CONSERVATION BIOLOGY INSTITUTE

Changed Circumstances
and
Implementation of the Southern Sierra Nevada Fisher Conservation Strategy
Note from the Authors[1], March 2017

1.0 Introduction

The Southern Sierra Nevada Fisher Conservation Strategy (February 2016, version 1.0) was intended as a living document to be implemented in an adaptive management framework. The habitat analyses, models, and recommendations in the Strategy were based on vegetation conditions during its preparation, as reflected in datasets updated mostly as of 2012. However, since then, dramatic changes have occurred in Sierra Nevada mixed conifer forests due to drought and extraordinary tree mortality. The Strategy could not have anticipated nor account for such changes. This situation, coupled with insights gained during attempts to implement habitat recommendations in the strategy, has compelled us to prepare this interim guidance document regarding Strategy implementation until issues identified herein are rectified and the Strategy updated accordingly.

There is no available research or direct observations concerning how massive changes in tree cover due to drought and insect mortality, including death in even the largest tree classes, may affect fisher habitat use or population processes. There is also no direct evidence indicating how fishers will respond to management actions being implemented by land managers in response to this mortality event. It is therefore important to continue and expand on monitoring and research in these altered landscapes to characterize how fishers respond. In the meantime, it is probable that maintaining, and increasing the resilience of the remaining patches of large living conifers will be important to providing for the long-term persistence of the fisher population.

Implementation of certain parts of the Strategy also suffers from a lack of accurate and regularly updated vegetation data. This was a concern during Strategy preparation that has been exacerbated by the recent rapid changes in vegetation. There is no vegetation mapping program available today that is updated annually and systematically; nor is there a standard means of translating between on-ground (plot-based) measurements and the remotely-sensed metrics used in the Strategy. This makes evaluating changes in fisher habitat conditions following disturbances very difficult. The Fisher Technical Team (FTT) is therefore re-evaluating and revising the Strategy, while the R5 Remote Sensing Lab (RSL) and other scientists are working to resolve the vegetation mapping limitations.

Here we highlight (1) aspects of the Strategy that should *not* be implemented as we tackle these issues, (2) aspects of Sections 3 and 4 that remain relevant during this interim period, and (3) interim guidance for analyzing forest management project effects on fishers until we can provide better, more quantifiable methods. Other sections of the Strategy remain relevant to the conservation of fisher today.

2.0 Aspects of the Strategy that should NOT be implemented at this time

Use of the management grid system (section 3.1) and conservation targets (section 4.1) should be delayed for the reasons described below. The approach described in the Strategy uses a spatial grid

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system and guidelines to minimize the individual and cumulative effects of management actions on the fisher population, while maximizing their effectiveness at restoring and sustaining resilient habitat conditions. The focus of this approach is on sustaining and increasing the capacity of the landscape to support reproductive female fishers and to facilitate fisher dispersal between suitable habitat areas while also increasing habitat resiliency. The management system uses a grid of hexagonal cells about the size of female breeding territories and a habitat suitability metric that scores the suitability of each cell to support a breeding female. This multivariate metric was meant to be used to evaluate the individual and cumulative effects of fires, management actions, or other disturbance and succession processes on fisher carrying capacity, and to track these changes over time. A conservation target for the number of suitable cells to be maintained now and achieved in the future was established for each Core Area as a mechanism to ensure population stability and to increase the population over time.

The authors have identified weaknesses in applying this grid of hexagonal cells and habitat suitability metrics as currently described in the Strategy, due to four main factors:

(1) The underlying vegetation data are not updated regularly, systematically, and frequently enough to detect or predict changed habitat conditions at relevant temporal and spatial scales.
(2) The sample of female fisher home ranges used to develop habitat selection indices represents a subset of (mostly fire-suppressed) habitat conditions fishers compared with what they experienced in the past, may be selecting currently, or are likely to use in the future.
(3) Because of #2, the principal components analysis (PCA) used to predict female habitat suitability apparently undervalues suitability in some areas that fisher experts consider highly suitable.
(4) Preliminary assessment of the degree of habitat change due to tree mortality indicates that many cells identified in the Strategy as suitable may no longer be identified as such using the PCA approach. Consequently, the conservation targets for the number of suitable habitat cells may no longer be relevant.

