United States Department of Agriculture **Forest Service** **Region One** **200 East Broadway P.O. Box 7669 Missoula, MT 59807**

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Ms. Kathy McAllister, Chair
Lynx and Wolverine Steering Committee
Acting Regional Forester, USDA Forest Service
Northern Region
PO Box 7669
Missoula, MT 59807

Dear Ms. McAllister:

Enclosed you will find the Lynx Biology Team response to the US Fish and Wildlife Service "white paper" titled *Management of Canada Lynx in the Cascades Geographic Areas of Oregon and Washington* (cover letter dated April 16, 2001 from Susan Martin, FWS, Region 1) that was delivered to the Lynx and Wolverine Steering Committee on April 30, 2001. At this meeting, the Steering Committee assigned the review of the "white paper" to the Lynx Science Team and Lynx Biology Team. Since the Lynx Science Team was officially disbanded after the Lynx Science Report was completed, this request for review went to Dr Len Ruggiero and two authors of Chapter 8 of the Science Report, namely Drs. Kevin McKelvey and Keith Aubry. The Steering Committee directed the Biology Team to prepare responses to Issues II, III, and IV.

The Biology Team met in Missoula, Montana, on October 2-4, 2001 to review and respond to issues raised in *Management of Canada Lynx in the Cascades Geographic Areas of Oregon and Washington,* ("white paper") prepared by Region 1 of the U.S. Fish and Wildlife Service. We concluded the "white paper" presented no new information compelling us to: 1 - change the lynx habitat description presented in the Lynx Conservation Assessment and Strategy (LCAS), 2 - modify the application of the LCAS, or, 3 - change the current direction for mapping lynx habitat.

In preparing the Biology Team response to the "white paper," we followed the same approach utilized to develop the Canada Lynx Conservation Assessment and Strategy (LCAS). The Biology Team approach consisted of science-based conservation utilizing the best biology and ecology principles as well as the most relevant data to define lynx habitat and mapping procedures. Soon after we received the June 12, 2001 Science Response, we commenced review of the "white paper."

To facilitate our review, we sequentially numbered each line of the "white paper" text and appendices. We responded specifically to Issues II-IV outlined in the FWS cover letter and the questions in the text. Some of the points and questions are repeated in the "white paper." In these cases, we referenced our initial answer rather than repeating the answers in the response. In addition, during our review of the white paper, we noticed references to "attachments" that we did not receive.

Many of the questions in the "white paper" indicate a misunderstanding of ecological concepts and terminology in the LCAS to describe vegetation and thereby define lynx habitat. Of fundamental importance is the understanding that lynx habitat is not defined solely by vegetation. We defined lynx habitat (LCAS, page 4 – Glossary) to include mesic coniferous forests that have cold, snowy winters; support some minimum density of snowshoe hares (lynx primary prey); and presented vegetation descriptions.

A primary concern raised many times in the "white paper" was how and why the Subalpine Fir Series was identified as primary vegetation to represent lynx habitat. Our response provides the details. We used current literature referencing lynx association with boreal forests and the connection of the Subalpine Fir Series to boreal forest at the southern end of the range. We consulted with research scientists conducting lynx research on vegetation conditions that best represent lynx habitat and we reviewed lynx occurrence data for consistent, long-term, high frequency occurrence through time. The Subalpine Fir Series provided the best representation of the environmental factors that provide lynx habitat.

Another issue raised in the "white paper" related to the many records of lynx occurrence, especially in the Oregon Cascades, that are outside of lynx analysis units (LAUs). The authors of the "white paper" believe lynx records represent lynx habitat and that these areas will not have the benefits of the application of the management direction in LCAS. Since the analyses conducted by the Science Team to produce Chapter 8 in Ecology and Conservation of Lynx in the United States, several additional lynx occurrence records were found through review of county bounty records. The authors of the "white paper" requested a new analysis to evaluate these records. Dr. Kevin McKelvey and Dr. Keith Aubry, primary authors of Chapter 8, provided response to this issue for the Steering Committee in a memo dated June 12, 2001. McKelvey and Aubry basically state the new records do not substantially change the quality of the information or our current understanding of lynx in Oregon. The Biology Team relies on the statistical and ecological expertise of the Science Team to guide data analyses. The Biology Team addressed lynx occurrence records across the range of lynx that are not in lynx habitat, from those occurring near lynx habitat, to those in habitats in North and South Dakota, Illinois, Indiana and Nebraska. McKelvey et al. (2000a) reported the three recent (1964, 1974, and 1993) verified lynx reports from Oregon were all in anomalous habitats and were within several years of lynx population peaks in western Canada. Based on information presented in the literature it would not be prudent to apply the LCAS everywhere a lynx occurrence is recorded.

In the description of lynx habitat, the Biology Team included "secondary vegetation where adjacent or intermingled" with primary vegetation could contribute to lynx habitat. The terms adjacent and intermingled seemed to cause confusion among the authors of the "white paper" and concern they may not be applied consistently. The "white paper" authors provided a suggestion that minimum daily movements of lynx within home ranges could be used to identify adjacent vegetation. The Biology Team did not provide quantitative advice for these terms, but described them more subjectively. The intent of the mapping direction was to achieve a landscape perspective of lynx habitat and it was expected there would be small inclusions of vegetation types other than primary vegetation present on the landscape and they likely contribute to lynx habitat. It was also expected that areas immediately adjacent to the primary vegetation should be included as lynx habitat. As administrative units began to apply the

mapping criteria, the Biology Team held workshops across the range to help employees apply the criteria so that consistent application would occur. The suggestion to use minimum daily movements, as reported in the literature, is not appropriate since these movements occur within lynx habitat to meet daily needs. It would not be appropriate to include all vegetation within 3 miles (as recommended in the "white paper") of primary vegetation as lynx habitat.

The U.S. Fish and Wildlife Service R1 suggested mapping "Evaluation Areas" to include areas with a "number of lynx occurrences" and areas no longer included in LAUs as lynx habitat. Where lynx occur outside of lynx habitat, provisions in the Endangered Species Act provide protection for the individual. Designation of "Evaluation Areas" is not necessary to address individual lynx that may be detected outside of lynx habitat.

A framework for incorporating new information into the LCAS is described on page 4-Introduction. During development of the LCAS, it was recognized that information on lynx ecology and distribution in the southern portion of the range was limited. The Biology Team recommended that an interagency team review new information on lynx ecology and distribution at least every five years and adjust the LCAS as necessary. A more detailed framework was provided to the Steering Committee (April, 2001) for amending the LCAS that requires Lynx and Wolverine Steering Committee approval (Biology Team response, pages 19-20).

Finally, the Biology Team agrees that sightings and anecdotal records of lynx may occur in the Oregon Cascades and western Washington Cascades. However, contrary to the assertions in the "white paper," there is no evidence that lynx were more widespread and abundant in these areas than previously thought.

The Biology Team (BT) concluded:

1. The "white paper" provides no evidence that lynx were more widespread and abundant in Oregon and Washington than "previously" thought (BT response, page 38).
2. The additional lynx records collected and reported in the "white paper" do not change the quality of our understanding of lynx distribution (BT response, pages17-18; Mckelvey and Aubry, Science Response, June 12, 2001).
3. The LCAS and current mapping direction utilize the body of evidence related to lynx biology and ecology, thereby providing a science-based approach to conservation. It is contradictory to require additional landscapes to be managed to conserve lynx based on subsets of unreliable occurrence records or single verified records presented in the "white paper."
4. The Biology Team believes that the current mapping direction represents and includes all areas capable of supporting lynx (BT response, page 15). We believe that the direction is a reasonable conservation approach based on the best scientific information available (BT response, page 4).
5. The Biology Team recognized that the existing data indicate a number of lynx occurrence records occur outside areas currently mapped as lynx habitat (BT response, pages 17-18). We expect that some future lynx occurrences will be outside of mapped lynx habitat and this may happen in all the Geographic Areas (LCAS page 4-1). Many documented,

verified records of lynx occur in North and South Dakota and Nebraska, but habitat to support lynx is not present. Lynx occurrences in these states are strongly correlated (with lagged synchrony) with lynx population highs in Canada, and thus, are thought to represent transient individuals dispersing from Canada or elsewhere, subsequent to crashes of snowshoe hare populations (McKelvey et al. 2000a and BT response, page 18.). Similar to Nebraska, North and South Dakota, verified records of lynx in Oregon appear to be correlated with lynx population cycles in Canada (McKelvey et al. 2000a).

6. The "white paper" does not present substantive evidence, data or biological interpretations that provides a basis for the Biology Team to recommend any change in the current direction to mapping lynx habitat.
7. The "white paper" does not present substantive evidence, data or biological interpretations that provides a basis for the Biology Team to recommend an amendment to the LCAS.

Sincerely,

/S/JAMES J CLAAR
JAMES J CLAAR, Leader
Lynx Biology Team
Carnivore Program Leader

Enclosure

Response of the Lynx Biology Team to:

Management of Canada Lynx in the Cascades Geographic Areas of Oregon and Washington: A "White Paper" Prepared by the Offices of Region 1 of the Fish and Wildlife Service. April 10, 2001.

Lynx Biology Team members that prepared this response are as follows: James Claar, Steve Gniadek, Bryon Holt, Steve Mighton, Bob Naney, Joel Trick, Anne Vandehey, Fred Wahl, Nancy Warren, Dick Wenger, Joyce Whitney, and Tom Wittinger.

EXECUTIVE SUMMARY

The Biology Team met in Missoula, Montana, on October 2 – 4, 2001 to review and respond to issues raised in *Management of Canada Lynx in the Cascades Geographic Areas of Oregon and Washington,* ("white paper") prepared by Region 1 of the U.S. Fish and Wildlife Service. We concluded the "white paper" presented no new information compelling us to:
1- change the lynx habitat description presented in the Lynx Conservation Assessment and Strategy (Ruediger et al. 2000)(hereafter LCAS);
2- the application of the LCAS, or;
3- change the current direction for mapping lynx habitat.

