, 2015 5:48 PM
Subject: Canada Lynx Expert Elicitation Workshop

Greetings!

You have been identified by your peers, the U.S Fish and Wildlife Service, and our State, Federal, and Academic partners as a candidate to participate in a structured expert elicitation workshop that is a crucial part of our Species Status Assessment for the contiguous United States Distinct Population Segment (DPS) of Canada lynx.

The objective of the workshop is to assess the current status of and threats to the various DPS populations and to evaluate the DPS's viability under a range of future threat, habitat condition, and climate scenarios.

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Thanks for your consideration of and prompt reply to this request.

Cheers!

Jim

--
Jim Zelenak, Biologist
U.S. Fish and Wildlife Service
Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, MT 59601
(406) 449-5225 ext. 220
jim_zelenak@fws.gov

From: Vashon, Jennifer
To: Zelenak, Jim
Subject: RE: Canada Lynx Expert Elicitation Workshop
Date: Tuesday, September 08, 2015 9:41:23 AM

Hi Jim,

Thanks for checking. I am available on those dates. I'll wait to hear from you next week.

Take care,

Jen

Jennifer Vashon-MDIFW's Mammal Program
Canada Lynx and Black Bear Biologist
Maine Department of Inland Fisheries and Wildlife
650 State St. Bangor, ME 04401
jennifer.vashon@maine.gov
207.941.4238 (office)
207.941.4450 (fax)
Remember Maine's Wildlife!
Purchase a Loon Plate Contribute at tax time

From: Zelenak, Jim [mailto:jim_zelenak@fws.gov]
Sent: Friday, September 04, 2015 5:48 PM
Subject: Canada Lynx Expert Elicitation Workshop

Greetings!

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Thanks for your consideration of and prompt reply to this request.

Cheers!

Jim

--
Jim Zelenak, Biologist
U.S. Fish and Wildlife Service
Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, MT 59601
(406) 449-5225 ext. 220
jim_zelenak@fws.gov

From: Bush, Jodi
To: Lewis, Jeffrey C (DFW)
Subject: Re: Reminder: Lynx SSA Coordination Call
Date: Tuesday, September 08, 2015 9:50:57 AM

Thanks Jeff. Hope you are doing well. JB

Jodi L. Bush
Field Supervisor
Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, MT 59601
(406) 449-5225, ext.205

On Sat, Sep 5, 2015 at 4:43 PM, Lewis, Jeffrey C (DFW) <Jeffrey.Lewis@dfw.wa.gov> wrote:

> Hi Jodi and Jim: Per your request and the discussion that we had on the conference call, I would recommend that you consider asking Josh Lawler (Univ of WA; http://faculty.washington.edu/jlawler/) to be a member of the lynx team. Jodi, you may already know Josh really well from your time here in WA, but if not he is an accomplished scientist and professor that is a leading researcher on forecasting the effects of climate change on species and species persistence. I am not aware of him having any direct experience with lynx but his background and skills and work make him someone that you may want to consider. He was on my committee at UW and I cannot say enough about him as a scientist, professor and person. He may not have enough spare time to help but this might be something that would interest him. Good luck, Jeff
>
> **From:** Bush, Jodi [mailto:jodi_bush@fws.gov]
> **Sent:** Thursday, September 03, 2015 11:47 AM
> **To:** bob.broscheid@state.co.us; Odell, Eric; virgil.moore@idfg.idaho.gov; Sallabanks,Rex; Chandler.woodcock@maine.gov; Jake Ivan - DNR; Sam Eaton; dustin.miller@osc.idaho.gov; moritzw@michigan.gov; commissioner.dnr@state.mn.us; Ed.Boggess@state.mn.us; Baker, Richard (DNR); john.erb@state.mn.us; Tubbs, John; Hagener, Jeff; McDonald, Ken; Jay Kolbe; Lexi J., Sandoval; glenn.normandeau@wildlife.nh.gov; Joshua Uriarte; Inman, Bob; DNR-Wildlife@michigan.gov; curt.melcher@state.or.us; Kimberly Hersey; Greg Sheehan; mark scott; DNR RE CPL; Director (DFW); Lewis, Jeffrey C (DFW); louis.porter@state.vt.us; Bernier, Chris; kurt.thiede@wisconsin.gov; scott.talbot@wyo.gov; Bob Lanka; Nichole Cudworth; Zack Walker; cathy.stepp@wisconsin.gov; Vashon, Jennifer; Jonathan Mawdsley; patricia.riexinger@dec.ny.gov
> **Cc:** Heather Bell; Mary Parkin; Mark McCollough; David Smith; Tamara Smith; Seth Willey; Bryon Holt; Kurt Broderdorp; Jonathan Cummings; Nick.Wiley@myfwc.com; Zelenak, Jim
> **Subject:** Re: Reminder: Lynx SSA Coordination Call
>
> Good afternoon folks. This is a reminder that we remain interested in your input on our list of candidates that we are considering for the Expert Elicitation Panel in October. Because we need to notify these folks soon, we ask that you get any comments or additions to us ASAP but no later than COB tomorrow, September 4, 2015. Thank you. JB

Jodi L. Bush

Field Supervisor

Montana Ecological Services Office

585 Shepard Way, Suite 1

Helena, MT 59601

(406) 449-5225, ext.205

The Service is in the process of identifying candidates to participate in an expert elicitation workshop that will likely be held in mid-Oct., tentatively in Minneapolis, Minnesota. Please review the attached DRAFT (in progress) list of Canada lynx experts we've identified as candidates for participation in the workshop. The overarching objective of the workshop is to assess the current and likely future status of each of the lynx populations in the DPS (contiguous U.S.).

If you believe we have overlooked any lynx experts crucial to achieving that objective, please add their names, affiliations, and areas of expertise, and email me the revised table at your earliest convenience. We intend to extend formal invitation as soon as possible.

We will need to limit the number of experts to facilitate open dialog and candid discussion, and simply for logistical reasons. We will consider any candidates you put forth, but the Service will make the final decision on which experts will be formally invited to participate in the workshop.

Let me know if you have questions or need more information.

Cheers!

> Jim
>
> --
>
> Jim Zelenak, Biologist
>
> U.S. Fish and Wildlife Service
>
> Montana Ecological Services Office
>
> 585 Shepard Way, Suite 1
>
> Helena, MT 59601
>
> (406) 449-5225 ext. 220
>
> jim_zelenak@fws.gov

From:	McCollough, Mark
To:	Jim Zelenak
Subject:	Fwd: AP Big Story: Landowners managing habitat to help Canada lynx in Maine
Date:	Tuesday, September 08, 2015 10:23:33 AM

FYI. Mark
---------- Forwarded message ----------
From: **Sharp, David** <DSharp@ap.org>
Date: Mon, Sep 7, 2015 at 1:34 PM
Subject: AP Big Story: Landowners managing habitat to help Canada lynx in Maine
To: "mark_mccollough@fws.gov" <mark_mccollough@fws.gov>, Jim Zelenak <jim_zelenak@fws.gov>, Kyle Lima <kylelemur21@gmail.com>, Don Lima <don_lima@fws.gov>

All:

Thanks for your help on the lynx story. You can see the story and Kyle's wonderful photo by following the link below.

Let me know if there are concerns.

Best,

David

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http://bigstory.ap.org/article/b6d8724d09a64b819189031c0e6883ff/landowners-managing-habitat-help-canada-lynx-maine

Sent from my iPhone

msk dccc60c6d2c3a6438f0cf467d9a4938

--
Mark McCollough, Ph.D.
Endangered Species Specialist
Maine Field Office
U. S. Fish and Wildlife Service
17 Godfrey Drive, Suite 2
Orono, ME 04473
Phone 207 866-3344 x115
Cell Phone: 207 944-5709
mark_mccollough@fws.gov

From: Baker, Richard (DNR)
To: Bush, Jodi; Zelenak, Jim
Cc: Erb, John D (DNR); Telander, Paul B (DNR); Boggess, Ed (DNR)
Subject: Request to Attend Lynx SSA as Observer
Date: Tuesday, September 08, 2015 11:08:52 AM

Jodi/Jim,

I want to follow up on last Friday’s correspondence by reiterating my request that I be permitted to attend the October Expert Elicitation Panel as an observer. My intention would not be to interfere at all with the proceedings. There are three reasons I believe it would be appropriate for me to attend:

1. I will continue to improve my understanding of the SSA process by observing the proceedings so that I can be a more effective partner with the Service and its staff as this becomes a more frequently used tool in endangered species conservation.
2. I will build my understanding of nuances of lynx ecology and conservation in Minnesota so that I can be a more effective advocate for the species and for the decisions that are reached by the Service.
3. Needless to say, I could attend at no cost or inconvenience to either the Service or myself, since I live and work here.

You have indicated that you will make your decisions regarding observers in consultation with AFWA, so I have copied Ed Boggess, our AFWA representative and President of MAFWA, here.

Thank you for considering this request.

Rich

<><><><><><><><><><><><><><><><><><>
Richard J. Baker
Minnesota Endangered Species Coordinator
Division of Ecological and Water Resources
Minnesota Department of Natural Resources
500 Lafayette Rd., Box 25
St. Paul, MN 55155
Phone: 651/259-5073
Fax: 651/296-1811
E-mail: richard.baker@state.mn.us
http://www.dnr.state.mn.us/eco/nhnrp
<><><><><><><><><><><><><><><><><><>

From: Bell, Heather
To: Mary_Parkin
Subject: Gleaned from my lynx reading today.
Date: Tuesday, September 08, 2015 1:41:01 PM

Not that I think we should make a full ecological model of lynx, but here is some cuts from what i read in the crit hab final rule" (bolded is my emphasis, red is some questions) that might help us verify our simpler model!

