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Attn: Jim Zelanak
U.S. Fish and Wildlife Service
585 Shepard Way, Suite 1
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Subject: Request for Peer Review of the Proposed Rule to Revise the Designation of Critical Habitat for the Contiguous U.S. Distinct Population Segment of the Canada Lynx

To Whom It May Concern:

I thank the U.S. Fish and Wildlife Service for the opportunity to comment on the proposed rule 78 FR 59429-59474. Below I have provided responses to specific questions as requested. I have also included citations where I refer to literature not already included in the proposed rule, and copies of the documents on a DVD (enclosed).

1. The "presence of snowshoe hares and their preferred habitat conditions" and not habitat with specific hare density is ultimately included as a Primary Constituent Element (PCE) of critical habitat. The descriptions of lynx biology and habitat, however, emphasize the dependence of lynx persistence on the availability of enough high-quality snowshoe hare habitat to support "high" hare densities and the natural limitation of southern boreal landscapes to achieving northern hare (or lynx) densities because of the "patchy and transitional" nature of the habitat. Although I do not disagree with the analysis, I think those general principles are somewhat overemphasized in the context of the needs of lynx conservation in the U.S. Specifically, as demonstrated by Steury and Murray (2004), a self-sustaining lynx population in the U.S. does not require high-quality stands of hare habitat to attain densities comparable to the northern high, particularly with reduced year-to-year variability. The more important point may be "lynx populations cannot persist over time in areas with consistently low hare densities [78 FR 59435]" and the important question - how low is too low?

Particularly because of the mixing of stand- and landscape-scale density estimates at various times, I find there to be a general lack of clarity in the proposed rule on what constitutes a "low" (or "high") hare density. Although defining either is understandably difficult, I suggest that it would be helpful to have a working definition that is more clearly stated rather than implicitly applied as it is in the case of, for example, Colorado (78 FR 59559). I also suggest that the appropriate scale of that definition is the landscape (or home range) scale, which allows areas to

be compared on the basis of average hare density (or at the very least proportion of high-quality habitat) even if the hare density - forest type relationships differ.

As described in more detail below (see #7), I think the agency's determination of the occupied area in Maine bears additional consideration.

2. I am not aware of any additional populations of lynx.

3. I am not aware of any additional information on the biological or ecological requirements of lynx.

4. With respect to the amount, distribution, and quality of habitat in Maine - although I agree that the extent of high-quality hare habitat in western Maine is currently less compared to northern Maine, I question the general characterization that spruce-fir forest is a lower percentage of the landscape. Spruce-fir forest is broadly distributed across Maine; red spruce and balsam fir (McCaskill et al. 2011; Figs. 28 and 30) extend well into the western mountains, including areas with high predicted volume based on the most recent analysis by the U.S. Forest Service. Balsam fir volume is actually estimated to be higher in westerly Franklin County compared to Piscatiquis County (McCaskill et al. 2011; p.25), which is at the center of proposed critical habitat in Maine. Further, our past (Simons 2009) and ongoing (Legaard et al. 2013 *Unpublished Report*, Simons-Legaard et al. 2013 *Unpublished Report*) efforts to project the future distribution of spruce-fir forest indicate that the amount and extent of conifer or mixedwood regenerating forest capable of supporting high densities of snowshoe hare will expand in western Maine.

Rates of stand-replacing timber harvests in the 1970s and 1980s were considerably higher in northern Maine compared to western where the severity of the spruce budworm outbreak and the need to salvage were both less. In the 1990s and 2000s, rates were more similar in the two areas of the state and, assuming post-harvest forest composition will be similar to pre-harvest, we can expect that many new areas of high-quality hare habitat will emerge in western Maine over the next 25 years. The amount and extent of high-quality habitat in northern Maine, however, is likely to decrease in many areas as cuts from the 1970s and 1980s continue to mature. There is not an equal amount of younger regenerating forest (due to the reduced clearcut rates in the 1990s and 2000s) in close proximity to replace it. As a consequence, the availability of high-quality hare habitat at the scale of a lynx home range (and, consequently, landscape-scale hare densities) will likely increase in western Maine as they are decreasing in areas of northern Maine. Given the 1) historic (Hoving et al. 2004) and recent (Vashon et al. 2012) observations of lynx in south-central and western Maine; 2) observations in northern NH (78 FR 59452); and 3) high-level of habitat connectivity in the region (78 FR 59453), it seems likely that lynx will find their way to those areas.

5. The proposed rule emphasizes the potential negative effects of climate change on lynx via reductions in snowfall but says little of the effects of climate change on lynx habitat. Spruce-fir

forests in the northeastern U.S. are expected to be particularly susceptible to climate change effects (Potter et al 2012); red spruce has a very limited distribution and balsam fir is at the southern limit of its range. Broad-scale climate-envelope models predict that overall habitat suitability for the primary tree species of the spruce-fir forest type will be reduced in the U.S. and remnant trees will experience increased effects of drought and thermal stress. As temperatures increase and suitable conditions are reduced or eliminated throughout much of the current spruce-fir range, growth and regeneration of hardwood forests or more southerly conifers will be favored. Beckage et al. (2008) found that the ecotone between northern hardwood forests and montane boreal forests in the Green Mountains of Vermont has shifted approximately 100 m upslope just over the last 40 years. Some research suggests that spruce-fir forest will disappear from New England and much of the upper Great Lakes region within this century (Iverson and Prassad 2001, Iverson et al. 2008). These changes are expected to result from increased competition from other tree species, decreased regeneration success, and increased susceptibility to pathogens and other forest insects.