A primary concern raised many times in the white paper was how and why the Subalpine Fir Series was identified as primary vegetation to represent lynx habitat. Our response provides the details. We used current literature referencing lynx association with boreal forests and the connection of the Subalpine Fir Series to boreal forest at the southern end of the range. We consulted with research scientists conducting lynx research on vegetation conditions that best represent lynx habitat and we reviewed lynx occurrence data for consistent, long-term, high frequency occurrence through time. The Subalpine Fir Series provided the best representation of the environmental factors that provide lynx habitat.

Another issue raised in the "white paper" related to the many records of lynx occurrence, especially in the Oregon Cascades, that are outside of lynx analysis units (LAUs). The authors of the "white paper" believe lynx records represent lynx habitat and that these areas will not have the benefits of the application of the management direction in LCAS. Since the analyses conducted by the science team to produce Chapter 8 in Ecology and Conservation of Lynx in the United States (McKelvey et al. 2000a), several additional lynx occurrence records were found through review of county bounty records. The authors of the white paper requested a new analysis to evaluate these records. Drs. Kevin McKelvey and Keith Aubry, primary authors of McKelvey et al. 2000a, provided response to this issue for the Steering Committee in a memo dated June 12, 2001. McKelvey and Aubry basically state the new records do not substantially change the quality of the information or our current understanding of lynx in Oregon. The Biology Team relied on the statistical and ecological expertise of the Science Team to guide data analyses. The Biology Team addressed lynx occurrence records across the range of lynx that are not in lynx habitat, from those occurring near lynx habitat to those in habitats in North

and South Dakota, Illinois, Indiana and Nebraska. McKelvey et al. (2000a) reported the three recent (1964, 1974, and 1993) verified reports from Oregon were all in anomalous habitats and were within several years of lynx population peaks in western Canada. Based on information presented in the literature it would not be prudent to apply the LCAS everywhere a lynx occurrence is recorded.

In the description of lynx habitat, the Biology Team included "secondary vegetation where adjacent or intermingled" with primary vegetation could contribute to lynx habitat. The terms adjacent and intermingled seemed to cause confusion among the authors of the white paper and concern they may not be applied consistently. The white paper authors provided a suggestion that minimum daily movements of lynx within home ranges could be used to identify adjacent vegetation. The Biology Team did not provide quantitative advice for these terms, but described them more subjectively. The intent of the mapping direction was to achieve a landscape perspective of lynx habitat. It was expected there would be small inclusions of vegetation types other than primary vegetation present on the landscape and these inclusions likely contribute to lynx habitat. It was also expected that areas immediately adjacent to the primary vegetation should be included as lynx habitat. As administrative units began to apply the mapping criteria the Biology Team held workshops across the range to help employees interpret the criteria so that consistent application would occur. The suggestion to use minimum daily movements, as reported in the literature, is not appropriate since these movements occur within lynx habitat to meet daily needs. It would not be appropriate to include all vegetation within 3 miles (as recommended in the white paper) of primary vegetation as lynx habitat.

The U.S. Fish and Wildlife Service, R1 suggested mapping "Evaluation Areas" to include areas with a "number of lynx occurrences" and areas no longer included in LAUs as lynx habitat. Where lynx occur outside of lynx habitat, provisions in the Endangered Species provide protection for the individual. Designation of "Evaluation Areas" is not necessary to address individual lynx that may be detected outside of lynx habitat.

A framework for incorporating new information into the LCAS was described. During development of the LCAS it was recognized that information on lynx ecology and distribution in the southern portion of the range was limited. The biology team recommended that an interagency team review new information on lynx ecology and distribution at least every five years and adjust the LCAS as necessary. Additionally, a more detailed framework was provided to the Steering Committee (April, 2001) for incorporating new information.

Finally, the Biology Team agrees that sightings and anecdotal records of lynx may occur in the Oregon Cascades and western Washington Cascades. However, contrary to the assertions in the white paper, there is no evidence that lynx were more widespread and abundant in these areas than previously thought.

In the letter transmitting the "white paper," Region 1 of the U.S. Fish and Wildlife Service

requested that the Lynx Steering Committee review the "white paper" and assign the Biology

Team or Science Team, as appropriate, to respond to the issues raised. The Steering

Committee directed the Biology Team to prepare responses to Issues II, III, and IV. We have completed our review of the white paper, and following is our response to each issue raised. As an aid to the reader, we referenced our response to line numbers of the white paper (copy of their report with line numbers is attached).

Response to Issue II—Lynx Habitat Delineation

Many of the questions in the white paper indicate a misunderstanding of ecological concepts and terminology used in the LCAS (Ruediger et al. 2000) to describe lynx habitat. Therefore, we include the following introductory information to clarify several concepts.

Of fundamental importance is the understanding that lynx habitat is not defined solely by vegetation. Lynx habitat is generally defined as mesic coniferous forests that have cold, snowy winters and support some minimum density of snowshoe hares, lynx primary prey (McCord and Cordoza 1982, Ruggiero et al. 2000a, McKelvey et al. 2000a). A number of environmental factors contribute to the conditions that create lynx habitat, many of which are poorly understood. However, surrogate parameters can be described to delineate the areas within which lynx habitat occurs, as reasonably defined using the existing body of information on lynx.

Plant ecologists use a variety of terms to describe potential vegetation, and the terminology varies in different parts of the country. “Habitat type”, “plant association”, “plant series”, and “potential vegetation community” (e.g., climax lodgepole pine or subalpine fir habitat types) provide a classification of the **potential** expression of vegetation, given the environmental conditions of the site and assuming that successional sequences were completed without disturbance. In contrast, “cover type” (e.g. seral lodgepole pine) describes the **existing**

vegetation composition in terms of the dominant plant species currently on site. Various cover types may exist within a plant association, habitat type, or potential vegetation community.

Kuchler (1964), Franklin and Dyrness (1973), Williams and Lillybridge (1983), and others developed classifications of potential vegetation at varying levels of detail; they did not address lynx or lynx habitat. McKelvey et al. (2000a) quantified lynx occurrences in terms of vegetation and elevation ranges. The Biology Team reviewed available temporal and spatial lynx location data from lynx research projects for a consistent pattern and correlation to develop mapping direction. These data indicated a strong correlation to the subalpine fir series in the west. Additionally, the association of lynx to boreal forests in North America reported in the literature (Koehler 1990, Agee 2000, Mowat et al. 2000, Slough 1999, Koehler and Aubry 1994, Koehler and Brittell 1990) and literature describing subalpine fir potential vegetation as representative of boreal/sub boreal forests (Agee 2000, Franklin and Dyrness 1973) helped develop the direction and description for lynx habitat in the west.

Lines 102-107. The Biology Team believes that the current mapping direction does represent all areas capable of supporting lynx. We believe that the direction is a conservative, reasonable approach based on the best information available. As new information becomes available, such as results from research, ongoing lynx surveys, and information from states, the Biology Team fully expects it will be reviewed within the context of all available knowledge. New occurrence information will be examined within the context of and where appropriate added to existing data sets. Of fundamental importance is our assumption that lynx occurrence records or locations, whether verified or not, and when examined individually or in subsets, do not infer that the areas in which they are collected are capable of supporting lynx. Rather it is the collection of records forming a data set that allows us the opportunity for inference. Additionally, results of

occurrence analyses must then be reviewed considering all biological and ecological information regarding lynx. McKelvey et al. (2000a) used a comprehensive data set of lynx occurrence records from throughout the species' range to demonstrate high frequencies of occurrence in cool, coniferous forests in all regions, with occurrences primarily at higher elevations in the west. The Biology Team used this information as a basis, a starting point, for mapping lynx habitat. Given the current understandings about lynx ecology and movements across landscapes, along with the often unreliable nature of occurrence information, it is reasonable and expected that many lynx occurrence records throughout the range of the species will fall outside areas mapped as lynx habitat.

The Steering Committee provided the initial lynx habitat mapping direction on May 25, 1999. Subsequent mapping direction specific to the Cascades Geographic Area was provided in a letter dated July 9, 1999, from the Pacific Northwest Regional Office of the Forest Service. We assume that this is the direction referred to in the white paper as the "original" mapping direction. The July 9, 1999, letter indicated that our understanding of what constitutes lynx habitat is evolving and changing, and would need refinement. The Biology Team recognized that the initial mapping would be very preliminary in nature and was essentially done to begin the process of identifying and mapping all *potential* lynx habitat. The initial mapping direction was developed without the benefit of the spatial correlation and analysis of lynx occurrences subsequently completed in the Science Team's report. Furthermore, the initial mapping direction was intentionally designed to be overly inclusive in order to 1) include all potential areas within which to direct lynx survey efforts, and 2) provide an inclusive outer lynx habitat map boundary within which to begin further refinements.

Further direction clarifying the mapping of lynx habitat was issued on August 22, 2000 in a memo from Kathleen A. McAllister, Deputy Regional Forester, Region 1, Ralph Morgenweck, Director, U.S. Fish and Wildlife Service, Region 6, and Chris Jauhola, Group Manager, Fish, Wildlife, and Forests, BLM. This direction incorporated historical and current distribution information contained in Ruggiero et al. (2000b), and was based on literature related to lynx habitat and home ranges, discussions with the Lynx Science Team, and the results of a meeting on July 11, 2000 involving members of the Science Team, Biology Team, and biologists from the Boise, Portland, and Lacey U.S. Fish and Wildlife Service offices.