1. Lynx populations respond to biotic and abiotic factors at different scales. At the regional scale, boreal forests, snow conditions, and competitors (especially **bobcat**) influence the species' range (Aubry et al. 2000, pp. 378–380; McKelvey et al. 2000a, pp. 242–253; Hoving et al., 2005 p. 749).
2. At the landscape scale within each region, natural and human-caused disturbance processes (e.g., **fire, wind, insect infestations, forest management, and development) may influence the spatial and temporal distribution of lynx populations by affecting the distribution of high-quality habitat for snowshoe hares** (Agee 2000, pp. 47–73; Ruediger et al. 2000, pp. 1–3, 2–2—2–6, 7–3).
3. At the stand-level (vegetation community) scale, the **quality, quantity, and juxtaposition of habitats influence home range location and size, productivity, and survival** (Aubry et al. 2000, pp. 380–390; Vashon et al. 2005a, pp. 9–11).
4. At the smaller substand (within-stand) scale, the spatial distribution and abundance of prey and microclimate likely influence lynx movements, hunting behavior, and den and resting site locations (Organ et al. 2008, entire; Squires et al. 2008, entire; Moen and Burdett 2009, p. 16; Squ
5. Generally, the physical and biological features of critical habitat for lynx are found within relatively large landscapes (large enough to support multiple lynx home ranges) [which is what?]in what is broadly described as the boreal forest or cold temperate forest (Frelich and Reich 1995, p. 325; Agee 2000, pp. 43–46).
6. In **eastern North America**, lynx are strongly associated with areas of **deep snowfall and large (40-mi2 (100- km2)) landscapes** that have been heavily cut and treated with herbicides and have a high proportion of young regenerating forest (Hoving 2001, pp. 75, 143). the broad geographic distribution of lynx in eastern North America is most influenced by snowfall, but within areas of similarly deep snowfall, measures of forest succession become more important factors in determining lynx distribution. Second order habitat selection in the Acadian forest region is influenced by hare density (a surrogate for early successional forest) and by mature conifer forest, despite its association with lower hare densities (SimonsLegaard et al. 2013b, pp. 573–574). ...Tthe broad geographic distribution of lynx in eastern North America is most influenced by **snowfall**, but within areas of similarly deep snowfall, **measures of forest succession** become more important factors in determining lynx distribution. Secondorder habitat selection in the Acadian forest region is influenced by **hare density** (a surrogate for early successional forest) and by mature conifer forest, despite its association with lower hare densities (SimonsLegaard et al. 2013b, pp. 573–574).
7. In the **Northern Rocky Mountains**, lynx appear to be less tied to early successional forest stages; high lynx use and hare densities, especially in the critical winter season, occur in mature multistoried forest stands where conifer branches reach the snow surface and thereby provide **hare forage** (Squires et al. 2006a, p. 15; Squires et al. 2010, pp. 1653–1657; Berg et al. 2012, entire).
8. In many places, periodic vegetation disturbances stimulate development of dense understory or early successional **habitat for snowshoe hares** (Ruediger et al. 2000, pp.

1–3—1–4, 7–4—7–5). In other places, such as the **Northern Rocky Mountains and Greater Yellowstone Area,** mature multistoried conifer forests as well as dense regenerating conifer stands **provide foraging habitat for lynx** [which means it must be hare habitat with hare forage??] (Squires et al. 2010, pp. 1648, 1653–1657; Berg et al. 2012, entire).

9. **lynx foraging habitat must be near denning habitat** [how near?] to allow females to adequately provision dependent kittens, especially when the kittens are relatively immobile (Moen et al. 2008a, p. 1507; Vashon et al. 2012, p. 16).
10. The size of lynx home ranges is strongly influenced by the quality of the habitat, particularly the abundance of snowshoe hares, in addition to other factors such as gender, age, season, and density of the lynx population (Aubry et al. 2000, pp. 382–385; Mowat et al. 2000, pp. 276–280). Generally, females with kittens have the smallest home ranges while males have the largest home ranges (Moen et al. 2005, p. 11; Burdett et al. 2007, p. 463). Reported average home range sizes vary greatly from 12 mi2 (31 km2) for females and 26 mi2 (68 km2) for males in Maine (Vashon et al. 2005a, p. 7), 8 mi2 (21 km2) for females and 119 mi2 (307 km2) for males in Minnesota (Moen et al. 2005, p. 12), and 34 mi2 (88 km2) for females and 83 mi2 (216 km2) for males in northwest Montana (Squires et al. 2004a, p. 13). Home range sizes of lynx in the population introduced into Colorado averaged 29 mi2 (75 km2) among reproductive females, 40 mi2 (103 km2) among attending (reproductive) males, and 252 mi2 (654 km2) among all non-reproductive lynx (Shenk 2008, pp. 1, 10). Based on data presented in Shenk (2008, p. 10) and combining reproductive and nonreproductive lynx, home range estimates for lynx in Colorado averaged 181 mi2 (470 km2) for females and 106 mi2 (273 km2) for males.

Ok, that is enough for now!

Heather Bell
Ecological Services HQ
Branch of Conservation Integration
SSA Framework Team Lead
Remotely Located at
134 S. Union Blvd
Lakewood, CO 80228
303-236-4514

Check it out! SSA Framework - Google Site for Staff
at https://sites.google.com/a/fws.gov/ssa/ and the REV Google Site: https://sites.google.com/a/fws.gov/rev/

From: Gary Koehler
To: Holt, Bryon
Subject: Re: Canada Lynx Expert Elicitation Workshop
Date: Tuesday, September 08, 2015 8:34:43 PM

Just returned home from road Tripp to AK

Gary M Koehler
Sent from my iPhone

On Sep 8, 2015, at 4:15 PM, Holt, Bryon <bryon_holt@fws.gov> wrote:

> Hi Gary,
>
> I am forwarding this request for Jim Zelenak because he did not have your email address. I copied Jim on this message, so he now has your email address.
>
> Bryon
>
> ---------- Forwarded message ----------
> From: **Zelenak, Jim** <jim_zelenak@fws.gov>
> Date: Fri, Sep 4, 2015 at 2:50 PM
> Subject: Fwd: Canada Lynx Expert Elicitation Workshop
> To: Bryon Holt <bryon_holt@fws.gov>
>
> Bryon,
>
> Please forward this to Gary Koehler - he's the only expert candidate whose email address I don't have.
>
> Thanks,
>
> Jim
> ---------- Forwarded message ----------
> From: **Zelenak, Jim** <jim_zelenak@fws.gov>
> Date: Fri, Sep 4, 2015 at 3:47 PM
> Subject: Canada Lynx Expert Elicitation Workshop
> To:
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> Greetings!
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Cheers!

Jim

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(406) 449-5225 ext. 220
jim_zelenak@fws.gov

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585 Shepard Way, Suite 1
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jim_zelenak@fws.gov

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****
Bryon Holt
U.S. Fish and Wildlife Service
Northern Idaho Field Office, Spokane, WA
Telephone: (509) 893-8014
Fax: (509) 891-6748
email: bryon_holt@fws.gov

****

From: Holt, Bryon
To: Gary Koehler
Subject: Re: Canada Lynx Expert Elicitation Workshop
Date: Wednesday, September 09, 2015 7:19:13 AM

Sounds good Gary. Glad you are back. Hope you can make the expert elicitation workshop next month.

Bryon

On Wed, Sep 9, 2015 at 5:21 AM, Gary Koehler <garykoehler@nwi.net> wrote:

> Bryon: I just returned from a 5-week trip to Alaska, so I will send the 'bio' to you today.
> Gary Koehler
> garykoehler@nwi.net
> 509-699-9857
> Skype: puma.koehler151
>
> On Sep 8, 2015, at 4:15 PM, Holt, Bryon <bryon_holt@fws.gov> wrote:
>
> Hi Gary,
>
> I am forwarding this request for Jim Zelenak because he did not have your email address. I copied Jim on this message, so he now has your email address.
>
> Bryon
>
> ---------- Forwarded message ----------
> From: **Zelenak, Jim** <jim_zelenak@fws.gov>
> Date: Fri, Sep 4, 2015 at 2:50 PM
> Subject: Fwd: Canada Lynx Expert Elicitation Workshop
> To: Bryon Holt <bryon_holt@fws.gov>
>
> Bryon,
>
> Please forward this to Gary Koehler - he's the only expert candidate whose email address I don't have.
>
> Thanks,
>
> Jim
> ---------- Forwarded message ----------
> From: **Zelenak, Jim** <jim_zelenak@fws.gov>
> Date: Fri, Sep 4, 2015 at 3:47 PM
> Subject: Canada Lynx Expert Elicitation Workshop
> To:
>
> Greetings!

You have been identified by your peers, the U.S Fish and Wildlife Service, and our State, Federal, and Academic partners as a candidate to participate in a structured expert elicitation workshop that is a crucial part of our Species Status Assessment for the contiguous United States Distinct Population Segment (DPS) of Canada lynx.

The objective of the workshop is to assess the current status of and threats to the various DPS populations and to evaluate the DPS's viability under a range of future threat, habitat condition, and climate scenarios.

The workshop will be held in Minneapolis, Minnesota on Oct. 13-15, 2015.

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Thanks for your consideration of and prompt reply to this request.

Cheers!

Jim

--
Jim Zelenak, Biologist
U.S. Fish and Wildlife Service
Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, MT 59601
(406) 449-5225 ext. 220
jim_zelenak@fws.gov

--
Jim Zelenak, Biologist
U.S. Fish and Wildlife Service
Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, MT 59601
(406) 449-5225 ext. 220
jim_zelenak@fws.gov

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Bryon Holt
U.S. Fish and Wildlife Service

Northern Idaho Field Office, Spokane, WA
Telephone: (509) 893-8014
Fax: (509) 891-6748
email: bryon_holt@fws.gov

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email: bryon_holt@fws.gov

****

From: Zelenak, Jim
To: Smith, Tamara
Cc: Bush, Jodi; Bell, Heather; Mary Parkin
Subject: Re: conference room logistics-QR needed
Date: Wednesday, September 09, 2015 10:29:30 AM

Thanks so much Tam!

On Wed, Sep 9, 2015 at 10:10 AM, Smith, Tamara <tamara_smith@fws.gov> wrote:

> Hi All - I'm working from home today but asked a co-worker to walk down to the Crowne Plaza this morning to check out the Empire Room - see attached photo. It holds about 80 people and can be split in half. She said that they do have AV equipment available at the hotel but I'm guessing it costs extra. They said we could request it at the last minute, however, if we do not end up bringing our own gear. I have a call in to some folks at the RO about equipment they may have available for use. I'll get back to you asap.
>
> Had we thought about using a conf. room at the RO instead of a hotel?
>
> On Wed, Sep 9, 2015 at 9:57 AM, Smith, Tamara <tamara_smith@fws.gov> wrote:
>
> > Okay - will do. I'll get back to you asap.
> >
> > On Wed, Sep 9, 2015 at 9:09 AM, Bush, Jodi <jodi_bush@fws.gov> wrote:
> >
> > > Hey Tam. Thanks. If you could stop by the hotel sooner -that would be appreciated. We need to make a decision asap. Thanks JB
> > >
> > > Jodi L. Bush
> > > Field Supervisor
> > > Montana Ecological Services Office
> > > 585 Shepard Way, Suite 1
> > > Helena, MT 59601
> > > (406) 449-5225, ext.205
> > >
> > > On Wed, Sep 9, 2015 at 6:54 AM, Smith, Tamara <tamara_smith@fws.gov> wrote:
> > >
> > > > Hi All - Sorry, just catching up. I'll contact someone in the RO today to see if they have microphones, etc. I can stop by the Crowne Plaza on Friday morning on my way in to work - is that too late? - Tam
> > > >
> > > > On Tue, Sep 8, 2015 at 4:09 PM, Bush, Jodi <jodi_bush@fws.gov> wrote:
> > > >
> > > > > well we dont want alot but when you starting counting, the FWS folks, and the states and tribes and federal partners you are at 8 or so pretty fast. Then the core team and the SSA team and you've got a room of at least two dozen or even more if we have 15 panelists.
> > > > >
> > > > > I don't disagree about the microphones but I feel like we need to have folks be able to hear...Mary ?