The FTT is therefore refocusing our efforts on developing more reliable habitat suitability metrics for the management grid system, in consultation with experts that are addressing the vegetation mapping issues (item #1) before updating and recommending how to use the management grid system. **Until these issues are rectified, we do not recommend applying the original management grid system to evaluate the changes to unsuitable, potentially suitable, and suitable cells at this time. We also do not recommend applying the conservation targets, nor the Strategy description of *target cells*, at this time.**

3.0 Application of sections 3 and 4 to the design of vegetation management projects

The conservation of fisher as outlined in the Strategy is based on "reducing threats and increasing the quality and resiliency of fisher habitat." This remains true; and the guiding principles, goals, and objectives of the Strategy continue to serve as a foundation for fisher conservation options and planning. The desired conditions outlined in section 4.3 represent a range of characteristics to strive for in various areas, and should inform fine scale assessment of key fisher habitat elements, including their connectivity within potential home ranges and across the landscape. While the conditions described in 4.3.2 have recently become rarer on the landscape, and may take decades to centuries to promote in some instances, they still represent long term goals for fisher conservation, particularly in areas identified as able to sustain such conditions in a resilient landscape. Conservation measures described in section 4.5 are still appropriate to help guide the design of any management/conservation project.

3.1 Revision of some conservation measures for near-term application

Some of the conservation measures, particularly those tied directly to *target cells*, are no-longer applicable as written, given the issues described above. The following are suggested revisions to these particular measures in the near-term, as we refocus our efforts and revise the overall Strategy.

In Section 4.5.1 (Maintain Well-distributed and Connected Fisher Habitat) the two bullets under "In fisher core area" (page 54) should be replaced by the following two bullets:

- Avoid treating two or more adjacent cells in a manner that reduces connectivity of remaining high reproductive habitat value (CWHR 4D, 5M, 5D, and 6)[2] within and between cells.
- When treating cells within or adjacent to recently disturbed areas (e.g. severely burned or highly impacted by drought mortality), protect and promote connectivity within and between cells, and focus treatment on increasing resilience of remaining suitable[3] habitat.

In Section 4.5.2 (Improve Habitat Resiliency and Restore Fire as a Key Ecological Process) the last line on page 56 and first bullet on page 57 should be revised to read:

> The following should be considered where mechanical treatments are planned in and around remaining high value reproductive habitat (CWHR 4D, 5M, 5D, and 6):
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> - Design treatments to limit disturbance from mechanical treatments to <13% of each affected cell within a 5-year period (Zielinski et al. 2013b), providing resilience goals for remaining high value reproductive habitat are achievable. Where remaining high value reproductive habitat is at significant risk of loss or isolation due to lack of resilience, design treatments to limit disturbance from mechanical treatments to <30% of each affected cell within a 5-year period (Zielinski et al. 2013b, Spencer et al. 2015). Where remaining high value reproductive habitat is at significant risk, and resiliency goals cannot be met while limiting treatment disturbance to these rates, conduct a cost-benefit assessment to determine if benefits to fisher habitat conservation in the long-term are likely to outweigh short-term costs (*see section 3.3 below*).

3.2 Near Term Application of Limited Operating Periods

Whenever possible, it is preferred to delay management activities in previously identified fisher denning habitat until after June 30, as described in the Fisher Conservation Strategy. However, the authors recognize the need to improve the resiliency of stands impacted by tree mortality and to mitigate the hazards posed by dead trees, and that a Limiting Operating Period (LOP) may impose restrictions on these activities. At the same time, the available evidence indicates that female fishers are continuing to use areas with high levels of tree mortality (C. Thompson, pers. obs.). It is currently unknown whether these animals will reproduce in these areas; however it is likely that they are experiencing elevated