Responses to Questions 1-9:

1. Lines 110-112. The information from McKelvey et al. (2000a) of the Science Team's report (Ruggiero et al. 2000b) was not intended to be applied to habitat mapping at the site-specific level. Lynx habitat, per se, was not mapped in McKelvey et al. (2000a). Rather, their analysis described lynx distribution relative to topography and vegetation over broad scales of time and space. Refer also to McKelvey and Aubry's June 12, 2001, response to the white paper.

2. Lines 115-122. The subalpine fir series is clearly important in describing lynx habitat. The Biology Team used several sources of information to arrive at this conclusion including Koehler (1990), Agee (2000), Aubry et al. (2000), and discussions with scientists currently conducting lynx and snowshoe hare research. Additionally, lynx in North America are primarily associated with boreal habitats (Agee 2000, Aubry et al. 2000, Mowat et al. 2000, Koehler and Aubry 1994, Washington Department of Wildlife 1993, McCord and Cordoza 1982). Agee (2000) characterized the "Western" boreal forests as more subalpine than "classical" boreal forest but identified

Engelmann spruce, subalpine fir and lodgepole pine as the primary dominants of Western boreal forests. Franklin and Dyrness (1973) listed “subalpine” forests of Oregon and Washington: eastern Washington and Oregon – subalpine fir; interior southwestern Oregon – Shasta red fir and mountain hemlock; western Washington – mountain hemlock. Mowat et al. (2000) and Aubry et al. (2000) reported lynx were absent or very rare in the wet coastal forests in western Canada and Alaska.

All investigations into lynx **use of habitat** in the southern portion of its range have consistently shown an association between lynx and lodgepole pine *cover types* **within** the subalpine fir *series* (Aubry et al. 2000, Mowat et al. 2000, Koehler and Aubry 1994, Washington Department of Wildlife 1993). Additionally, McKelvey et al. (2000a) reviewed lynx occurrence records for frequency of occurrence in broad vegetation types; the Biology Team reviewed this analysis for associations that could be used to identify lynx habitat. In areas with consistent, high frequencies of documented records of lynx through time, a common feature was the subalpine fir series, with lodgepole pine as the common seral *cover type*. The Biology Team recognized that the presence of this particular vegetation may not have been the single key to lynx habitat, but rather the subalpine fir series was a reasonable surrogate for all the environmental factors that support development of suitable conditions for snowshoe hare and lynx.

Lines 116-118. Local mapping efforts refined primary **vegetation**, not **habitat**, to the subalpine fir series. Secondary vegetation alone does not constitute lynx habitat. Secondary vegetation is vegetation that is immediately adjacent to or interspersed with primary vegetation (subalpine fir series) and therefore is expected to contribute to lynx

habitat. Primary vegetation together with secondary vegetation constitutes lynx habitat (see also our response to 132-133).

Lines 118 –120. There is no direct "crosswalk" between the Kuchler (1964) classification and other systems for classifying potential vegetation in the west. Kuchler (1964) classified potential vegetation very broadly, at a continental scale. McKelvey et al. (2000a) used the Kuchler (1964) classification as a starting point to define the outer boundaries of lynx distribution mapping. More refined classification schemes were needed for local habitat mapping (see response above to lines 115-118.).

Lines 120-122. The Biology Team did not compare lynx occurrences to Kuchler (1964) types and plant associations. However, as mentioned earlier, McKelvey et al. (2000a) presented a comparison of the occurrences of lynx to the broad potential vegetation types described by Kuchler (1964). Based on information provided by the Lynx Science Team (Ruggiero et al. 2000b) including maps of concentrations of occurrences through time, verifiable records, and published lynx research, we identified *potential* vegetation (as opposed to *current* vegetation or cover type) to be used to map lynx habitat. Agencies were directed to use the most reliable local vegetation data available to display the subalpine fir series, then assess whether adequate amounts were present in a given area to support reproducing lynx.

3. Lines 124 -127. The Biology Team referenced Franklin and Dyrness (1973) to better understand vegetation and environmental conditions in subalpine forests and how those may relate to lynx habitat. Franklin and Dyrness (1973) described potential natural vegetation communities in Washington and Oregon and discussed the environmental

setting and relationships of the vegetation that occur in them. They did not map or discuss *lynx habitat*. Franklin and Dyrness (1973) discussed the subalpine zone of the Cascades as including a variety of potential vegetation series. However Mowat et al. (2000), Aubry et al. (2000) and Hatler (1988) all stated lynx were absent or uncommon in the wet coastal forests of western Canada and Alaska. See our response to Question 4, below, for the distinction between subalpine zones and the subalpine fir series.

4. Lines 128-130. We acknowledge that various, perhaps confusing, terminology was used in the LCAS. Depending upon the geographic region being discussed or the information used, various terms were used depending in part upon the source of information (refer to our explanation of terminology on page 1 of this response). The Biology Team does not define lynx habitat in terms of the **subalpine zone**. The **subalpine zone** is described in Franklin and Dyrness (1973) to include the **subalpine fir series** on the east side of the Cascades and components of mountain hemlock on the west side. We restricted lynx habitat to the **subalpine fir series**, based on the scientific literature. Lynx studies in British Columbia, Alaska, and the Northwest Territories were conducted in "classic" boreal forests (e.g., Mowat et al. (2000) and Staples (1995)). Agee (2000) described "Western" boreal forest as primarily subalpine rather than a "classical" boreal climate. Agee (2000) stated, "The Western boreal forests where lynx habitat has historically occurred are surprisingly uniform in their tree species composition: Engelmann spruce, subalpine fir, and lodgepole pine are found across the range." He also indicated that other western boreal forests, such as in the western Cascades of Washington and Oregon and in the Olympic Peninsula, apparently do not support lynx. We also noted that Mowat et al. (2000), Aubry et al. (2000), and Hatler (1988) all stated lynx were absent or uncommon in the wet coastal forests of western Canada and Alaska. We

used the subalpine fir series to describe lynx habitat in the west based on work by Aubry et al. (2000), Apps (2000), Squires and Laurion (2000), Slough (1999), Koehler and Aubry (1994), Koehler (1990), Koehler and Brittell (1990), Reeve et al. (1986), and Koehler et al. (1979).

5. Lines 132-133. The Biology Team did not use plant associations to define "primary" or "secondary" lynx **habitat**. Primary and secondary "**vegetation**" (not "**habitat**") are terms we used in the LCAS as a surrogate to help describe lynx habitat. The literature cited in our response to Issue II question #4, above, was used as rationale for identifying the subalpine fir series as primary **vegetation**. We distinguished primary vegetation from secondary vegetation in order to ensure that the primary conditions considered necessary to support lynx reproduction and survival are provided. Lynx have large home ranges (Apps 2000, Squires and Laurion 2000, and Koehler 1990) and their movements are not necessarily confined by fine-scale features. A landscape approach to mapping is appropriate. Our use of "secondary vegetation" was designed to encompass other vegetation types that when intermingled with or adjacent to the primary vegetation are expected to contribute to lynx habitat. Secondary vegetation alone does not constitute lynx habitat.

6. Lines 134-136. The Biology Team does not believe it appropriate to include all current vegetation and early seral vegetation or cover types, regardless of the plant association, as suitable to define lynx habitat. Early seral vegetation in the subalpine fir series is an important component of lynx habitat because of its relationship to snowshoe hare density. The white paper seems to infer that all young vegetation provides suitable conditions for lynx and snowshoe hare, irrespective of other environmental conditions.

We are aware of no literature that supports this premise. However, numerous references in the literature (Agee 2000, McKelvey et al. 2000a, Buskirk et al. 2000, Mowat et al. 2000, Slough 1999, Koehler and Aubry 1994, Koehler and Brittell 1990, Koehler 1990) report snowshoe hares, the primary prey for lynx, reach their highest densities in young, dense boreal forests, the taiga, or sub boreal forests. Hodges (2000) suggests understory structure, rather the age of a stand, is the important component supporting snowshoe hare density. Hodges (2000) further states the common habitats for snowshoe hares are lodgepole pine, Engelmann spruce/subalpine fir and Douglas-fir on the west coast. Structure is important to lynx habitat as it provides conditions that may support higher densities of snowshoe hares, but overall habitat conditions including snow condition, climate, plant species composition, and natural fragmentation of habitat are also critically important to conditions that support both hares and lynx. McKelvey and Aubry's, June 12, 2001, response to the white paper discussed the inherent difficulty with focusing on structure alone to predict snowshoe hare response. Further, as vegetation structure alone does not create the conditions that support snowshoe hares, snowshoe hare presence alone does not create conditions that support lynx. Hodges (2000) described snowshoe hares in the "south" as occurring in States such as New Mexico, California, Tennessee, Virginia and West Virginia, far south of the known historic or current distribution of lynx populations. The best scientific information available suggests that the conditions that provide some minimum density of snowshoe hares combined with adequate distribution of those hares across the landscape create conditions that support lynx. The Biology Team concluded that those conditions are best expressed in the subalpine fir series, including all the cover types in that series. Therefore the subalpine fir series represents a reasonable surrogate for describing lynx habitat conditions in the west.

7. Lines 137-142. The Biology Team felt that the terms intermingled and adjacent have fairly obvious, if subjective, meaning. We did not attempt to provide absolute quantitative criteria with which to implement these terms. Mapping direction was intended to gain a landscape representation of lynx habitat based primarily on vegetation and elevation information. Since a landscape perspective was the objective, small inclusions of other vegetation types interspersed with or immediately adjacent to primary vegetation in otherwise contiguous primary vegetation (e.g., subalpine fir plant associations in the west) were included as lynx habitat (LCAS, Glossary page 5). Further, the level of detail (resolution) of vegetation maps that are currently available varies among Forest Service and BLM units. A fine-grained map resolution will portray more variety and inclusions of vegetation than a coarse-grained resolution map of the same area. Therefore, informed judgment must be used in applying and interpreting interspersion and adjacency for an individual situation and available information. Given the varying mapping resolution capabilities among the many administrative units involved, we found no distance measurement or even range of distances as appropriate for definitively interpreting “adjacent” or “intermingled”. We do not agree that it is appropriate to use *within* home range daily movement distances for the purposes of mapping vegetation *adjacent* to the primary vegetation. Refer also to the introductory paragraphs of our response to Issue II regarding how the direction was developed, and to our response to lines 442-447.