Jodi L. Bush
Field Supervisor
Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, MT 59601
(406) 449-5225, ext.205

On Tue, Sep 8, 2015 at 1:42 PM, Bell, Heather <heather_bell@fws.gov> wrote:

> oh, but i thought we weren't having lots of observers....microphones make a whole different and more formal atmosphere. i will leave that to mary to respond to!
>
> Heather Bell
> Ecological Services HQ
> Branch of Conservation Integration
> SSA Framework Team Lead
> Remotely Located at
> 134 S. Union Blvd
> Lakewood, CO 80228
> 303-236-4514
>
> Check it out! SSA Framework - Google Site for Staff
> at https://sites.google.com/a/fws.gov/ssa/ and the REV Google Site: https://sites.google.com/a/fws.gov/rev/
>
> On Tue, Sep 8, 2015 at 1:23 PM, Bush, Jodi <jodi_bush@fws.gov> wrote:
>
> > I can tell you that (having sat in the back on pipit) it was really hard to hear the conversation among the experts in the front of the room so I do recommend microphones. I think we had them for wolverine panel. if we have fifteen panelists maybe we just need 8 or so microphones on the table .
> >
> > Just my opinion. JB
> >
> > Jodi L. Bush
> > Field Supervisor
> > Montana Ecological Services Office
> > 585 Shepard Way, Suite 1
> > Helena, MT 59601
> > (406) 449-5225, ext.205
> >
> > On Tue, Sep 8, 2015 at 1:15 PM, Bell, Heather <heather_bell@fws.gov> wrote:
> >
> > > I can comment from the Pipit perspective. we had three tables to make a U shape for the experts (we would need seating enough for say 15? experts). they faced the facilitator and we had a projector (or the ability to project) a computer. this allows for PP and for tracking expert elicitation. I don't think we need a microphone.
> > > If we end up with "observers" they have in the past either sat in the back

(Pipit) or along the sides (Rio Grande cutthroat trout), but not at the table with the experts. It is also helpful to have a table for the notetakers/gopher (me!), and other fws/usgs staff that are assisting. we don't need to sit with the experts, just to the side of the experts, preferably near the door so we don't distract if we need to run out and get something!

Heather Bell
Ecological Services HQ
Branch of Conservation Integration
SSA Framework Team Lead
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at https://sites.google.com/a/fws.gov/ssa/ and the REV Google Site: https://sites.google.com/a/fws.gov/rev/

On Tue, Sep 8, 2015 at 12:29 PM, Bush, Jodi <jodi_bush@fws.gov> wrote:

> Hey guys. Jim is tied up with litigation stuff so I am sending you a message on the room logistics in Minn. We are trying to get this finalized today or tomorrow...
>
> **How many and what type of microphones do we need? on the table in front of the panelists? one in front? Any other electronic necessities? We will have a few power strips.**
>
> **Tam. Does the RO have this kind of stuff and if so could we get your AV/IT person to the hotel to set it up for us?**
>
> I'm asking cause the AV stuff is expensive and I just want to get what we need.
>
> I think we are going to go with **Crowne Plaza hotel on 3 Appletree Square.** It has a restaurant so we can get lunch on site and lower time spent over lunch break.
>
> It also has hotel shuttle, continental breakfast, wireless.
>
> **Tam - Do you have time to go by and check it out before we sign a contract?** the meeting room is called the Empire room and is about 1400 sq feet. Let me know if you can or can't and about the AV/IT availability.
>
> Thanks all for your help. JB

Jodi L. Bush
Field Supervisor
Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, MT 59601
(406) 449-5225, ext.205

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Tamara Smith
U.S. Fish and Wildlife Service
Twin Cities Field Office
4101 American Boulevard East
Bloomington, MN 55425
612-725-3548 ext. 2219
612-600-1599 cell

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Tamara Smith
U.S. Fish and Wildlife Service
Twin Cities Field Office
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U.S. Fish and Wildlife Service
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4101 American Boulevard East
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612-725-3548 ext. 2219
612-600-1599 cell

--
Jim Zelenak, Biologist

U.S. Fish and Wildlife Service
Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, MT 59601
(406) 449-5225 ext. 220
jim_zelenak@fws.gov

From: Schwartz, Michael K -FS
To: Zelenak, Jim
Subject: RE: Canada Lynx Expert Elicitation Workshop
Date: Wednesday, September 09, 2015 11:32:40 AM

Jim,
I'll get back to you soon. These dates are a bit rough with TWS the following week, but I'll see if I can make it work.
Mike

From: Zelenak, Jim [mailto:jim_zelenak@fws.gov]
Sent: Friday, September 04, 2015 3:48 PM
Subject: Canada Lynx Expert Elicitation Workshop

Greetings!

You have been identified by your peers, the U.S Fish and Wildlife Service, and our State, Federal, and Academic partners as a candidate to participate in a structured expert elicitation workshop that is a crucial part of our Species Status Assessment for the contiguous United States Distinct Population Segment (DPS) of Canada lynx.

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In addition to lynx experts, we are assembling a list of candidates for workshop presentations on boreal forest ecology (distribution, insects, fires, and likely future condition), climate change/ modeling, and the regulatory environment as it pertains to lynx in the Lower 48 states and southern Canada. If you have recommendations for experts on those topics, please also provide them to me with you response.

Thanks for your consideration of and prompt reply to this request.

Cheers!

Jim

--
Jim Zelenak, Biologist
U.S. Fish and Wildlife Service
Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, MT 59601

(406) 449-5225 ext. 220
jim_zelenak@fws.gov

From: Bell, Heather
To: Mary_Parkin
Subject: More good lynx stuff!
Date: Wednesday, September 09, 2015 12:57:08 PM

---

1. **Deep, fluffy snow conditions** likely restrict potential lynx competitors such as bobcat or coyote from effectively encroaching on or hunting hares in winter lynx habitat. In addition to snow depth, other snow properties, including **surface hardness or sinking depth, also influence lynx foraging success and, ultimately may be important factors in the spatial, ecological, and genetic structuring of the species** (Stenseth et al. 2004, entire). Gonzalez et al. (2007, pp. 4, 7) compared 496 lynx locations with snow cover over the period 1966–2005 and concluded that lynx require **4 months (December through March) of continuous winter snow coverage.**
2. **In eastern North America, snowfall was the strongest predictor of lynx occurrence at a regional scale** (Hoving et al. 2005, p. 746, Table 5), and lynx in the northeastern United States were **most likely to occur in areas with a 10- year mean annual snowfall greater than 105 in (268 cm)** (Hoving 2001, p. 75; Hoving et al. 2005, p. 749).
3. **Minnesota-**Average annual snowfall from 1971 to 2000 in this area was generally g**reater than 55 in** (149 cm) (University of Minnesota 2005).
4. Lynx **den sites** are found in mature and younger boreal forest stands that have a large amount of cover and downed, large woody debris. The structural components of lynx den sites **are common features** in **managed (logged) and unmanaged** (e.g., insect damaged, wind-throw) stands. **Downed trees** provide excellent cover for den sites and kittens and often are associated with dense woody stem growth. Lynx essentially selected **dense cover in a cover-rich area for denning**. Denning habitat was provided by blowdown, deadfalls, and root wads. [so does not appear to be a limiting resource within a home range unless it was managed to look like a lawn with trees!)
5. Stressor of CC - **lynx are dependent on deep snow that persists for long periods of time**. An analysis of potential snow cover under a range of IPCC future climate scenarios and modeling of vegetation using a dynamic vegetation model indicates that **potential lynx habitat could decrease by as much as two-thirds in the contiguous United States by the end of this century** (Gonzalez et al. 2007, pp. 4, 7–8, 10, 13–14). As climate changes over a landscape, the ecosystems that support lynx are likely to shift, tracking the change of temperature, but with a time lag depending on the ability of individual plant and animal species to migrate (McDonald and Brown 1992, pp. 413–414; Hall and Fagre 2003, p. 138; Peterson 2003, p. 652) (Mary, they have lots of info on the "likely" affects of cc which don't look promising for lynx. I think this is going to need to be a significant set of questions for the experts...not if cc is an issue but for recovery are there ways in which cc effects can be minimized or mitigated though recovery actions.)
6. A list of individual needs...not sure any of these rise to population needs: PCE specific to lynx in the contiguous United States is: (1) Boreal forest landscapes supporting a mosaic of differing successional forest stages and containing: (a) Presence of snowshoe hares and their preferred habitat conditions, which include dense understories of young trees, shrubs or overhanging boughs that protrude above the snow, and mature multistoried stands with conifer boughs touching the snow surface; (b) Winter conditions that provide and maintain deep fluffy snow for extended periods of time; (c) Sites for denning that have abundant coarse woody debris, such as downed trees and root wads; and (d) Matrix habitat (e.g., hardwood forest, dry forest, non-forest, or other

habitat types that do not support snowshoe hares) that occurs between patches of boreal forest in close juxtaposition (at the scale of a lynx home range) such that lynx are likely to travel through such habitat while accessing patches of boreal forest within a home range.