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[2] High value reproductive habitat includes: habitat types: Douglas Fir, Eastside Pine, Jeffrey Pine, Lodgepole Pine, Montane Hardwood-Conifer, Montane Hardwood, Montane Riparian, Ponderosa Pine, Red Fir, Subalpine Conifer, Sierran Mixed Conifer, or White Fir; CWHR size and density classes: 4D, 5M, 5D, and 6

[3] Suitable habitat includes both high value reproductive habitat (defined above) and moderate to high capability habitat (defined in footnote 4 below).

stress due to habitat change and may be less tolerant of disruption than previously documented. Therefore, we recommend that the LOP identified in the Strategy be maintained in areas previously identified as suitable denning habitat even if those areas no longer appear to meet the requisite conditions. While human safety may dictate work associated with mitigating hazards in these areas within the LOP window, when any decision space in timing and location of hazard mitigation exists, we recommend prioritizing areas as follows:

1. Between March 15 and May 31, minimize the amount of work done along secondary roads and in areas removed from human activity or development. Instead, focus hazard removal work along primary or high-traffic roads, or near occupied human structures, where female fishers are less likely to den.
2. Conduct work along secondary roads or in more remote areas *after* June 1. By this time, fisher kits are more robust and capable of dealing with extended maternal absences, and females are able to move them more easily.

3.3 Analysis Process

Here we briefly describe an interim process for designing and evaluating vegetation management projects.

The Conservation Strategy identifies 3 spatial scales to consider when conducting project-level analyses.

1) Stand scale – this scale represents the availability of individual habitat features within the project area. Structural characteristics such as canopy cover or large tree availability should be evaluated for the proposed action and any alternatives, with availability of the structural characteristics projected into the future both with and without a simulated fire.

- Select habitat characteristics relevant to the project area based on available research and strategy recommendations. The importance of habitat elements such as canopy cover, large tree and snag availability, and hardwood basal area has been repeatedly supported. Other factors, such as the acreage of moderate and high capability habitat as defined by CWHR 2.1[4], and high value reproductive habitat (CWHR 4D, 5M, 5D, and 6)[5] should also be included. We suggest evaluating at least the following:
    - canopy cover
    - large trees and snags
    - hardwood basal area and total basal area
    - remaining CWHR high reproductive value habitat pockets/refugia

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CWHR2.1 Habitats	CWHR2.1 High and Moderate Capability Size, Canopy Cover, and Substrate Classes
JEFFREY PINE	4P, 4M, 4D, 5P, 5M, 5D
MONTANE HARDWOOD-CONIFER	4P, 4M, 4D, 5S, 5P, 5M, 5D, 6
PONDEROSA PINE	4P, 4M, 4D, 5P, 5M, 5D
SIERRAN MIXED CONIFER	4P, 4M, 4D, 5S, 5P, 5M, 5D, 6
WHITE FIR	4P, 4M, 4D, 5S, 5P, 5M, 5D, 6

5 High value reproductive habitat includes: habitat types: Douglas Fir, Eastside Pine, Jeffrey Pine, Lodgepole Pine, Montane Hardwood-Conifer, Montane Hardwood, Montane Riparian, Ponderosa Pine, Red Fir, Subalpine Conifer, Sierran Mixed Conifer, or White Fir; CWHR size and density classes: 4D, 5M, 5D, and 6

- connectivity between pockets of high value reproductive habitat, as indicated by presence of other moderate and high capability habitat as defined by CWHR 2.1

➢ Compare the current and projected availability of these elements under the management alternatives, as well as with and without wildfire, using FVS software.

   - Note that FVS projections for canopy cover in particular are unlikely to align with SSNFCS recommendations (which are based on remotely-sensed metrics). One approach to addressing this issue has the following four steps: 1) compare the current FVS modeled value to the current EVEG value; 2) project stand characteristics forward using FVS; 3) measure the change in FVS from current to projected; 4) add or subtract this change from the current EVEG value and use the resulting number as the likely future condition

➢ If possible, compare the trajectory of these habitat elements in the project area with the projected changes in fire characteristics such as flame length and torching index under the different alternatives.

➢ Consider the cost vs. benefit of management alternatives, and look for opportunities to modify prescriptions to minimize negative impacts, while recognizing that short-term risk may be necessary to meet longer term conservation and resiliency objectives.