The Steering Committee has persistently directed the field to strive for coordination and consistency. A fundamental objective of the interagency lynx conservation effort was to promote a consistent, science-based approach to lynx conservation across its range. To

promote consistency in applying mapping direction, the Steering Committee (May 25, 1999) specifically directed that Forest Service and BLM maps be coordinated with adjacent administrative units and with their U.S. Fish and Wildlife Service counterparts, and that questions be raised to Biology Team members. Biology Team members remained in close contact either by phone or through meetings to discuss mapping issues as they arose in each geographic region. Issues not resolved by this process were to be elevated to the Steering Committtee. Again on August 22, 2000, the Steering Committee requested the field strive for consistency, and that lynx habitat maps be reviewed for consistency with the new mapping criteria. Since the 1999 Steering Committee direction, workshops were held in various locations to assist agencies with mapping and interpretation of the LCAS, including the concepts of adjacent and intermingled vegetation. Mapping discussions were also held in many level 1 team meetings. It is the Biology Team's understanding that in most regions, application of these terms was not found to be problematic.

8. Lines 144-146. The Biology Team's basis for use of subalpine fir series as primary vegetation to describe lynx habitat was discussed earlier in this response to Issue II, question 2 (lines 115-122). The basis for recommending a minimum of 10 sq mi (26 sq. km) of primary vegetation within a LAU was derived from Koehler (1990). Within his study area in north central Washington, Koehler (1990) reported mean home range sizes of two females was 39 +/-2 sq. km (15 +/-0.8 sq. mi.) and 69 +/-28 sq. km (27 +/-11 sq.mi.) for five males. Subalpine fir (reported as Engelmann spruce, subalpine fir, and lodgepole pine) comprised a mean of 82 percent of all home ranges (Koehler 1990). Using the information from Koehler (1990) of approximately 12 sq. mi. of subalpine fir in both male and female home ranges, we conservatively used 10 sq. mi. of primary vegetation within an LAU as needed to support lynx. This guidance was provided in the

LCAS to ensure sufficient habitat was present to establish a LAU. The intent was not to represent a lynx home range.

9. Lines 147-150. The question stated here reflects an apparent misunderstanding regarding plant associations. Subalpine fir trees grow in several plant associations, however the tree species alone is not the indicator for the subalpine fir plant association or for lynx habitat. As explained previously, all vegetation types within the subalpine fir series were used as a surrogate for the environmental conditions that determine lynx habitat. Refer also to Issue II, questions 2, 3, and 4.

Response to Issue III–Uncertainty of data

Lines 151-154. Current management direction does not preclude lynx conservation where no surveys or studies have been conducted. The LCAS provides guidance to conserve lynx and lynx habitat as mapped according to the best available information. Large portions of mapped lynx habitat have not been surveyed but are being managed for lynx conservation. Efforts are being conducted in areas outside currently mapped lynx habitat to gain a better understanding of lynx distribution. In addition to surveys implementing the National Survey Protocol (McKelvey et al. 1999), Oregon Department of Fish and Wildlife conducted aerial detection flights and snow tracking surveys covering approximately 800 miles in the Cascade region between the early 1970s and mid-1990s, and monitored 160 baited camera sites on national forest system lands in the mid-1990s to detect carnivores. No lynx were reported from any of these survey efforts although other species including wolverine have been detected (L. Cooper, Oregon Department of Fish and Wildlife, pers. comm. 2001). Also, in Oregon lynx were not considered a furbearer because the Oregon Department of Fish and Wildlife did not consider lynx to be present and

therefore regulations to address them were not necessary. Therefore lynx were not covered by regulations and could be legally taken up until the date of Federal listing. Only two lynx were trapped, one in 1964 in Wallow County, northeast Oregon, and one in 1993 near Drewsey, in Harney County, northeast Oregon. Finally, several on-going research efforts on both lynx (Squires; Aubry and Koehler) and snowshoe hares (Mills; Murray) will provide additional information useful for guiding management within the near future.

The Biology Team acknowledges and expects that lynx occurrences have and will be documented in anomalous habitats and outside mapped lynx habitat. However, individual records of lynx occurrence, and the areas or habitats in which they are recorded, are not necessarily indicative of habitats capable of supporting lynx. These records in and of themselves are not indicative of areas or landscapes that should be managed for lynx. Rather, the examination and analyses of data sets, including use and availability analysis, should form the basis for determining which plant associations and cover types are more likely capable of supporting lynx. The results of such analyses provide information to identify habitat that should be managed for the lynx conservation. The revised mapping direction incorporates the insights provided by the Science Team's analyses of the range-wide lynx occurrence data set (McKelvey et al. 2000a) and other information provided in the literature. Based on the best scientific information available, the Biology Team believes the mapping direction is inclusive of habitats capable of supporting lynx.

Responses to Questions 1-3:

1. Lines 155-159. Future options for lynx management and conservation will be retained by 1) implementation of the LCAS, which is applied to all currently mapped lynx habitat, and 2) LCAS direction to maintain connectivity between areas of lynx habitat. Also, Federal

lands that do not fit the current description of lynx habitat are managed, in most cases, to provide for conservation of other wildlife species, such as ungulates, raptors, aquatic species, plants and other listed species, as well as for other resource values such as old growth, riparian habitat, and protection of watershed integrity. Requirements to conserve these species and resource values address many of the needs of lynx. If future information indicates that other vegetation types support lynx, it is highly unlikely that federal land management in those areas would have resulted in either long term or significant permanent loss of resources relative to the needs of lynx.

Support for developing the descriptions of lynx habitat was documented in our response to Issue II and response to lines 151-154. The LCAS identifies the importance of maintaining connectivity between lynx habitat by requiring identification of key linkage areas across all ownerships. The LCAS emphasizes the need to either consolidate federal ownership in these areas and/or pursue conservation easements or agreements to further ensure that connectivity of lynx habitat is maintained across the landscape. Where developments such as ski areas or dispersed winter recreation expansions are planned outside of areas currently identified as lynx habitat, a permanent change of habitat conditions may occur. In such cases, the LCAS directs that the proposed project area should be examined for its possible relevance to connectivity and key linkage areas.

2. Lines 160-164. The Biology Team did consider how the new mapping criteria would affect connectivity within and between all geographic areas. We believe the new mapping direction represents a more accurate representation of habitats capable of supporting lynx and best serves to focus conservation efforts. Thus, we expect that the

revised mapping direction will be more effective in providing for the lynx conservation in the Cascades Mountains Geographic Area, and elsewhere within the historical range of lynx in the United States. Areas in the Cascade Mountains and Blue Mountains of Oregon supporting the subalpine fir series have been mapped as lynx habitat. Any areas previously mapped as lynx habitat per the original mapping direction that are important for maintaining connectivity between lynx populations and/or habitat, are subject to the conservation measures in the LCAS addressing connectivity (referenced above). Also, the LCAS provides direction for consideration of new information (LCAS p. 4 – Introduction). Refer also to our response to Issue II.

3. Lines 166-169. The 50 new reports of lynx in the southern Cascades of Oregon referenced in the white paper are mostly visual sightings and bounty records, and represent only a small percentage of lynx occurrence records. The problems associated with these types of records and the appropriate use of such information is discussed by McKelvey et al. (2000a) and again in the McKelvey and Aubry's June 12, 2001 response to the white paper. McKelvey et al. (2000a) used 72 lynx occurrence records (12 of which were verified) from Oregon in their analyses of lynx distribution. In their June 12, 2001 response to the white paper, McKelvey and Aubry indicate the new occurrence data would not substantially change the quality of our understanding of lynx occurrence in Oregon. (Refer to our response to Issue III, question 1 on how current management direction will affect conservation of the species, our response to lines 462-473, and our response to Appendix A.)

The Biology Team recognized the existing data indicate a number of lynx occurrence records occur outside areas currently mapped as lynx habitat. Although it is unlikely that

all occurrence records are correctly identified as lynx, we recognize lynx have, and in the future will, occur outside of areas mapped as lynx habitat. This has and is expected to occur in all Geographic Areas. Many documented, verified records of lynx occur from North Dakota, South Dakota, and Nebraska, but habitat to support lynx is not present. Lynx occurrences in these states are strongly correlated (with lagged synchrony) with lynx population highs in Canada, and thus, are thought to represent transient individuals dispersing from Canada or elsewhere subsequent to crashes of snowshoe hare populations (McKelvey et al. 2000a). Similar to Nebraska, North Dakota, and South Dakota, verified records of lynx in Oregon appear to be correlated with lynx population cycles in Canada (McKelvey et al. 2000a).