7. Good Canada connection- In central Canada where they inhabit a large, relatively homogenous boreal forest landscape, lynx respond quickly to cyclic fluctuations in hare populations. When hares are abundant, lynx respond with increased productivity and survival and, therefore, increased population sizes (Slough and Mowat 1996, pp. 955–956; Mowat et al. 2000, pp. 266, 272). Typically, after hare numbers peak, they begin to decline rapidly and dramatically, forcing large numbers of lynx to disperse—to abandon home ranges in areas with dwindling prey bases no longer capable of supporting the large number of lynx that resulted from the earlier prey abundance (Slough and Mowat 1996, pp. 956–957; Mowat et al. 2000, pp. 291–294). These periodic mass dispersal events (irruptions) appear to start at the core of the species' range in Canada and radiate outward (McKelvey et al. 2000a, p. 239). At the southern periphery of the lynx's range, these events sometimes result in large numbers of lynx dispersing into a variety of habitats in some areas of the northern contiguous United States in search of adequate food resources (Thiel 1987, entire; McKelvey et al. 2000a, pp. 239–242). Some of these dispersing lynx survive and reestablish home ranges elsewhere, but many die en route, often soon after initiating dispersal (Mowat et al. 2000, p. 293), and some appear to remain temporarily in areas not capable of supporting all of their life-history needs over time (Thiel 1987, entire). Canadian lynx have historically been the most reliable source for lynx populations in many areas of the contiguous United States, tending to replenish them within the DPS about every ten years as the lynx/ hare cycle ebbs and flows (McKelvey et al. 2000a, entire). These events can be pictured as a ''wave'' of lynx that occasionally washes over many of the northern tier of States. Over time the wave recedes, leaving remnant lynx populations or ''puddles'' of lynx in a variety of habitats. These puddles of lynx shrink over time as many lynx perish in inhospitable habitats or disperse elsewhere in search of adequate hare densities. When these waves recede, lynx may disappear abruptly from areas of unsuitable habitat or more gradually from suboptimal or marginal habitats. In both cases, lynx perish in or leave many of the places where they occurred temporarily because the habitats in such places, due to insufficient prey densities or inadequacy of one or more other physical or biological features, are incapable of supporting them over time. In a few places in the northern contiguous United States, in landscapes with high snowshoe hare densities and adequate quantities and spatial arrangements of other essential physical and biological features, the puddles tend to persist. It is these remnant ''puddle'' areas that demonstrate the capacity to support lynx population resiliency—the ability of lynx to persist through lows in their own populations and those of their primary prey—that we have determined are essential to conservation of the contiguous U.S. lynx DPS. (so what does all this mean to recovery and "recovered"?)

Heather Bell
Ecological Services HQ
Branch of Conservation Integration
SSA Framework Team Lead
Remotely Located at
134 S. Union Blvd
Lakewood, CO 80228
303-236-4514

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From: Zelenak, Jim
To: Smith, Tamara
Subject: Re: Canada Lynx Expert Elicitation Workshop
Date: Wednesday, September 09, 2015 1:23:32 PM

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thanks

On Wed, Sep 9, 2015 at 12:31 PM, Smith, Tamara <tamara_smith@fws.gov> wrote:

> Will do - sorry just catching up on emails...
>
> On Fri, Sep 4, 2015 at 4:52 PM, Zelenak, Jim <jim_zelenak@fws.gov> wrote:
>
> > Hi Tam,
> >
> > I had Susan Catton in my google mail, but not Tim. Could you please forward this to him also?
> >
> > Thanks,
> >
> > Jim
> > ---------- Forwarded message ----------
> > From: **Zelenak, Jim** <jim_zelenak@fws.gov>
> > Date: Fri, Sep 4, 2015 at 3:47 PM
> > Subject: Canada Lynx Expert Elicitation Workshop
> > To:
> >
> >
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> >
> > Thanks for your consideration of and prompt reply to this request.
> >
> > Cheers!
> >
> > Jim
> >
> > --
> > Jim Zelenak, Biologist

> U.S. Fish and Wildlife Service
> Montana Ecological Services Office
> 585 Shepard Way, Suite 1
> Helena, MT 59601
> (406) 449-5225 ext. 220
> jim_zelenak@fws.gov
>
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> U.S. Fish and Wildlife Service
> Montana Ecological Services Office
> 585 Shepard Way, Suite 1
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> (406) 449-5225 ext. 220
> jim_zelenak@fws.gov

--
Tamara Smith
U.S. Fish and Wildlife Service
Twin Cities Field Office
4101 American Boulevard East
Bloomington, MN 55425
612-725-3548 ext. 2219
612-600-1599 cell

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Jim Zelenak, Biologist
U.S. Fish and Wildlife Service
Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, MT 59601
(406) 449-5225 ext. 220
jim_zelenak@fws.gov

From: Bell, Heather
To: Mary_Parkin
Subject: lynx population needs
Date: Wednesday, September 09, 2015 4:04:06 PM

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sorry Mary! this is probably driving you nuts! i had no idea there was already this much information. i am just reading through the FR crit hab notices pretty quickly to see what I can glean for the SSA structure. I can put these in a more organized fashion if you want! (like a google doc with individual and pop needs, don't know about DPS needs, that is going to have to be a well thought out set of questions to the experts, particularly in light of "recovered" status being what we want).
Pop needs from crit hab.

1. areas that support lynx populations over time (the **lasting ‘‘puddles’’**). these are likely ‘‘source’’ subpopulations within the lynx metapopulation. In addition to their ability to persist through lows in hare and lynx numbers, those areas, during times of hare abundance, produce excess lynx that may either subsequently bolster the local population or disperse into adjacent areas, should habitats and hare numbers in those areas become favorable. (I think these might be actual "places")
2. Natural selection theory implies the **ability of lynx to locate and occupy areas conducive to their survival and population viability.** (our need is smart lynx? oh no, it is perhaps landscape features/connectivity that allows for lynx to have the ability to blah blah...)
3. Exactly how much of each of the physical and biological features must be present and specifically how each must be spatially arranged within boreal forest landscapes to **support lynx populations over time is unknown.** (how much of this would we try to elicit from experts?)
4. **boreal forest landscapes of sufficient size to encompass the temporal and spatial changes in habitat and snowshoe hare populations to support interbreeding lynx populations over time.** (i think this is related to number 1, and we must have some idea what sufficient size ISNT!)
5. **As defined in the Recovery Outline, areas that meet these criteria and have recent evidence of reproduction are considered ‘‘core areas’’ for lynx** (U.S. Fish and Wildlife Service 2005, pp. 3– 4). (i wonder if questions or validation of this approach would be beneficial to get from the experts? have you seen the recovery outline?)
6. More on CC and Colorado. When specifically modeling potential impacts of climate change on lynx, researchers concluded that potential snow and boreal forest **habitat refugia** were most likely to occur in the **Bridger-Teton National Forest in northwestern Wyoming, the Superior National Forest in northeastern Minnesota, and across western Canada,** while h**igh-elevation parts of Colorado are among the areas vulnerable** to the loss of potential lynx habitat in the long term (Gonzalez et al. 2007, pp. 4, 8). Even if suitable snow conditions persist in Colorado and boreal and subalpine forests move upslope with continued climate warming, the amount of potential lynx habitat, already considered patchy and relatively isolated, will likely decrease, becoming even more patchy and isolated and less capable of supporting lynx populations over time. For these reasons, w**e conclude that habitat in Colorado and other parts of the Southern Rockies is marginal, naturally fragmented, and disjunct; that it has not been historically capable of supporting natural resident lynx populations; that it has not been demonstrated to contain all of the physical and biological features essential to lynx in adequate quantity and spatial arrangement to support lynx populations over the long term (i.e., it does not**

contain the PCE); and that it is not essential to the conservation of the DPS.

Heather Bell
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SSA Framework Team Lead
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From: Bush, Jodi
To: O"Malley, Robin
Cc: Jonathan Mawdsley; Jim Zelenak
Subject: Re: connecting lynx assessment group with USGS National Climate Change and Wildlife Science Center
Date: Thursday, September 10, 2015 8:46:46 AM

Thanks Robin. Can we do a call to chat about this? Jim and I are available Monday (9/14) anytime but 11-12 MTN. JB

Jodi L. Bush
Field Supervisor
Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, MT 59601
(406) 449-5225, ext.205

On Wed, Sep 9, 2015 at 11:37 AM, O'Malley, Robin <romalley@usgs.gov> wrote:

> Jodi, Jim -- Glad to meet you!
>
> Jonathan -- I can get this out to our folks -- Northeast CSC, North Central (CSU) and Northeast.
>
> ANY PROBLEM WITH DOING THIS?
>
> R

Robin O'Malley
Policy and Partnership Coordinator
National Climate Change and Wildlife Science Center
US Geological Survey, Mail Stop 516
12201 Sunrise Valley Drive
Reston, VA 20192
703-648-4086
571-294-0922 (cell)
romalley@usgs.gov
http://nccwsc.usgs.gov

On Fri, Sep 4, 2015 at 9:45 AM, Jonathan Mawdsley <jmawdsley@fishwildlife.org> wrote:

> Hello Jody, Jim, and Robin,
>
> I wanted to connect the three of you, based on a discussion on last week's conference call regarding the Species Status Assessment for Canada Lynx. Jodi and Jim are coordinating the Species Status Assessment process for Canada Lynx on behalf of the U. S. Fish and Wildlife Service. This is a new process to gather scientific information about a species that can then be used to inform a variety of listing and management decisions. Jodi indicated on the call last week that the Service has identified a need for persons with expertise in boreal forest ecology and also persons with expertise in modeling the effects

of climate change on boreal forest systems and species. Robin is the Coordinator for the National Climate Change and Wildlife Science Center at USGS (https://nccwsc.usgs.gov/) and may be able to help identify persons with specific expertise to inform the species status assessment process for Canada Lynx. Robin, I was thinking that this may be something that Dennis Ojima's group at Colorado State may be able to help inform? Let me know if I can be helpful in making connections – I'd be happy to help arrange a conversation among us on this important topic.

All the best,

Jonathan

Jonathan R. Mawdsley, Ph.D.

Fish and Wildlife Science Coordinator

Association of Fish and Wildlife Agencies

1100 First Street, NE, Suite 825

Washington, DC 20002 USA

Phone: (202) 838-3462

Cell: (202) 997-6628

Fax: (202) 350-9869

E-mail: jmawdsley@fishwildlife.org

Web: http://www.fishwildlife.org

From: Roberts, Nathan M - DNR
To: jodi_bush@fws.gov
Cc: Hauge, Tom M - DNR; Thiede, Kurt A - DNR
Subject: Lynx SSA Expert nomination
Date: Thursday, September 10, 2015 9:36:39 AM

Hi Jodi,
If it is not too late, Wisconsin would like to like to make a nomination to this panel.

> Dr. Nathan Roberts, Wisconsin, Wisconsin Department of Natural Resources:
> Dr. Roberts is a furbearer/carnivore research scientist with the WDNR. He has worked on *Lynx spp* (bobcat) population dynamics and harvest ecology for several years in WI (WDNR) and NY (Cornell University). He is an expert in carnivore population and harvest dynamics. In addition, Dr. Roberts has been deeply involved with furbearer harvest issues, nationally and internationally, for approximately 10 years; including assisting authoring CITES proposals and positions for the United States regarding *Lynx spp*.

Thank you for your consideration,
-Nathan Roberts for Wisconsin DNR

Nathan M. Roberts, PhD
Bear, Wolf, and Furbearer Research Scientist
Wisconsin Department of Natural Resources
107 Sutliff Ave.
Rhinelander, WI 54501

NathanM.Roberts@wisconsin.gov
715.490.9345

From:	Bush, Jodi
To:	Roberts, Nathan M - DNR
Cc:	Hauge, Tom M - DNR; Thiede, Kurt A - DNR
Subject:	Re: Lynx SSA Expert nomination
Date:	Thursday, September 10, 2015 10:07:14 AM

Thanks Nathan.