Given the close associations between regenerating spruce-fir forest, snowshoe hare, and lynx, the northward contraction of the range of spruce-fir forest is another likely threat posed to lynx conservation in the U.S. by climate change.

6. I find the agency's assumptions and definitions of critical habitat to be logical and adequate.

7. I find the agency's conclusions regarding 1) Colorado/Southern Rockies; 2) Beaverhead-Deerlodge, Bitteroot, Clearwater, and Nez Perce National Forests; 3) Helena and Lolo National National Forests outside those proposed for critical habitat; 4) New Hampshire and Vermont; and 5) eastern Maine to be logical and supported by the evidence. I think the conclusion that western Maine does not (or will not) have the features to sustain lynx over time and is not essential to lynx conservation, however, bears additional consideration (see below).

One of the primary reasons given for the decision to not include western Maine as part of critical habitat is the differences in habitat conditions compared to northern Maine. Specifically, that spruce-fir is a lower percentage of the landscape and that lynx habitat is more fragmented. These conclusions appear to be primarily based on land cover maps used in analyses by Hoving (2001), Robinson (2006), and Vashon et al. (2012). These various maps, however, reflect past and not current habitat conditions. The early 1990s (i.e., 1992-1993) in the case of Hoving (2001); the early 2000s in the cases of Robinson (2006) and Vashon et al. (2012), circa 2004 and 2003, respectively. As frequently mentioned in the proposed rule, lynx habitat is a shifting mosaic, and as mentioned above, habitat conditions in western Maine are likely to improve in the near future while conditions in northern Maine may decline. This south-westerly shift in habitat is highlighted in Figures 3.10 and 3.11 in Simons (2009).

A second reason given is the lack of consistent presence and reproduction in western Maine. Here there would seem to be some inconsistency with regards to the critical habitat

determination compared to the newly added Van Buren and Hersheytown-Staceyville areas. Western Maine has "a persistent historical presence" and, along with the Van Buren and Hersheytown-Staceyville areas, is within the "core area" classified in the Recovery Outline. Evidence of occurrence based on the 2003-2008 surveys (Vashon et al. 2012; Fig. 2.3) is stronger in western Maine than it is either in the Van Buren or Hersheytown-Staceyville areas, or, further, the area of northern Somerset that is included in critical habitat. Although it is not made clear, I presume that aside from the radio-telemetry data, the same "new information on lynx" that helped to demonstrate that the Van Buren or Hersheytown-Staceyville areas contain the PCEs is captured by Fig. 4.2 in Vashon et al. (2012), and this same map also provides additional evidence of lynx occurrence in western Maine. There is no mention of known reproduction in either the Van Buren or Hersheytown-Staceyville areas as compared to some evidence in western Maine.

A third reason given is the low probability of occurrence predicted by the Hoving et al. (2004) model. Again, there would seem to be inconsistency with regards to the critical habitat determination compared to the newly added Van Buren area as it is also predicted to have a low probability of occurrence by Hoving et al. (2004). More importantly, however, I would assert that in the case of occurrence prediction the results of the Hoving et al. (2005) are more reliable, particularly with respect to the model's ability to predict presence (i.e., sensitivity). Sensitivity of the Hoving et al. (2005) model was 57% compared to 38% for the Hoving et al. (2004). This is pertinent because results differ between these two models in western and northeastern Maine; in both regions of Maine, areas with consistently low predicted probabilities (i.e., 0-20%) based on the regional model (Hoving et al. 2004) are predicted to have probabilities >50% based on the broad-scale model (Fig 2.; Hoving et al. 2005). This continues to be the case even when bobcat harvest density is included (Fig. 2.8; Hoving 2001) (see following).

A fourth reason given is the presence of bobcats in western Maine. As mentioned above, however, areas of relatively high probability of lynx occurrence remained in western Maine even when bobcat harvest density was included in Hoving's broad-scale model (Hoving 2001). Further, average bobcat harvest densities in western Maine (0.003 - 0.008 bobcat per km^2; Fig. 2.5 in Hoving 2001) are lower than St. Louis County in Minnesota (0.012 bobcat per km^2; Minnesota Department of Natural Resources 2011, p. 7), the majority of which has been proposed for inclusion in critical habitat.

I find the agency's decision to include both new areas to critical habitat in Maine, particularly the Van Buren area, to be logical, but I also find that western Maine meets many if not all of the same criteria put forward by the U.S. Fish and Wildlife Service (2013a, p. 12) for those areas: 1) likely occupied at the time of listing; 2) habitat is contiguous and similar to lynx critical habitat; 3) predominantly industrial forestlands with intensive management; 4) snow regime suitable; and 5) new information on recent occurrence. In addition, the importance of western Maine to lynx conservation in the U.S. may increase in the future given the potential for higher elevations to

moderate climate change effects on snow accumulation in the Northeast as some studies suggest (e.g., Feng and Hu 2007). The positive effect that this would have on lynx occurrence is suggested by Fig 2.14 in Hoving (2001).

8. I find that the agency included the necessary and pertinent literature.

9. In my answer to #5, I have highlighted what I think is the primary oversight (i.e., climate change effects on lynx habitat) in the proposed rule, and in my answer to #7 I have outlined what I think are inconsistencies with regards to the inclusion or exclusion of areas from critical habitat.

Please feel free to contact me if you have any additional questions.

Sincerely,

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