It is not surprising that lynx are observed or trapped in anomalous habitats and/or beyond the boundaries of their range. Lynx are capable of traveling large distances over areas that are not considered lynx habitat. Under the Endangered Species Act, individual lynx are protected regardless of where they occur within their range. However, where we focus on land management direction to conserve the species, we are most concerned with managing those **habitats** for lynx in areas where lynx will actually reside. Individual records of lynx occurrence, and the areas or habitats in which they are recorded, are not necessarily indicative of habitats capable of supporting "resident" lynx and these records, in and of themselves, are not necessarily indicative of areas that should be managed for lynx. First, McKelvey et al. (2000a) described the problematic nature of occurrence records and the appropriate use of such data discussed as earlier in this response. Second, and more importantly, the examination and analyses of data sets, including use and availability analysis, should form the basis for determining which cover types and plant associations are more likely capable of

providing conditions that support lynx. The results of such analyses provide information useful in identifying **habitat** that should be managed for the conservation of lynx. The revised mapping direction incorporates the insights provided by the Science Team's analyses of the range-wide lynx occurrence data set (McKelvey et al. 2000a) and other information provided in the literature, and is inclusive of habitats capable of supporting lynx.

In the Cascade Mountains and Blue Mountains of Oregon where the subalpine fir series occurs in adequate amounts and distribution, lynx habitat has been mapped and the LCAS does apply.

Response to Issue IV–Incorporation of New Information

The LCAS provided a framework for incorporating new information (see LCAS p. 4 – Introduction). In addition, the Steering Committee has accepted a detailed process to amend the LCAS as proposed at their April 30-May 1, 2001 Committee meeting listed in items #1-6 below. This process will be presented at the Committee meeting on October 23-24, 2001 for final approval.

1. Upon completion of any peer-reviewed research or other relevant information, a proposal to amend a conservation strategy may be drafted for review by the Biologist Team and Science Team. This proposal shall include all scientific evidence, reports scientific publications, etc that support the proposed change.

2. The Biologist Team shall review the proposal and make a written recommendation to the Interagency Lynx and Wolverine Steering Committee regarding acceptance of the proposed modification. Allow a minimum of 60 days for this review.

3. The Research Subcommittee or Science Team shall review the proposal and make a written recommendation to the Interagency Lynx and Wolverine Steering Committee regarding acceptance of the proposed modification. Allow a minimum of 60 days for this review.

4. Forward the proposal and written recommendation(s) to the Interagency Lynx and Wolverine Steering Committee for action.

5. When a proposed amendment to a conservation strategy is approved it shall receive a sequential number and be officially attached to the conservation strategy. The amendment shall specify which language in a conservation strategy is modified and the precise geographic area where the amendment is to be applied.

6. When a conservation strategy is amended, the Interagency Lynx and Wolverine Steering Committee member agencies shall apply this new direction in all their operations.

Lines 174-177. Refer to our responses to Issues II and III.

Lines 175-179. The Biology Team does not agree that "Evaluation Areas" and associated interim guidance are necessary or appropriate to address individual lynx found outside of lynx habitat. Lynx occurrence records, including verified records, exist outside of lynx habitat in all Geographic Areas. These records, including those identified in "Evaluation Areas", were included and considered in the analysis conducted by McKelvey et al. (2000a). That analysis, the spatial and temporal pattern of lynx occurrence records, and other published information were used to develop descriptions of lynx habitat (see response to Issue II and III). In their June 12, 2001 response to the white paper, McKelvey and Aubry state that "While a good deal of new occurrence data has been included, none of the new data presented in this paper substantively changes the *quality* of our understandings of lynx in Oregon." Finally, the provisions of the Endangered Species Act provide protection for individuals of listed species wherever they occur (see also our response to 166-169 above). Future options for lynx management in evaluation areas is unlikely to be precluded, especially if as the white paper suggests, new information will be available within 5 years. As mentioned previously, the requirements on Federal lands to conserve other wildlife species and resource values address many of the needs of lynx. If future information indicates that other vegetation types support

lynx, it is highly unlikely that federal land management in those areas would have resulted in either long term or significant permanent loss of resources relative to the needs of lynx.

Lines 180-181. The Biology Team acknowledges that surveys and other studies are being conducted to gain a better understanding of lynx distribution. We recommended that an interagency review be conducted periodically at intervals of no longer than 5 years across the entire range of the species in the United States south of Canada, to determine whether the LCAS should be adjusted to reflect new information (LCAS, Introduction page 4).

Lines 183-185. The Lynx Steering Committee has incorporated a process to amend the LCAS. See Issue IV response.

Response to BACKGROUND:

Lines 209-211. The Biology Team did not agree that programmatic consultation would be necessary in all areas previously mapped as lynx habitat. Section 7 consultation is appropriate only in those areas where the best information suggests the species may be present.

Lines 219-224. The white paper incorrectly characterizes the 22 August 2000 Steering Committee direction by stating that "…*the Biology Team recommended that the Pacific silver-fir/mountain hemlock plant associations should not be mapped as lynx habitat…and the LCAS, would not be applied west of the Cascade crest.*" The letter actually directs that these types not be identified as "primary vegetation"; these areas can be mapped as lynx habitat as part of a lynx analysis unit, when adjacent to or intermingled with primary vegetation as directed in the LCAS. Specifically, the letter directed, "…*do not delineate LAUs or apply the LCAS west of the*

crest of the Cascades unless subalpine fir vegetation types occur in amounts and distribution great enough to establish an LAU." Therefore, contrary to the allegations in the white paper, the direction does not contradict agreements made at the July 11, 2000 meeting in Spokane.

Lines 224-226. The direction is not contradictory to agreements reached in Spokane. The mapping direction from the Pacific Northwest Regional Office of the Forest Service was sent to all Forests in Region 6 and is being applied consistently. A meeting was held in January, 2001, to clarify the direction and the rationale for the direction, and was attended by Forest Service and Fish and Wildlife Service scientists, plant ecologists and biologists. National forests applied the direction west of the Cascades crest and submitted maps to the Forest Service Regional Office in Portland. The maps submitted displayed the subalpine fir series and interspersed and adjacent vegetation.

Lines 228-232. This statement contradicts the assertions made in the previous paragraph (lines 222-223). Here the white paper acknowledges that the Biology Team and Steering Committee direction suggest that Pacific silver fir and mountain hemlock be mapped as lynx habitat when intermingled with or adjacent to the subalpine fir series.

Lines 233-236. The Biology Team does not agree with applying the conservation measures (e.g. the "standards" and "guidelines") found in the LCAS outside of mapped lynx habitat. The LCAS provides habitat management direction for those habitat types that support lynx populations and direction related to maintaining connectivity between lynx populations. The specific habitat conservation measures, or standards and guidelines, are largely inappropriate to be applied to other habitat types. However, it may be appropriate to use the information on lynx biology and ecology found in various documents including Ruediger et al. (2000), Ruggiero et

al. (2001b) report, and other literature to evaluate effects of actions on lynx wherever they occur. The U.S. Fish and Wildlife Service (2000) concluded that "We know and expect that lynx will occur outside primary lynx habitat types…. these occurrences represent – (a) lynx that are dispersing to lynx habitat elsewhere, (b) lynx that are on relatively short exploratory movements near or adjacent to lynx habitat that will ultimately return to lynx habitat, or (c) individuals that have emigrated from lynx habitat due to prey species declines and ultimately will not successfully establish home ranges and reproduce, and may succumb to starvation for lack of prey". Therefore, in most cases Forest Service and BLM *land management direction* outside of lynx habitat is not expected to negatively affect lynx conservation or individual lynx occurring there. Should there be demonstrated, consistent occupancy of areas not currently mapped as lynx habitat, the LCAS contains provisions for modification to reflect new information (Introduction, page 4). In the rare event that a lynx is known to reside in anomalous habitats, the above sources of information could be used to develop ways to minimize adverse impacts to that individual.

Response to RATIONALE FOR THE ISSUES PRESENTED

Issue I - Lynx Occurrence Data

Lines 243-246. Survey efforts to date suggest that where lynx are present, they can be detected. For instance, surveys to detect lynx and to improve knowledge of distribution on the Okanogan National Forest began in 1991 with snow tracking transects. In 1994 biologists started using remote cameras in addition to snow tracking. Lynx have been detected annually with both snow tracking and cameras. In 1997 biologists began experimenting with the use of hair snagging pads and that work is still ongoing. In Oregon, until recently lynx were not regulated and could be legally harvested and many surveys were conducted. Despite years of

snow tracking efforts for carnivores (described in response to Issue III, lines 151-154) and no restrictions on harvest of lynx up to the date of Federal listing, Oregon Department of Fish and Wildlife reported no records of lynx tracks and only two lynx trapped, one in 1964 and one in 1993 (see response to Issue III, lines 151-154).

Lines 246-249. Refer to McKelvey and Aubry, June 12, 2001, response to white paper. Refer also to our response to 251-254 below.

Lines 251-256. Refer to McKelvey et al. 2000a and McKelvey and Aubry (June 12, 2001) response to white paper for discussion of reliability and appropriate use of any occurrence data.

Lines 251-254. Intensive survey efforts for carnivore detection began in Oregon in the mid 1970s. Several miles of snow tracking transects in the Cascade Mountains, aerial detection flights, and baited camera stations have been deployed for detection of carnivores. Various species have been detected, including wolverine, but no lynx have been recorded (L. Cooper, Oregon Department of Fish and Wildlife, 2001, pers. comm.) (see response to Issue III, lines 151-154). Additionally, there was no legal restriction against commercial lynx harvest in Oregon up to the date of Federal listing, yet only two lynx were harvested. In 1998, Dr. John Weaver was contracted to design and implement a survey detection process to address the Survey and Manage Component (lynx) in the Northwest Forest Plan. Forests north of Crater Lake National Park in Washington and Oregon in the Northwest Forest Plan area were surveyed (except the Okanogan National Forest). Initial results suggested that lynx were present in several locations, but further analyses of the samples concluded they were contaminated and the hair collected on the pads was not lynx (Weaver et al. 2001). During 1999 and 2000 surveys were conducted in the Cascades of Oregon and Washington employing the National Detection Protocol (McKelvey

et al. 1999) and Weaver (1997) protocol. The National Detection Protocol effort involved 14 survey grids each with 25 transects of five stations, for a total of 1750 sampling sites monitored in the Cascades during both years. In 1999 the U.S. Fish and Wildlife Service used the Weaver (1997) protocol establishing 17 survey blocks, 16 square miles each, with 12-16 stations per survey block, for a total of 114 sampling stations. Lynx were detected only on the Okanogan National Forest in Washington.