Jodi L. Bush
Field Supervisor
Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, MT 59601
(406) 449-5225, ext.205

On Thu, Sep 10, 2015 at 9:36 AM, Roberts, Nathan M - DNR <NathanM.Roberts@wisconsin.gov> wrote:

> Hi Jodi,
>
> If it is not too late, Wisconsin would like to like to make a nomination to this panel.
>
> > Dr. Nathan Roberts, Wisconsin, Wisconsin Department of Natural Resources:
> >
> > Dr. Roberts is a furbearer/carnivore research scientist with the WDNR. He has worked on *Lynx spp* (bobcat) population dynamics and harvest ecology for several years in WI (WDNR) and NY (Cornell University). He is an expert in carnivore population and harvest dynamics. In addition, Dr. Roberts has been deeply involved with furbearer harvest issues, nationally and internationally, for approximately 10 years; including assisting authoring CITES proposals and positions for the United States regarding *Lynx spp*.
>
> Thank you for your consideration,
>
> -Nathan Roberts for Wisconsin DNR
>
> Nathan M. Roberts, PhD
>
> Bear, Wolf, and Furbearer Research Scientist
>
> Wisconsin Department of Natural Resources
>
> 107 Sutliff Ave.
>
> Rhinelander, WI 54501

NathanM.Roberts@wisconsin.gov

715.490.9345

From: Smith, Tamara
To: Catton, Timothy J -FS
Subject: Re: Canada Lynx Expert Elicitation Workshop
Date: Thursday, September 10, 2015 11:15:44 AM

Sounds good, Tim! Thank you!

On Thu, Sep 10, 2015 at 11:07 AM, Catton, Timothy J -FS <tcatton@fs.fed.us> wrote:

> Okay, thanks. At this point I will let Susan represent the Superior NF as well as the Forest Service Eastern Region National Lynx Biology Team rep at the workshop. I'll be happy to provide any other input as requested.
>
> **From:** Smith, Tamara [mailto:tamara_smith@fws.gov]
> **Sent:** Thursday, September 10, 2015 10:59 AM
> **To:** Catton, Timothy J -FS
> **Subject:** Re: Canada Lynx Expert Elicitation Workshop
>
> Hi Tim - You could let Jim Zelenak know if you think we are missing someone off our list of potential lynx experts invitees - include your rationale and their qualifications. We are tying to limit the number of people - obviously all lynx experts will not be able to attend this workshop, but may later be asked for information, input, reviews, etc.
>
> On Wed, Sep 9, 2015 at 3:50 PM, Catton, Timothy J -FS <tcatton@fs.fed.us> wrote:
>
> Thanks, Tam. This would be awesome to be part of! However, although we haven't talked about it I think Susan will be the one of us to attend. I was wondering, however, if I could nominate someone in my stead? Or do you think that would be bad form?
>
> Tim
>
> **From:** Smith, Tamara [mailto:tamara_smith@fws.gov]
> **Sent:** Wednesday, September 09, 2015 1:33 PM
> **To:** Catton, Timothy J -FS
> **Subject:** Fwd: Canada Lynx Expert Elicitation Workshop
>
> Hi Tim - Jim meant to send this to both you and Susan. See message below. hope one or both of you can make it. Thanks! - Tam

---------- Forwarded message ----------
From: **Zelenak, Jim** <jim_zelenak@fws.gov>
Date: Fri, Sep 4, 2015 at 3:47 PM
Subject: Canada Lynx Expert Elicitation Workshop
To:

Greetings!

You have been identified by your peers, the U.S Fish and Wildlife Service, and our State, Federal, and Academic partners as a candidate to participate in a structured expert elicitation workshop that is a crucial part of our Species Status Assessment for the contiguous United States Distinct Population Segment (DPS) of Canada lynx.

The objective of the workshop is to assess the current status of and threats to the various DPS populations and to evaluate the DPS's viability under a range of future threat, habitat condition, and climate scenarios.

The workshop will be held in Minneapolis, Minnesota on Oct. 13-15, 2015.

This is not a formal invitation to participate in the workshop; it is a request to let me know at your earliest convenience whether or not you would be able to attend the workshop on those dates. We hope to finalize the list of invitees and send out formal invitations in the next week or so.

In addition to lynx experts, we are assembling a list of candidates for workshop presentations on boreal forest ecology (distribution, insects, fires, and likely future condition), climate change/ modeling, and the regulatory environment as it pertains to lynx in the Lower 48 states and southern Canada. If you have recommendations for experts on those topics, please also provide them to me with you response.

Thanks for your consideration of and prompt reply to this request.

Cheers!

Jim

--

Jim Zelenak, Biologist

U.S. Fish and Wildlife Service

Montana Ecological Services Office

585 Shepard Way, Suite 1

Helena, MT 59601

(406) 449-5225 ext. 220

jim_zelenak@fws.gov

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Tamara Smith

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From:	Zelenak, Jim
To:	McCollough, Mark
Cc:	Tamara Smith; Jodi Bush; Mary Parkin; Heather Bell; Bryon Holt; Kurt Broderdorp
Subject:	Re: Lynx SSA Expert nomination
Date:	Friday, September 11, 2015 9:16:17 AM

Thanks Mark.

I agree.

On Fri, Sep 11, 2015 at 9:13 AM, McCollough, Mark <mark_mccollough@fws.gov> wrote:

> Hi all:
>
> From a quick look at Google Scholar, I see that Dr. Roberts has a few publications on bobcats, specifically concerning population estimates. However, I am concerned that considering biologists with expertise in bobcats or other felids may unnecessarily expand and complicate our potential field of candidates. These publications don't seem to offer unique application to estimating lynx populations, however, it seems we could always contact experts outside of those invited to the lynx meeting if/when we have a specific need for that expertise.
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> Furthermore, Wisconsin is not a state that consistently supports lynx. There are wildlife biologists with expertise in bobcats from northern New England (that do support a few lynx) that would be equally qualified (e.g. Dr. John Litvaitis at the Univ. of New Hampshire).
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> ## Bobcat population status and management in North America: evidence of large-scale population increase
>
> NM **Roberts**, SM Crimmins - Journal of Fish and Wildlife Management, 2010 - fwspubs.org
> Abstract **Bobcat** Lynx rufus populations are thought to be increasing in North America; however, little information exists on their current population status. In the United States, management and monitoring of **bobcat** populations is the responsibility of state wildlife **...**
> Cited by 29 Related articles All 4 versions Cite SaveSaving...SavedError saving. Try again?
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>
> ## Enhancing furbearer management in New York
>
> N **Roberts** - 2010 - ecommons.library.cornell.edu
> **...** Please use this identifier to cite or link to this item: http://hdl.handle.net/1813/17133.
> Title:
> Enhancing Furbearer Management In New York. Authors: **Roberts**, **Nathan**. Issue Date: 5-Aug-2010. **...** We also developed a population model for a previously unexploited **bobcat** population. **...**
> Cited by 1 Related articles All 6 versions Cite SaveSaving...SavedError saving. Try again?
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[PDF] from wi.govwi.gov [PDF]

[PDF][PDF] Bobcat Population Analyses 2014

RE Rolley, NM **Roberts**, TR Pearson - ua.dnr.wi.gov
Abstract Age and reproductive data obtained from 5,381 **bobcats** harvested during the 1983-2012 seasons and data from the winter furbearer track survey were used to evaluate Wisconsin's **bobcat** population. Analysis suggested that fall population size in northern **...**

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> I'm thinking no because of how many we already have that are actually in places with lynx, and the need to even whittle that number down, but would like your thoughts (and those of other Core Team members who would like to offer theirs).
>
> ---------- Forwarded message ----------
> From: **Bush, Jodi** <jodi_bush@fws.gov>
> Date: Thu, Sep 10, 2015 at 10:07 AM
> Subject: Fwd: Lynx SSA Expert nomination
> To: Jim Zelenak <jim_zelenak@fws.gov>
>
> fyi
>
> Jodi L. Bush
> Field Supervisor
> Montana Ecological Services Office
> 585 Shepard Way, Suite 1
> Helena, MT 59601
> (406) 449-5225, ext.205
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> Date: Thu, Sep 10, 2015 at 9:36 AM
> Subject: Lynx SSA Expert nomination
> To: "jodi_bush@fws.gov" <jodi_bush@fws.gov>
> Cc: "Hauge, Tom M - DNR" <Tom.Hauge@wisconsin.gov>, "Thiede, Kurt A - DNR" <Kurt.Thiede@wisconsin.gov>
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Thank you for your consideration,

-Nathan Roberts for Wisconsin DNR

Nathan M. Roberts, PhD

Bear, Wolf, and Furbearer Research Scientist

Wisconsin Department of Natural Resources

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U.S. Fish and Wildlife Service
Montana Ecological Services Office
585 Shepard Way, Suite 1
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--

> Mark McCollough, Ph.D.
> Endangered Species Specialist
> Maine Field Office
> U. S. Fish and Wildlife Service
> 17 Godfrey Drive, Suite 2
> Orono, ME 04473
> Phone 207 866-3344 x115
> Cell Phone: 207 944-5709
> mark_mccollough@fws.gov

--
Jim Zelenak, Biologist
U.S. Fish and Wildlife Service
Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, MT 59601
(406) 449-5225 ext. 220
jim_zelenak@fws.gov

From: McCollough, Mark
To: Zelenak, Jim
Subject: Re: Maine Reps at Expert Meeting
Date: Friday, September 11, 2015 9:20:10 AM

Jim:

I've exchanged emails with Dan Harrison just this week. He does plan to attend and agreed to give an overall summary of lynx status for Maine. Dan is Department Chair at UMaine and the semester just began last week. I suspect he is swamped, but I will remind him to get back to you.

Jen and Erin have confirmed with me that they will attend as well. Our field office plans to support Erin's travel, and Jen and Dan said they would provide for their own travel.

Thus, it may be hard to dis-invite one of these. If I had to, I would choose Dan to represent UMaine because he has had the longest involvement with lynx-hare-forestry work in Maine. However, I would really like Erin to be present because she as an associate research faculty at UMaine she has developed a unique line of research regarding effects of forestry-insect-climate change on Maine's boreal forest. She also is providing us with an expanded lynx habitat model for northern Maine.

I hope we can continue to invite all 3 from Maine?

Mark

On Fri, Sep 11, 2015 at 10:45 AM, Zelenak, Jim <jim_zelenak@fws.gov> wrote:

> Hi Mark,
>
> I've heard back from Both Jenn Vashon and Erin Simons-LeGaard that they are available to attend the Oct 13-15 workshop. I have not heard back from Dan Harrison.
>
> If you could only select either Erin or Dan to help us best understand current and likely future status and threats for lynx in Maine.the Northeast, who would you pick?
>
> --
> Jim Zelenak, Biologist
> U.S. Fish and Wildlife Service
> Montana Ecological Services Office
> 585 Shepard Way, Suite 1
> Helena, MT 59601
> (406) 449-5225 ext. 220
> jim_zelenak@fws.gov

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17 Godfrey Drive, Suite 2
Orono, ME 04473
Phone 207 866-3344 x115
Cell Phone: 207 944-5709
mark_mccollough@fws.gov

From: Zelenak, Jim
To: McCollough, Mark
Subject: Re: outline for state/region summary of lynx status
Date: Friday, September 11, 2015 9:38:02 AM

We do need to put some directed thought there - to organize our own thinking and to provide some guidance for the experts we will ask to present.

I haven't had time lately to give it much thought, which bothers me, but I hope to wrap up the lawsuit responses today and the review of the DOJ's draft docs early next week. It is crunch time for the lawyers -therefore for me, too.

I'm here next week, then gone the following week for recovery planning course at NCTC (bad timing), leaving not much time when I return to prep for the workshop.

I really want to get formal invitations out next week, along with instructions to those we ask to present. I will send you and the others an expert update later today.

I'm a little fuzzy, too, on the structured process, but trust that USGS, Mary and Heather will be directing that appropriately.

On Fri, Sep 11, 2015 at 9:29 AM, McCollough, Mark <mark_mccollough@fws.gov> wrote:

> Jim:
>
> You mentioned on a recent call that we may request several individuals to present the status of lynx for different states/regions, and that we would want each presenter to address similar information. In other words, we don't want the experts to go off on a tangent on highlighting some aspect of their own research.
>
> We probably need to put some thought into this outline soon, so the presenters can have enough lead time to assemble the information for their state/region.
>
> Does the Core Team want to prepare the outlines as a group or do you already have ideas on what the outline would be?
>
> Mary recommended that we start weekly calls each Tuesday to address our considerable workload leading up to the expert meeting. I know I am still unclear on what the "structure" is that USGS will be leading us through. I'm fine with weekly calls.
>
> Mark
>
> --
> Mark McCollough, Ph.D.
> Endangered Species Specialist
> Maine Field Office
> U. S. Fish and Wildlife Service
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585 Shepard Way, Suite 1
Helena, MT 59601
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jim_zelenak@fws.gov

From:	Zelenak, Jim
To:	Bush, Jodi
Subject:	Re: Reminder: Lynx SSA Coordination Call
Date:	Friday, September 11, 2015 9:47:31 AM

never mind - Rich sent it to me, too

On Fri, Sep 11, 2015 at 9:45 AM, Zelenak, Jim <jim_zelenak@fws.gov> wrote:

> Can you forward me the attachment from Rich? It didn't accompany your reply to him/cc to me.
>
> thanks
>
> On Fri, Sep 4, 2015 at 2:34 PM, Bush, Jodi <jodi_bush@fws.gov> wrote:
>
>> Thanks Rich. Appreciate your input. JB
>>
>> Jodi L. Bush
>> Field Supervisor
>> Montana Ecological Services Office
>> 585 Shepard Way, Suite 1
>> Helena, MT 59601
>> (406) 449-5225, ext.205
>>
>> On Fri, Sep 4, 2015 at 2:33 PM, Baker, Richard (DNR) <richard.baker@state.mn.us> wrote:
>>
>>> Jodi,
>>>
>>> Thank you for your email. In the attached, I have added Minnesota's large carnivore specialist, Dr. John Erb, to the list of candidates for the Lynx Expert Elicitation Panel. Dr. Erb provides technical oversight for the state's wide variety of forest carnivore management programs, and would contribute significantly to the workshop's goals of assessing the current and future status of the Lake States' lynx population.
>>>
>>> Thank you,
>>>
>>> Rich
>>>
>>> <><><><><><><><><><><><><><><><><><>
>>>
>>> Richard J. Baker
>>>
>>> Minnesota Endangered Species Coordinator

Division of Ecological and Water Resources

Minnesota Department of Natural Resources

500 Lafayette Rd., Box 25

St. Paul, MN 55155

Phone: 651/259-5073

Fax: 651/296-1811

E-mail: richard.baker@state.mn.us

http://www.dnr.state.mn.us/eco/nhnrp

<><><><><><><><><><><><><><><><><><><><><><><><>

From: Bush, Jodi [mailto:jodi_bush@fws.gov]
Sent: Thursday, September 03, 2015 1:47 PM
To: bob.broscheid@state.co.us; Odell, Eric; virgil.moore@idfg.idaho.gov; Sallabanks,Rex; Chandler.woodcock@maine.gov; Jake Ivan - DNR; Sam Eaton; dustin.miller@osc.idaho.gov; moritzw@michigan.gov; *Commissioner (DNR); Boggess, Ed (DNR); Baker, Richard (DNR); Erb, John D (DNR); Tubbs, John; Hagener, Jeff; McDonald, Ken; Jay Kolbe; Lexi J., Sandoval; glenn.normandeau@wildlife.nh.gov; Joshua Uriarte; Inman, Bob; DNR-Wildlife@michigan.gov; curt.melcher@state.or.us; Kimberly Hersey; Greg Sheehan; mark scott; cpl@dnr.wa.gov; director@dfw.wa.gov; Lewis, Jeffrey C (DFW); louis.porter@state.vt.us; Bernier, Chris; kurt.thiede@wisconsin.gov; scott.talbot@wyo.gov; Bob Lanka; Nichole Cudworth; Zack Walker; cathy.stepp@wisconsin.gov; Vashon, Jennifer; Jonathan Mawdsley; patricia.riexinger@dec.ny.gov
Cc: Heather Bell; Mary Parkin; Mark McCollough; David Smith; Tamara Smith; Seth Willey; Bryon Holt; Kurt Broderdorp; Jonathan Cummings; Nick.Wiley@myfwc.com; Zelenak, Jim
Subject: Re: Reminder: Lynx SSA Coordination Call

Good afternoon folks. This is a reminder that we remain interested in your input on our list of candidates that we are considering for the Expert Elicitation Panel in October. Because we need to notify these folks soon, we ask that you get any comments or additions to us ASAP but no later than COB tomorrow, September 4, 2015. Thank you. JB

Jodi L. Bush

Field Supervisor

Montana Ecological Services Office

585 Shepard Way, Suite 1

Helena, MT 59601

(406) 449-5225, ext.205

The Service is in the process of identifying candidates to participate in an expert elicitation workshop that will likely be held in mid-Oct., tentatively in Minneapolis, Minnesota. Please review the attached DRAFT (in progress) list of Canada lynx experts we've identified as candidates for participation in the workshop. The overarching objective of the workshop is to assess the current and likely future status of each of the lynx populations in the DPS (contiguous U.S.).

If you believe we have overlooked any lynx experts crucial to achieving that objective, please add their names, affiliations, and areas of expertise, and email me the revised table at your earliest convenience. We intend to extend formal invitation as soon as possible.

We will need to limit the number of experts to facilitate open dialog and candid discussion, and simply for logistical reasons. We will consider any candidates you put forth, but the Service will make the final decision on which experts will be formally invited to participate in the workshop.

Let me know if you have questions or need more information.

Cheers!

Jim

--

Jim Zelenak, Biologist

U.S. Fish and Wildlife Service

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From:	Smith, Tamara
To:	McCollough, Mark
Cc:	Zelenak, Jim; Jodi Bush; Mary Parkin; Heather Bell; Bryon Holt; Kurt Broderdorp
Subject:	Re: Lynx SSA Expert nomination
Date:	Friday, September 11, 2015 10:29:07 AM

Jim - I agree with you and Mark. If we feel the need for Dr. Robert's input later, especially if WI specific and/or harvest/bobcat issues arise through this process - it might be more appropriate to reach out to him at that time.

Thanks,
Tam

On Fri, Sep 11, 2015 at 10:13 AM, McCollough, Mark <mark_mccollough@fws.gov> wrote:

> Hi all:
>
> From a quick look at Google Scholar, I see that Dr. Roberts has a few publications on bobcats, specifically concerning population estimates. However, I am concerned that considering biologists with expertise in bobcats or other felids may unnecessarily expand and complicate our potential field of candidates. These publications don't seem to offer unique application to estimating lynx populations, however, it seems we could always contact experts outside of those invited to the lynx meeting if/when we have a specific need for that expertise.
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> Abstract **Bobcat** Lynx rufus populations are thought to be increasing in North America; however, little information exists on their current population status. In the United States, management and monitoring of **bobcat** populations is the responsibility of state wildlife **...**
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> **...** Please use this identifier to cite or link to this item: http://hdl.handle.net/1813/17133.
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[PDF][PDF] Bobcat Population Analyses 2014

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> To: Jim Zelenak <jim_zelenak@fws.gov>
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> Cc: "Hauge, Tom M - DNR" <Tom.Hauge@wisconsin.gov>, "Thiede, Kurt A - DNR" <Kurt.Thiede@wisconsin.gov>
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-Nathan Roberts for Wisconsin DNR

Nathan M. Roberts, PhD

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612-725-3548 ext. 2219
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From:	Zelenak, Jim
To:	McCollough, Mark
Cc:	Tamara Smith; Jodi Bush; Mary Parkin; Heather Bell; Bryon Holt; Kurt Broderdorp
Subject:	Re: Lynx SSA Expert nomination
Date:	Friday, September 11, 2015 11:16:19 AM

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> Furthermore, Wisconsin is not a state that consistently supports lynx. There are wildlife biologists with expertise in bobcats from northern New England (that do support a few lynx) that would be equally qualified (e.g. Dr. John Litvaitis at the Univ. of New Hampshire).
>
> Mark
>
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> Abstract **Bobcat** Lynx rufus populations are thought to be increasing in North America; however, little information exists on their current population status. In the United States, management and monitoring of **bobcat** populations is the responsibility of state wildlife **...**
> Cited by 29 Related articles All 4 versions Cite SaveSaving...SavedError saving. Try again?
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>
> ## Enhancing furbearer management in New York
>
> N **Roberts** - 2010 - ecommons.library.cornell.edu
> **...** Please use this identifier to cite or link to this item: http://hdl.handle.net/1813/17133.
> Title:
> Enhancing Furbearer Management In New York. Authors: **Roberts**, **Nathan**. Issue Date: 5-Aug-2010. **...** We also developed a population model for a previously unexploited **bobcat** population. **...**
> Cited by 1 Related articles All 6 versions Cite SaveSaving...SavedError saving. Try again?
> More Cached Fewer

[PDF] from wi.govwi.gov [PDF]