Lines 254-255. The Biology Team disagrees there is no evidence of lynx presence other than incidental reports and trapping records in Washington and Oregon. Documentation from the Okanogan National Forest includes DNA analyses, photographs (using remote cameras), and tracks (validated by tracking experts).

Lines 258-291. Refer to McKelvey and Aubry response to white paper, June 12, 2001.

Issue II - Lynx Habitat Mapping

Line 305-322. The authors of the white paper argue that habitat structure is more important than plant composition, but fail to acknowledge that all of the lynx research they cite addressed the importance of stand structure within habitats where lynx populations were present. Hodges (2000) reports on the importance of stand structure in habitats that support snowshoe hares. We agree that structure is important in lynx habitat, as it provides conditions that may support higher densities of snowshoe hares (Hodges 2000), but features other than structure, such as snow condition, temperature, and plant species composition, are also important in creating habitat conditions that support lynx. Hodges (2000) reported snowshoe hare in the United States using forests extending into California, New Mexico, Virginia, West Virginia, and Tennessee, far south of the range of lynx. The presence of structure alone does not create

snowshoe hare habitat, and the presence of snowshoe hares does not necessarily indicate that the habitat supports lynx. The presence of some minimum density of hares distributed adequately across a landscape is believed necessary to support lynx (Ruggiero et al. 2000a). None of the research conducted in the lower 48 states cited in this section of the white paper measured hare density at scales appropriate to predict lynx population response.

Lines 309-316. The white paper's authors fail to report that the same paper they cite (Hodges 2000) states the common habitat for snowshoe hare in the west is lodgepole pine, Engelmann spruce/subalpine fir and Douglas-fir, and **within** these types, understory components an*d* density regulate hare use and abundance.

Line 319-326. The Biology Team agrees with Hodges (2000) who found no particular tree species more important than others to *hares*, but Stinson (2001), Agee (2000), Aubry et al. (2000), Koehler et al. (1979), Koehler (1990), and others suggest that *lynx* in the western United States are closely tied to boreal forests. Agee (2000) described components of western boreal or sub-boreal forests as composed primarily of Engelmann spruce, subalpine fir and lodgepole pine. Koehler (1990) stated that greater than 80 percent of male and female home ranges was comprised of subalpine fir, Engelmann spruce and lodgepole pine stands. McKelvey et al. (2000b), in a re-analysis of Koehler's (1990) data, reported that Douglas-fir, ponderosa pine, and western larch stands were used less than expected by lynx.

Lines 324-331. The literature is clear: lynx in North America are closely associated with boreal, sub-boreal and/or montane forests (Agee 2000, McCord and Cordoza 1982, Mowat et al. 2000, Aubry et al. 2000 , Koehler and Brittell 1990, Murray et al. 1994, O'Donoghue 1997). Agee (2000) described the western boreal forests as uniform in tree species composition: subalpine

fir, Engelmann spruce, and lodgepole pine. The study areas where lynx have been investigated in the western conterminous United States (Montana, Washington and Wyoming) and in southern British Columbia all report subalpine fir, Engelmann spruce and lodgepole pine as occupying large portions of the study areas. Where drier vegetation types such as ponderosa pine or Douglas-fir occurred in these study areas, results indicate they were generally avoided by lynx (Koehler 1990, Koehler and Brittell 1990, Apps 2000, Squires and Laurion 2000). Mowat et al. (2000) also noted lynx were absent or uncommon from the wet coastal forest of Alaska and British Columbia. Stinson (2001) reviewed lynx records for development of the Washington state lynx recovery plan and reported "…The weight of evidence supports the statement of Taylor and Shaw (1929) that lynx were 'scarce' on the west slope of the Cascades (in fact Walter Taylors' original manuscript states, 'scarce or absent from their west slopes')."

Buskirk et al. (2000) discussed the relationship of forest successional pathways on lynx and snowshoe hare, but restricted their discussion to the taiga, western montane boreal forests and subalpine fir climax types. Buskirk et al. (2000) supported using stand structure or stage of succession to infer animal densities, as long as they are within forest types known to support the species.

Koehler (1990) reported forest cover types within home ranges: Engelmann spruce, subalpine fir, and lodgepole pine (seral to subalpine fir) comprised 82 percent of 7 lynx home ranges. Female home range sizes were 38 and 41 sq. km. (15 and 16 sq. mi.) and the male home ranges were from 29 to 99 sq km (11 to 38 sq. mi.) Within his study area in north central Washington, Koehler (1990) reported that Engelmann spruce, subalpine fir and lodgepole pine were the dominant vegetation types above 1370 meters (4495 ft.). Apps (2000) characterized his study area in southern British Columbia as largely rock, ice and other unsuitable habitat,

which separate broad valleys incised by narrow tributary valleys. The lowest elevation, below 1,500 m (4921 ft.), supports hybrid Engelmann/ white spruce and subalpine fir; 1,500 to 2,300 m (4921 to 7546 ft.) is primarily dominated by Engelmann spruce and subalpine fir; and alpine vegetation occurs above 2,300 m (7546 ft.). Squires and Laurion (2000) described the study area in Montana, with elevations between 1,200 and 2,100 m, as being dominated by Douglas-fir, western larch and lodgepole at the lower elevations, and by subalpine fir, whitebark pine, and Engelmann spruce at the upper elevations. Smith (1984) monitored five lynx in Montana and the habitat was described as subalpine fir forest associations. In Wyoming, the study area is between 2,600 to 2,750 m (8530 to 9132 ft.) in elevation, and pure patches of lodgepole pine are found on drier sites while spruce-fir is found on north slopes; sagebrush and wheat grass are found on south slopes. Only one study (Koehler 1990) reported vegetation types within home ranges of lynx, but all report a dominance of subalpine fir within the study areas.

Lines 333-335. Both the original and current mapping direction required mapping of existing and potential vegetation. Potential vegetation was and is used to define where lynx habitat occurs, and existing vegetation was and is used to calculate current condition for project-level effects analysis. In a letter of May 25, 1999, the Steering Committee directed that the draft LCAS, pages 33-52, be used as direction for mapping of lynx habitat.

We assumed that the mapping direction dated July 9, 1999 from the Pacific Northwest Region of the Forest Service, is that referred to in the white paper as “original mapping guideline.” That memo directed forests in Region 6, within the Cascades Geographic Area, to prepare maps of lynx habitat to be used for conducting lynx surveys (implementing the national protocol) and to assist with conferencing and consultation under the Endangered Species Act.

Lines 335-337. Direction from the Steering Committee to use existing or current condition was never used solely to define lynx habitat. Some Forests that lacked **potential** vegetation maps were advised to use **current** vegetation maps and other information as a basis to derive **potential** vegetation. Direction to provide current or existing vegetation/conditions was a "carry over" from the 1998 survey effort which was designed to concentrate on high probability detection areas. This effort was a model designed to replicate conditions on the north central Washington lynx study area where lodgepole pine dominated and the research results indicated lodgepole pine between 20 and 40 years old had the highest snowshoe hare densities. Other factors, such as lynx reports on the Wenatchee National Forest, influenced this advice.

Lines 337-339. The current direction (22 August 2000 memo) was based on the recognition that environmental conditions, including components other than tree species, were likely important indicators of lynx habitat. Conditions within the subalpine fir vegetation series seemed to best represent boreal forest conditions that provide lynx habitat Refer also to our response to Issue II.

Lines 339-341 - Refer to our introductory remarks regarding the distinction between subalpine zone and subalpine fir series, to our previous responses to Issue II, and to our response to lines 341-342 below.

Lines 341-342. The mapping guidance/direction in the 22 August 2000 memo does not restrict lynx habitat to only one plant association. All plant associations having subalpine fir as a climax species are included. For example, there are 12 subalpine fir plant associations listed in Williams et al. (1995) for the Colville National Forest, and nine listed in Williams and Lillybridge (1983) for the Okanogan National Forest. Refer also to our response to Issue II, question 4.

Lines 342-344. The revised guidance (22 August 2000 memo) did not constrain flexibility to use site-specific knowledge, expertise and interpretations in determining local habitat suitability. The guidance merely refined the vegetation types to be mapped as lynx habitat, and those only changed for the west side of the Cascade Mountains. Refer also to our response to Issue II (lines 102-107).

Lines 345-347. Refer to our response to Issue III, lines 166-169, related to use of data, refer to McKelvey et al. 2000a and McKelvey and Aubry' s June 12, 2001 response to white paper related to reliability of occurrence data and for appropriate analyses of data sets.

Lines 353-373. The Biology Team reviewed most of the management guidelines referenced in the white paper during development of the LCAS. Most of these documents were written prior to publication of the Science Team's report, and did not have the benefit of the information and analyses on lynx habitat associations throughout the range of the species contained therein.

Lines 375-379. The consistent factor in all western U.S. lynx study areas is subalpine fir forest, including lodgepole pine as a seral species. The Steering Committee direction (22 August 2000 memo) identified subalpine fir potential vegetation as primary vegetation and adjacent and intermingled forest as secondary vegetation to be mapped as lynx habitat.