[PDF][PDF] Bobcat Population Analyses 2014

RE Rolley, NM **Roberts**, TR Pearson - ua.dnr.wi.gov
Abstract Age and reproductive data obtained from 5,381 **bobcats** harvested during the 1983-2012 seasons and data from the winter furbearer track survey were used to evaluate Wisconsin's **bobcat** population. Analysis suggested that fall population size in northern **...**

On Fri, Sep 11, 2015 at 10:35 AM, Zelenak, Jim <jim_zelenak@fws.gov> wrote:

> Hi Tam,
>
> Any thoughts on this self-nomination to the expert elicitation mtg.?
>
> I'm thinking no because of how many we already have that are actually in places with lynx, and the need to even whittle that number down, but would like your thoughts (and those of other Core Team members who would like to offer theirs).
>
> ---------- Forwarded message ----------
> From: **Bush, Jodi** <jodi_bush@fws.gov>
> Date: Thu, Sep 10, 2015 at 10:07 AM
> Subject: Fwd: Lynx SSA Expert nomination
> To: Jim Zelenak <jim_zelenak@fws.gov>
>
> fyi
>
> Jodi L. Bush
> Field Supervisor
> Montana Ecological Services Office
> 585 Shepard Way, Suite 1
> Helena, MT 59601
> (406) 449-5225, ext.205
>
> ---------- Forwarded message ----------
> From: **Roberts, Nathan M - DNR** <NathanM.Roberts@wisconsin.gov>
> Date: Thu, Sep 10, 2015 at 9:36 AM
> Subject: Lynx SSA Expert nomination
> To: "jodi_bush@fws.gov" <jodi_bush@fws.gov>
> Cc: "Hauge, Tom M - DNR" <Tom.Hauge@wisconsin.gov>, "Thiede, Kurt A - DNR" <Kurt.Thiede@wisconsin.gov>
>
> Hi Jodi,
>
> If it is not too late, Wisconsin would like to like to make a nomination to this panel.

Dr. Nathan Roberts, Wisconsin, Wisconsin Department of Natural Resources:

Dr. Roberts is a furbearer/carnivore research scientist with the WDNR. He has worked on *Lynx spp* (bobcat) population dynamics and harvest ecology for several years in WI (WDNR) and NY (Cornell University). He is an expert in carnivore population and harvest dynamics. In addition, Dr. Roberts has been deeply involved with furbearer harvest issues, nationally and internationally, for approximately 10 years; including assisting authoring CITES proposals and positions for the United States regarding *Lynx spp*.

Thank you for your consideration,

-Nathan Roberts for Wisconsin DNR

Nathan M. Roberts, PhD

Bear, Wolf, and Furbearer Research Scientist

Wisconsin Department of Natural Resources

107 Sutliff Ave.

Rhinelander, WI 54501

NathanM.Roberts@wisconsin.gov

715.490.9345

--
Jim Zelenak, Biologist
U.S. Fish and Wildlife Service
Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, MT 59601
(406) 449-5225 ext. 220
jim_zelenak@fws.gov

--

> Mark McCollough, Ph.D.
> Endangered Species Specialist
> Maine Field Office
> U. S. Fish and Wildlife Service
> 17 Godfrey Drive, Suite 2
> Orono, ME 04473
> Phone 207 866-3344 x115
> Cell Phone: 207 944-5709
> mark_mccollough@fws.gov

--
Jim Zelenak, Biologist
U.S. Fish and Wildlife Service
Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, MT 59601
(406) 449-5225 ext. 220
jim_zelenak@fws.gov

From: Holt, Bryon
To: Clayton Apps
Subject: Re: Lynx Species Status Assessment
Date: Friday, September 11, 2015 11:17:09 AM

Clayton,

We are working on this. I will be in touch with you soon.

Bryon

On Fri, Sep 11, 2015 at 9:23 AM, Clayton Apps <clayapps@telus.net> wrote:

> Hi Bryon,
>
> Did you want to put a contract in place to cover my involvement in the lynx status assessment workshop?
>
> Clayton
>
> **From:** Holt, Bryon
> **Sent:** Tuesday, August 25, 2015 8:31 AM
> **To:** Clayton Apps
> **Subject:** Re: Lynx Species Status Assessment
>
> Hi Clayton,
>
> Fits the bill perfectly. Thanks for providing your information.
>
> Bryon
>
> On Thu, Aug 20, 2015 at 11:59 PM, Clayton Apps <clayapps@telus.net> wrote:
>
> > Hi Bryon,
> >
> > Much of my work is for or in close association with the BC provincial and the Canadian federal government. However, I work under contract and my direct affiliation is with my own firm Aspen Wildlife Research.
> >
> > Attached is the brief bio which I tailored to focus a bit on my lynx work. I hope that is about the kind of thing you were looking for.
> >
> > Clayton
> >
> > **From:** Holt, Bryon
> > **Sent:** Wednesday, August 19, 2015 2:36 PM
> > **To:** Clayton Apps
> > **Subject:** Lynx Species Status Assessment

> Hi Clayton,
>
> We are putting together a document that we will send out to identify who the lynx experts are that will potentially be invited to participate on the lynx expert elicitation meeting/panel. This document will provide a brief summary of the individual's expertise/experience. I've provided an example for Dr. McKelvey below for you. Would you be able to provide a brief blurb? Also, what would you prefer your affiliation to be identified as? Right now I have you as "Independent Researcher".
>
> Example expertise paragraph: A Research Ecologist, Dr. McKelvey works to develop methods to evaluate status and trends of organisms across broad spatial and temporal scales, including genetic monitoring techniques to measure population connectivity across complex landscapes. He was a member of the Lynx Science Team and was the Science lead for the National Lynx Survey, which provided reliable presence/absence data for lynx on over 50 national forests, 5 national parks, and numerous other areas managed by the BLM and several Tribal Nations. He has authored and co-authored many peer-reviewed articles on lynx conservation, history and distribution in the Lower 48, and population ecology/dynamics, and on the dangers of relying on anecdotal occurrence data for rare or elusive species.
>
> Thanks,
>
> Bryon
>
> --
> **********
> Bryon Holt
> U.S. Fish and Wildlife Service
> Northern Idaho Field Office, Spokane, WA
> Telephone: (509) 893-8014
> Fax: (509) 891-6748
> email: bryon_holt@fws.gov
>
> **********

--
****
Bryon Holt
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Northern Idaho Field Office, Spokane, WA
Telephone: (509) 893-8014
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email: bryon_holt@fws.gov

****

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Telephone: (509) 893-8014
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email: bryon_holt@fws.gov

****

From: McCollough, Mark
To: Zelenak, Jim
Subject: Re: Maine Reps at Expert Meeting
Date: Friday, September 11, 2015 11:20:07 AM

Jim:

I've exchanged emails with Dan Harrison just this week. He does plan to attend and agreed to give an overall summary of lynx status for Maine. Dan is Department Chair at UMaine and the semester just began last week. I suspect he is swamped, but I will remind him to get back to you.

Jen and Erin have confirmed with me that they will attend as well. Our field office plans to support Erin's travel, and Jen and Dan said they would provide for their own travel.

Thus, it may be hard to dis-invite one of these. If I had to, I would choose Dan to represent UMaine because he has had the longest involvement with lynx-hare-forestry work in Maine. However, I would really like Erin to be present because she as an associate research faculty at UMaine she has developed a unique line of research regarding effects of forestry-insect-climate change on Maine's boreal forest. She also is providing us with an expanded lynx habitat model for northern Maine.

I hope we can continue to invite all 3 from Maine?

Mark

On Fri, Sep 11, 2015 at 10:45 AM, Zelenak, Jim <jim_zelenak@fws.gov> wrote:

> Hi Mark,
>
> I've heard back from Both Jenn Vashon and Erin Simons-LeGaard that they are available to attend the Oct 13-15 workshop. I have not heard back from Dan Harrison.
>
> If you could only select either Erin or Dan to help us best understand current and likely future status and threats for lynx in Maine.the Northeast, who would you pick?
>
> --
> Jim Zelenak, Biologist
> U.S. Fish and Wildlife Service
> Montana Ecological Services Office
> 585 Shepard Way, Suite 1
> Helena, MT 59601
> (406) 449-5225 ext. 220
> jim_zelenak@fws.gov

--
Mark McCollough, Ph.D.
Endangered Species Specialist
Maine Field Office
U. S. Fish and Wildlife Service

17 Godfrey Drive, Suite 2
Orono, ME 04473
Phone 207 866-3344 x115
Cell Phone: 207 944-5709
mark_mccollough@fws.gov

From: McCollough, Mark
To: Jim Zelenak
Subject: outline for state/region summary of lynx status
Date: Friday, September 11, 2015 11:29:38 AM

Jim:

You mentioned on a recent call that we may request several individuals to present the status of lynx for different states/regions, and that we would want each presenter to address similar information. In other words, we don't want the experts to go off on a tangent on highlighting some aspect of their own research.

We probably need to put some thought into this outline soon, so the presenters can have enough lead time to assemble the information for their state/region.

Does the Core Team want to prepare the outlines as a group or do you already have ideas on what the outline would be?

Mary recommended that we start weekly calls each Tuesday to address our considerable workload leading up to the expert meeting. I know I am still unclear on what the "structure" is that USGS will be leading us through. I'm fine with weekly calls.

Mark

--
Mark McCollough, Ph.D.
Endangered Species Specialist
Maine Field Office
U. S. Fish and Wildlife Service
17 Godfrey Drive, Suite 2
Orono, ME 04473
Phone 207 866-3344 x115
Cell Phone: 207 944-5709
mark_mccollough@fws.gov

From:	Smith, Tamara
To:	McCollough, Mark
Cc:	Zelenak, Jim; Jodi Bush; Mary Parkin; Heather Bell; Bryon Holt; Kurt Broderdorp
Subject:	Re: Lynx SSA Expert nomination
Date:	Friday, September 11, 2015 11:29:39 AM

Jim - I agree with you and Mark. If we feel the need for Dr. Robert's input later, especially if WI specific and/or harvest/bobcat issues arise through this process - it might be more appropriate to reach out to him at that time.

Thanks,
Tam

On Fri, Sep 11, 2015 at 10:13 AM, McCollough, Mark <mark_mccollough@fws.gov> wrote:

> Hi all:
>
> From a quick look at Google Scholar, I see that Dr. Roberts has a few publications on bobcats, specifically concerning population estimates. However, I am concerned that considering biologists with expertise in bobcats or other felids may unnecessarily expand and complicate our potential field of candidates. These publications don't seem to offer unique application to estimating lynx populations, however, it seems we could always contact experts outside of those invited to the lynx meeting if/when we have a specific need for that expertise.
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[PDF][PDF] Bobcat Population Analyses 2014

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Abstract Age and reproductive data obtained from 5,381 **bobcats** harvested during the 1983-2012 seasons and data from the winter furbearer track survey were used to evaluate Wisconsin's **bobcat** population. Analysis suggested that fall population size in northern **...**

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> Subject: Fwd: Lynx SSA Expert nomination
> To: Jim Zelenak <jim_zelenak@fws.gov>
>
> fyi
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> Jodi L. Bush
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> (406) 449-5225, ext.205
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> ---------- Forwarded message ----------
> From: **Roberts, Nathan M - DNR** <NathanM.Roberts@wisconsin.gov>
> Date: Thu, Sep 10, 2015 at 9:36 AM
> Subject: Lynx SSA Expert nomination
> To: "jodi_bush@fws.gov" <jodi_bush@fws.gov>
> Cc: "Hauge, Tom M - DNR" <Tom.Hauge@wisconsin.gov>, "Thiede, Kurt A - DNR" <Kurt.Thiede@wisconsin.gov>
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> Dr. Roberts is a furbearer/carnivore research scientist with the WDNR. He has worked on *Lynx spp* (bobcat) population dynamics and harvest ecology for several years in WI (WDNR) and NY (Cornell University). He is an expert in carnivore population and harvest dynamics. In addition, Dr. Roberts has been deeply involved with furbearer harvest issues, nationally and internationally, for approximately 10 years; including assisting authoring CITES proposals and positions for the United States regarding *Lynx spp*.

Thank you for your consideration,

-Nathan Roberts for Wisconsin DNR

Nathan M. Roberts, PhD

Bear, Wolf, and Furbearer Research Scientist

Wisconsin Department of Natural Resources

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NathanM.Roberts@wisconsin.gov

715.490.9345

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--
Tamara Smith
U.S. Fish and Wildlife Service
Twin Cities Field Office
4101 American Boulevard East
Bloomington, MN 55425
612-725-3548 ext. 2219
612-600-1599 cell

From: Zelenak, Jim
To: Holt, Bryon
Subject: Re: Lynx Species Status Assessment
Date: Friday, September 11, 2015 1:45:54 PM

As indicated in my earlier message - we haven't heard back from everyone yet, but we will still likely send formal invitations next week. I don't see anything changing with regard to Clayton - I think we will invite him. I think our admin folks here will be working on the contracting/payment issues next week. My understanding is that we will be able to pay airfare in advance, but that we will reimburse folks for lodging and per diem costs. I'll check and get back to you. I also understand that we don't pay salaries or stipend for participant's time.

On Fri, Sep 11, 2015 at 1:33 PM, Holt, Bryon <bryon_holt@fws.gov> wrote:

> Jim,
>
> See message from Clayton. Where are we at on this??
>
> Bryon
>
> ---------- Forwarded message ----------
> From: **Clayton Apps** <clayapps@telus.net>
> Date: Fri, Sep 11, 2015 at 9:23 AM
> Subject: Re: Lynx Species Status Assessment
> To: "Holt, Bryon" <bryon_holt@fws.gov>
>
> Hi Bryon,
>
> Did you want to put a contract in place to cover my involvement in the lynx status assessment workshop?
>
> Clayton
>
> **From:** Holt, Bryon
> **Sent:** Tuesday, August 25, 2015 8:31 AM
> **To:** Clayton Apps
> **Subject:** Re: Lynx Species Status Assessment
>
> Hi Clayton,
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> Bryon
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> On Thu, Aug 20, 2015 at 11:59 PM, Clayton Apps <clayapps@telus.net> wrote:
>
> > Hi Bryon,
> >
> > Much of my work is for or in close association with the BC provincial and the Canadian federal government. However, I work under contract and my direct affiliation is with my

own firm Aspen Wildlife Research.

Attached is the brief bio which I tailored to focus a bit on my lynx work. I hope that is about the kind of thing you were looking for.

Clayton

From: Holt, Bryon
Sent: Wednesday, August 19, 2015 2:36 PM
To: Clayton Apps
Subject: Lynx Species Status Assessment

Hi Clayton,

We are putting together a document that we will send out to identify who the lynx experts are that will potentially be invited to participate on the lynx expert elicitation meeting/panel. This document will provide a brief summary of the individual's expertise/experience. I've provided an example for Dr. McKelvey below for you. Would you be able to provide a brief blurb? Also, what would you prefer your affiliation to be identified as? Right now I have you as "Independent Researcher".

Example expertise paragraph: A Research Ecologist, Dr. McKelvey works to develop methods to evaluate status and trends of organisms across broad spatial and temporal scales, including genetic monitoring techniques to measure population connectivity across complex landscapes. He was a member of the Lynx Science Team and was the Science lead for the National Lynx Survey, which provided reliable presence/absence data for lynx on over 50 national forests, 5 national parks, and numerous other areas managed by the BLM and several Tribal Nations. He has authored and co-authored many peer-reviewed articles on lynx conservation, history and distribution in the Lower 48, and population ecology/dynamics, and on the dangers of relying on anecdotal occurrence data for rare or elusive species.

Thanks,

Bryon

--
****
Bryon Holt
U.S. Fish and Wildlife Service
Northern Idaho Field Office, Spokane, WA
Telephone: (509) 893-8014
Fax: (509) 891-6748
email: bryon_holt@fws.gov

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U.S. Fish and Wildlife Service

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Jim Zelenak, Biologist
U.S. Fish and Wildlife Service
Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, MT 59601
(406) 449-5225 ext. 220
jim_zelenak@fws.gov

From: Zelenak, Jim
To: McKelvey, Kevin -FS
Subject: Fwd: Canada Lynx Expert Elicitation Workshop
Date: Friday, September 11, 2015 1:49:01 PM

Hi Dr. McKelvey,

Needing to know if these dates still work for you. We hope to send formal invitations out next week.

Thanks,

Jim

---------- Forwarded message ----------
From: **Zelenak, Jim** <jim_zelenak@fws.gov>
Date: Fri, Sep 4, 2015 at 3:47 PM
Subject: Canada Lynx Expert Elicitation Workshop
To:

Greetings!

You have been identified by your peers, the U.S Fish and Wildlife Service, and our State, Federal, and Academic partners as a candidate to participate in a structured expert elicitation workshop that is a crucial part of our Species Status Assessment for the contiguous United States Distinct Population Segment (DPS) of Canada lynx.

The objective of the workshop is to assess the current status of and threats to the various DPS populations and to evaluate the DPS's viability under a range of future threat, habitat condition, and climate scenarios.

The workshop will be held in Minneapolis, Minnesota on Oct. 13-15, 2015.

This is not a formal invitation to participate in the workshop; it is a request to let me know at your earliest convenience whether or not you would be able to attend the workshop on those dates. We hope to finalize the list of invitees and send out formal invitations in the next week or so.

In addition to lynx experts, we are assembling a list of candidates for workshop presentations on boreal forest ecology (distribution, insects, fires, and likely future condition), climate change/ modeling, and the regulatory environment as it pertains to lynx in the Lower 48 states and southern Canada. If you have recommendations for experts on those topics, please also provide them to me with you response.

Thanks for your consideration of and prompt reply to this request.

Cheers!

Jim

--
Jim Zelenak, Biologist
U.S. Fish and Wildlife Service
Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, MT 59601
(406) 449-5225 ext. 220
jim_zelenak@fws.gov

--
Jim Zelenak, Biologist
U.S. Fish and Wildlife Service
Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, MT 59601
(406) 449-5225 ext. 220
jim_zelenak@fws.gov

From: Holt, Bryon
To: Zelenak, Jim
Subject: Re: Lynx Workshop 12 Oct 2015
Date: Monday, September 14, 2015 11:14:10 AM

It is the dates. I thought I advised you that when I first mentioned to Gary about the potential dates, he expressed some hesitation because it's the hunting season and he has other commitments, but said he thought he might be available. Anyway, now he is unwilling to commit. As for someone else, that's a good question. I don't know of anybody else who knows about the status of lynx and their biology in the west outside of Gary and, perhaps, Bob Naney. So, unfortunately, I do not have another suggestion for you. Sorry.

On Mon, Sep 14, 2015 at 9:57 AM, Zelenak, Jim <jim_zelenak@fws.gov> wrote:

> Do you know if it was just the dates? Or is something else going on? Thought he was originally pretty excited to attend and thought the general mid-Oct. - mid Nov. time frame would work.
>
> Well, regardless, we now need to find someone else who can give, in person or remotely, an update on lynx in northern Washington...
>
> Your thoughts?
>
> On Mon, Sep 14, 2015 at 10:52 AM, Holt, Bryon <bryon_holt@fws.gov> wrote:
>
> > I just talked with Gary, and he is not available.
> >
> > Bryon
> >
> > On Wed, Sep 9, 2015 at 9:43 AM, Zelenak, Jim <jim_zelenak@fws.gov> wrote:
> >
> > > Can you talk to Gary about whether he might be able to participate and/or present remotely - maybe only a few hours or for one day?
> > >
> > > On Wed, Sep 9, 2015 at 10:34 AM, Holt, Bryon <bryon_holt@fws.gov> wrote:
> > >
> > > > Yes, I agree. But, I really think from a lynx researcher/scientist perspective we need to get Gary's thoughts and perspectives on the issues we ask the panel to have a solid scientific base for the west.
> > > >
> > > > Bryon
> > > >
> > > > On Wed, Sep 9, 2015 at 9:28 AM, Zelenak, Jim <jim_zelenak@fws.gov> wrote:
> > > >
> > > > > Crap! Plan B for Washington representation? Think I'd lean toward more to Naney than to Jeff Lewis or other State Bio.
> > > > >
> > > > > Your thoughts?
> > > > >
> > > > > ---------- Forwarded message ----------
> > > > > From: **Gary Koehler** <garykoehler@nwi.net>
> > > > > Date: Wed, Sep 9, 2015 at 9:43 AM
> > > > > Subject: Lynx Workshop 12 Oct 2015

To: jim_zelenak@fws.gov
Cc: "Holt, Bryon" <bryon_holt@fws.gov>

Jim: I regret that I will not be able to attend the Workshop on Lynx in Minnesota in mid-October.

Gary Koehler
garykoehler@nwi.net
509-699-9857
Skype: puma.koehler151

--
Jim Zelenak, Biologist
U.S. Fish and Wildlife Service
Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, MT 59601
(406) 449-5225 ext. 220
jim_zelenak@fws.gov

--
****
Bryon Holt
U.S. Fish and Wildlife Service
Northern Idaho Field Office, Spokane, WA
Telephone: (509) 893-8014
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U.S. Fish and Wildlife Service
Montana Ecological Services Office
585 Shepard Way, Suite 1
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