Seven studies in the western United States, 3 of which are still ongoing, investigated lynx home range characteristics, demographics, habitat use, food habits and dispersal (Koehler et al. 1979, Smith 1984, Brainerd 1985, Brittell et al. 1989, Koehler 1990, Squires and Laurion 2000, Koehler et al. 2001). Additionally, one study (Apps 2000) has been conducted in southern

British Columbia. Research conducted by Brittell et al. (1989), Koehler (1990), and Koehler et al. (2001) all occurred on the same study area. Koehler (1990) described the study area as comprised of 52 percent Engelmann spruce/subalpine fir and lodgepole pine (seral to subalpine fir), 28 percent Douglas-fir/western larch/aspen, 15 percent ponderosa pine and lowland grassland and 5 percent alpine. The elevations on the study area ranged from 750 to 2540 m (2460 to 8331 ft). The Douglas-fir and ponderosa pine forest associations were mostly below 1370 m (4494 ft). Lynx were located at higher elevations. Mean lynx locations were 1787 m (5862 ft) during summer and 1738 m (5762 ft) during winter. Radio-collared lynx used lodgepole pine, and Engelmann spruce/subalpine fir cover types more than expected. Apps (2000) described the southern British Columbia study area as composed largely of rock, ice, and other inherently unsuitable lynx habitat, with high peaks separating broad valleys incised by narrow valleys. The elevations were between 1200 to over 3000 m (3936 to over 9840 ft). Below 1500 m (4921 ft.) the Montane Spruce Zone is primarily hybrid Engelmann spruce/white spruce and subalpine fir; Engelmann spruce and subalpine fir occur at higher elevations but below 2300 m (7546 ft.) and Engelmann spruce and subalpine fir occur up to the Alpine Tundra Zone. The western Montana study area (Squires and Laurion 2000) was described as warm, dry forests at lower elevations dominated by Douglas-fir, western larch, lodgepole pine and ponderosa pine; mid-elevations supported primarily cool and moist, to dry conifer forests dominated by Douglas-fir, lodgepole pine and western larch; and the upper elevations were mostly subalpine fir, whitebark pine and Engelmann spruce. The Wyoming study area (Squires and Laurion 2000) ranged in elevation from 2400 to 3100 m (7874 to 10,171 ft.); drier sites were dominated primarily by homogenous stands of lodgepole pine, while spruce/fir forests were generally restricted to north aspects and comprised approximately 19 percent of vegetative cover. Koehler et al. (1979) reported most locations for radio-collared lynx were in lodgepole

pine (26 of 29 locations). Smith (1984) indicated that lynx in his study area used primarily subalpine fir forest associations.

Lines 381-386. The Biology Team agrees that figure 8.20 in McKelvey et al. (2000a) is too broad to accurately delineate lynx habitat in any geographic area. The Biology Team used 8.20 as an initial outer boundary for mapping, and developed more refined mapping criteria using additional literature on lynx and habitat, as described earlier.

Lines 387-391. The white paper authors provide no citations to support their premise there exists “local knowledge of vegetation that supports high hare densities”. The Biology Team reviewed literature on snowshoe hare in the southern portion of its range, but found no studies (including Black (1965)) that measured snowshoe hare densities at a scale sufficient to draw inferences to lynx population response.

Lines 393–399. Refer to McKelvey and Aubry’s June 12, 2001 response to the white paper.

Lines 401-409. The Biology Team did not conduct a step-down analysis of lynx occurrence data per geographic region. Instead we relied on the Science Team to assemble and analyze occurrence information. In their analysis in the white paper, the authors failed to address several important considerations and/or failed to list key assumptions related to the reliability of the data (including the estimated accuracy of the point locations) and the proportional availability of vegetation types in relationship to the proportion of lynx occurrence records within them. McKelvey et al. (2000a), addressed all of these considerations, including an analysis of use versus availability of habitat in relationship to lynx occurrence data. Additionally, the conclusions in the white paper seem to contradict the current body of evidence indicating that

lynx use moist, cool forests, in that many of “lynx” locations appear to occur on warm, dry sites. Furthermore, the white paper information was based on Gap data, which relied on current cover types, rather than potential vegetation. Because “lynx” records were accumulated over an extended time period, the current vegetative cover at any specific site may in fact be quite different from what was present at the time the report was recorded at the site. The rationale for our use of potential vegetation as a surrogate for mapping lynx habitat was discussed previously in response to Issue II.

Lines 411-414. Lynx observation information must be used cautiously, because reliability often is unknown. It is also unknown to what extent these observations are correlated with or biased by the densities and spatial distribution of roads. Please refer to McKelvey et al. (2000b).

Lines 416-421. This argument is spurious because the research by Slough (1999) was conducted in the taiga. The Biology Team did not attempt to assess potential primary vegetation in the taiga, instead we began our broad based approach within those habitats where the species is known to occur in the west.

Lines 423-435. Koehler (1990) reported higher densities of snowshoe hares in lodgepole pine cover types (existing condition), but these lodgepole pine stands occurred as a seral component in the subalpine fir series (potential vegetation). The majority of Koehler’s study area was comprised of subalpine fir plant associations. The Biology Team also agrees that where lodgepole pine occurs in other plant associations adjacent to or intermingled with primary vegetation, these stands may contribute to lynx habitat. We agree that lodgepole pine is a common, broadly distributed species that occurs in many plant series, however many of these plant series are not known to support lynx.

Lines 437- 444. Several workshops were held in various locations to assist agencies with mapping and interpretation of the LCAS. During discussions, examples of adjacent and intermingled or interspersed vegetation were provided to clarify the intent of mapping direction. There were many questions regarding the clarification of the terms and how far out adjacent types should be considered. The appropriateness of using the documented "minimum daily movement" distance was discussed at several of the work meetings. "Minimum daily movements" were documented **within** lynx home ranges. Therefore it is not reasonable to include all vegetation within 2 to 12 miles **beyond** lynx habitat, as the white paper infers. Refer also to our response to Issue II, question #7 (lines 137-142).

The scientific literature does not specifically define "adjacent" or "interspersed" related to lynx habitat, nor does it report distances that directly relate for use of these concepts in habitat management. We used the literature to describe lynx habitat and to develop definitions for terms used in the LCAS. The literature has documented the results of the studies with discussions on habitat use, food habits, dispersal, and demographics, among other things. The studies conducted in the western U.S. described habitat conditions within the study areas and one study documented the vegetation within home ranges. We relied on these data to develop the criteria for mapping used in the 22 August 2000 letter from the Steering Committee.

Lines 442-447. We do not agree that it is appropriate to use within-home range daily movement distances for the purposes of mapping habitat adjacent to the primary vegetation. The daily movement data reported in the literature, whether in Wyoming, Montana, or in other study areas, described daily movements **within** home ranges. Additionally, in at least three of the studies (Apps 2000, Squires and Laurion 2000), "exploratory" movements by lynx of up to 75 km

(46 miles) were reported. The distances represented by these movements were well beyond documented home ranges (Aubry et al. 2000).

Lines 452-459. For the reasons discussed above, the Biology Team does not agree that it is reasonable to define interspersed or adjacent habitat absolutely as any primary/secondary vegetation located up to 3 miles from primary vegetation. However, where patches of subalpine fir (primary vegetation) are scattered across the landscape, even where separated by 3 or more miles, they were/are considered lynx habitat if incorporated into a LAU.

Lines 461-462. The terms “primary” and “secondary” were selected to represent vegetation types, not habitat, that were considered in the delineation of lynx habitat and defined in the LCAS. The distinction is important in that when secondary vegetation is interspersed with or adjacent to primary vegetation, we expect that it contributes to lynx habitat. Secondary vegetation alone is not considered as having the characteristics necessary to support lynx. Our use of the term primary vegetation is not synonymous with primary habitat. Refer also to our response to Issue II, question #5 (lines 132-133).

Lines 462-465. The LCAS described primary vegetation in the western U.S. as subalpine fir forests. Figure 8.20 (McKelvey et al. 2000a) delineated areas of primary lynx occurrence, which the Biology Team used to represent the outer boundaries of lynx range in the geographic areas. The Biological Assessment was prepared prior to completion of the LCAS and described primary habitat.

465–473. The Biology Team did not conduct a step-down analysis of occurrence records for individual geographic areas. McKelvey et al. (2000a) discussed the problems with using

occurrence data in the manner suggested in the white paper, including that the occurrence data are from various sources and have varying levels of reliability in terms of species identification and location of observation. McKelvey et al. (2000a) further discussed how the reliability of the entire data set depends on the reliability of each piece of data as well as the rarity of the species. They suggest that as a species becomes more rare, the number of false positive observations will increase. They concluded that most states had data from physical remains or other information collected by state wildlife agencies; however, in Oregon and Colorado, a high proportion of the data were visual observations and therefore the patterns should be considered less reliable. Another example of why lynx occurrence data must be used cautiously are the numerous records of lynx, including physical remains, from states such as North and South Dakota and Nevada, none of which are considered within lynx range. An explanation for these records could be lynx dispersing following snowshoe hare population declines in Canada. Refer also to McKelvey and Aubry's June 12, 2001 response to the white paper.

In summary, the Biology Team relied on the Science Team to make decisions related to pooling or splitting available data sets. We relied on McKelvey et al. (2000a) as an appropriate analysis of lynx occurrence data for generating information useful to mapping lynx habitat.

The Biology Team notes here the white paper suggests that independent geographic analyses are necessary to reduce problems with extrapolation of research in one area to the next. The research heavily relied on for map refinement was conducted in the Cascades (Koehler 1990), the geographic region for which the authors are most concerned.

Lines 471-473. The Biology Team did not define secondary habitat, we used the term secondary vegetation (see our response to 461-462).

Lines 475-480. Refer to our response to Issue II question #8 (lines 144-146) relating to discussion of 10 sq mi of primary vegetation within a LAU. With regard to home ranges, the white paper correctly interprets the function of LAUs. LAUs were designed to be analysis areas within which to conduct effects analyses for project activity. However, the size of an LAU was to be similar to that of known home ranges of female lynx, but LAUs do not represent actual home ranges. The Biology Team had no intent to "…establish a minimum or maximum home range size threshold of primary habitat…". The "10 sq. mi. of primary vegetation" recommendation is from the LCAS, page 7-4 under Programmatic Planning – guidelines, number 2. "LAUs with only insignificant amounts of lynx habitat may be discarded, or lynx habitat within the unit incorporated into neighboring LAUs. Based on studies at the southern part of lynx range in the western U.S. it appears that at least 10 sq. mi. of primary vegetation should be present to support survival and reproduction. The distribution of habitat across the LAU should consider daily movement distances of resident females (typically up to 3-6 miles)." This recommendation was based on the species needs to meet daily/annual requirements for successful reproduction and survival.

Lines 482-486. The vegetation types may vary, but habitat in Alberta, Northwest Territories, and the Yukon is boreal forest.

Lines 488-494. Refer to our responses to earlier responses to Issue II, including relative sections of our responses to the Rationale for the Issues Presented.

Lines 496-521. Refer to our response to Issue III, question 1 (lines 155-159), Issue IV (lines 174-179) and Background (lines 233-236).

Conclusions

Lines 524-534. The Biology Team agrees that sightings and anecdotal records exist on both sides of the Cascade Mountains in Oregon and Washington. However, there are only 3 verified records on the west side of Oregon, and none west of the crest in Washington (McKelvey et al. 2000). These three records in Oregon coincide, with lagged synchrony, to the lynx population peaks in western Canada (McKelvey et al. 2000a). Refer to the sections: Synchrony between United States and Canada Trapping Data, and Lynx Associations with Broad Cover Types, found in McKelvey et al. (2000a). Refer also to our response to Appendix A.

Lines 525-527. Contrary to the assertions in the white paper, the authors provide **no** evidence that lynx were more widespread and abundant in Oregon and Washington than "previously" thought. There is **no** compelling evidence supporting present or historic "lynx residency" in the Oregon Cascades. McKelvey et al. (2000a) discussed the problematic nature of these records and McKelvey and Aubry (June 12, 2001) conclude that the additional records collected and reported in the white paper do not change our understanding of lynx distribution.

Lines 529-532. The Biology Team has always been keenly cognizant of the fact that the Endangered Species Act has provisions that protect individual lynx wherever they occur, and that residency is not a required threshold for consultation. We disagree, however, with the implication that individual records or subsets of lynx occurrence records are indicative of broad regions or habitats types that must be managed for lynx. The obligation to minimize the effects of incidental take applies where the best scientific information suggests the species may be present **and** where incidental take is likely to occur. The Biology Team used the best scientific information was used to predict and map those broad landscapes where lynx may occur and

where land management direction that minimizes the potential for adverse effects to lynx is necessary. We also conclude that requiring additional landscapes be managed to conserve lynx based on subsets of unreliable occurrence records or single verified records, ignoring the body of evidence related to lynx biology and ecology, is not a science-based approach to conservation.

The Biology Team concluded that:

1- the "white paper" does not present substantive evidence, data or biological interpretations that provided a basis for the Biology Team to recommend any change in the current direction to mapping lynx habitat; and,

2- the "white paper" does not present substantive evidence, data or biological interpretations that provided a basis for the Biology Team to recommend an amendment to the LCAS.

Following is the Biology Team's response to each section of the "white paper" Appendix. There is a substantive amount of information and numerous statements presented in the Appendix of the "white paper" that the Biology Team did not address due to time constraints. All information in the Appendix was thoroughly reviewed by the Biology Team and referenced with the current body of evidence available concerning lynx and their habitat.

APPENDIX A - LYNX OCCURRENCE DATA

McKelvey et al. (2000a) concluded that most states had data from physical remains or other information collected by state wildlife agencies; however, in Oregon and Colorado, a high

proportion of the data were visual observations and therefore the patterns should be considered less reliable. Another example of why lynx occurrence data must be used cautiously are the numerous records of lynx from states such as North and South Dakota and Nevada, none of which are considered within lynx range. Each of these states has several verified records of lynx killed. An explanation for these records could be lynx dispersing following "snowshoe hare crashes" in Canada. Refer also to McKelvey and Aubry's June 12, 2001 response to the white paper.

SIGHTING REPORTS (Visual and Tracks)

Western Washington:

Line 8-9. McKelvey et al. (2000a) reported there were no verified reports of lynx west of the Cascade crest in Washington. However, since data were collected for analyses of lynx distribution by McKelvey et al. (2000a) there have been some verified reports west of the Cascade crest in Washington. During surveys in the summer of 2000 along State Highway 20, hair was collected approximately 5 miles west of the crest on two adjacent transects. DNA analyses concluded both were from lynx. A third sample, also from DNA analyses, was from McMillian Park, approximately 10 miles west of the crest. This sample was collected during a project designed to collect bear hair (Kimberly Romain, Washington State University, pers. comm. 2001). All of these samples were collected within or adjacent to lynx habitat (subalpine fir series).

Line 20. The report by Zender was mis-located and was actually in Pend Oreille County, east of the Cascades (Stinson 2001).

Oregon:

Larry Cooper (Oregon Department of Fish and Wildlife, Furbearer and small game biologist, pers. comm. 2001) offered the following observations regarding historic lynx trapping records in Oregon. According to Mr. Cooper, a lynx pelt-tagging program to clearly identify bobcats was not implemented in Oregon until 1979. Prior to that, cats were primarily identified on the basis of where they were trapped, size of the animal, and quality of the pelt. Cats were identified as lynx if they were trapped high in the Cascade Mountains (Cascades), and bobcat if they were trapped lower in the Cascades or coast ranges. Or sometimes, if it was a very good quality pelt, it was called a lynx. Lynxcat was a less sophisticated term that was used by trappers to identify a cat that was big, had large spots, and a valuable pelt. Higher dollar values were paid for lynx pelts. Therefore, if it was a good quality pelt, there was an incentive to identify it as a lynx pelt. Additionally, prior to 1979, county clerks recorded trapper records. In many cases the clerks did not have backgrounds that allowed them to accurately distinguish a bobcat pelt from a lynx pelt. Since 1979, no lynx pelts have been tagged despite ongoing trapping efforts for other furbearers within what could be considered as potential lynx habitat within Oregon.

Sighting Locations:

Lines 74 – 77. Squires and Laurion (2000) reported on exploratory movements, but their data indicate these movements occurred mostly in mid-summer. The “White Paper” authors suggest that the three most recent verified reports in Oregon were lynx on exploratory movements. However, all three lynx were trapped or killed in winter or early spring. The lynx trapped in 1993 near Drewsey, Oregon, was caught in January, the one in 1964 was documented in March, and the one in Benton County was killed in October.

APPENDIX B - ADDITIONAL LYNX OCCURRENCE INFORMATION

Published Information

Lines 192 -193. Verts and Carraway (1998) reported lynx distribution from Hall (1981) as extending south to a line in southern Oregon to southern Colorado, southern Iowa, southern Indiana and southern Maryland. Verts and Carraway (1998) concluded either the species has had a substantial range retraction or the distribution described in Hall (1981) was based on dispersers which moved southward following prey populations further north crashed.

APPENDIX D - LYNX HABITAT MANAGEMENT IN OTHER AREAS

Washington State Department of Natural Resources (DNR)

Lines 364-366. The Washington Department of Natural Resources (DNR) does appear to consider all forested lands within lynx range (lynx management zones) (WDW 1993) as lynx habitat (WADNR 1996). However, the reference to the importance of boreal and/or subalpine forests to lynx and snowshoe hare is made throughout the report. The importance of subalpine fir plant associations is also acknowledged. For example, on page 4-100 in the Loomis-North LAU it states “The northern-most LAU of the Loomis State Forest, drained by North Fork Toats Coulee Creek and its tributaries, likely has the greatest potential of the three Loomis LAU’s to support lynx due to its relative inaccessibility (including 2,645 acres [1,070 ha] of Chopaka Natural Area Preserve), large portions (61%) of subalpine fir plant associations (currently lodgepole stands, Fig. 17) and rolling topography.”

Washington State Department of Fish and Wildlife

Lines 403-405. Stinson (2001) states lynx, in Washington, are found primarily in northcentral and northeastern Washington. He further states there is little evidence lynx were resident in the Olympics or very far from the Cascade crest.

APPENDIX E - RATIONALE SUPPORTING THE DEFINITION OF INTERMINGLED/ ADJACENT HABITATS

Lines 558-561. Minimum daily movement data cited in the "White Paper" reflect the distances moved within home ranges. In the LCAS, primary and secondary vegetation were used to describe lynx habitat. When developing the description of habitat, it was recognized that where two vegetation types were adjacent the "ecotone" between the two contained conditions which represented both types. Where the ecotone extended into the secondary vegetation it was included as lynx habitat. These types were considered secondary, but also contributed to lynx habitat because of their particular location. The research (Squires and Laurion 2000, Koehler 1990, Mowat et al. 2000, Apps 2000) reports on daily movements by lynx within lynx habitat. Exploratory movements described by Squires and Laurion (2000), Aubry et al. (2000) were those considered outside of normal home ranges.

APPENDIX F - THE VALUE OF OTHER VEGETATION TYPES AS LYNX HABITAT

Lynx use of lodgepole pine.

Lines 580-618. Koehler et al. (1979) reported 90 percent of the relocations were in lodgepole pine; it was seral to subalpine fir. Koehler's (1990) study area was primarily subalpine fir type, occupied by seral lodgepole pine. McKelvey et al. (2000a) was a re-analyses of data from Koehler (1990) and Brittell et al. (1989) studies in subalpine fir, reporting lodgepole pine as a seral component.

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