Example of stand-level analysis of canopy closure, taken from the Tobias Supplemental Biological Evaluation for fisher. The analysis indicates current (2010) canopy closure on the Tobias unit, as well as the projected trajectory under alternative management and fire scenarios. E. Lang, Sequoia National Forest.

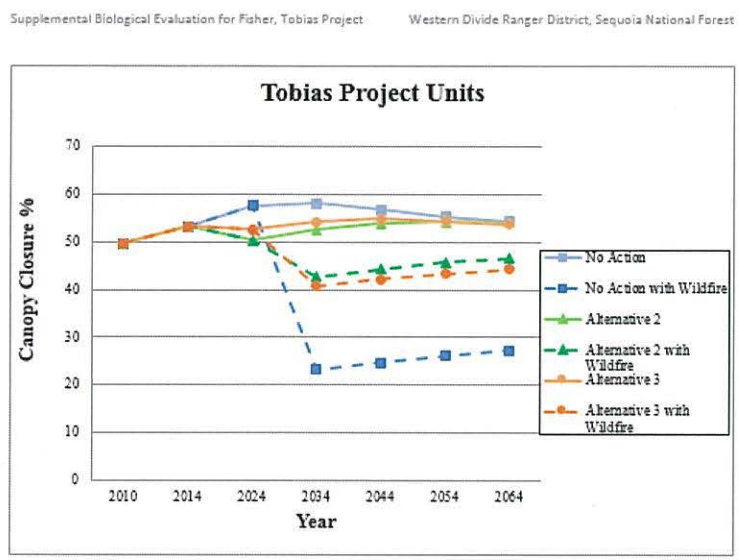

Figure 3: Average canopy closure projected to year 2064 under the No Action Alternative, No Action with Wildfire, Alternative 2, Alternative 2 with Wildfire, Alternative 3 and Alternative 3 with Wildfire.

2) Hexagon / home range scale – This scale considers the availability of suitable habitat within a home range. This should take into account changes in the high value reproductive habitat within any hexagons impacted by the project, and connectivity between those habitats. An analysis at this scale would evaluate both the availability and configuration of high value reproductive habitat within each hexagon into the future.

   ➢ Identify remaining high value reproductive habitat within each hexagon.

   ➢ Assess whether activity will maintain existing high value reproductive habitat in the near term, reduce risk of future loss of this habitat, and promote connectivity between high value reproductive habitat (e.g., through promotion of other moderate and high capability habitat as defined by CWHR 2.1).

- Consider the following in an informal cost-benefit analysis to consider potential short-term costs/benefits and long term costs/benefits of action.
  - What is relative risk of significant disturbance to moderate and high capability habitat as defined by CWHR 2.1 (see footnote 4 above) in a hexagon? Consider risk of high severity fire, density-driven mortality, drought driven mortality, and ability to mitigate these risks.
  - What is relative risk of significant disturbance to high value reproductive habitat within a hexagon?
  - How long will recovery to high value reproductive habitat take?
  - What is the relative proportion of treated area to the total available habitat within that hexagon?
  - Does the cell play a critical connectivity role, meaning does it serve as a corridor between otherwise unconnected habitat at larger scales?
  - Will key fisher habitat elements be maintained?
  - Will connectivity be promoted between patches of high value reproductive habitat?

3) Population core scale – the Strategy identifies 6 population cores. Analysis at this scale should focus on the availability and configuration of high value reproductive habitat across the core, as well as whether or not the overall availability of high value reproductive habitat is projected to be increasing or decreasing from current conditions, considering both past disturbance and actions outside the project area, as well as relative risk of future disturbance. As noted above, this analysis should *not* assess habitat projections relative to conservation targets or target cells as described in the Strategy. Rather, it should assess overall availability of and risk to high value reproductive habitat relative to current conditions and other alternatives within the affected core. While data limitations (see page 1) may restrict the extent to which these metrics can be accurately estimated, available information should be considered in a qualitative assessment if a more quantitative assessment is not possible. Analysis should use the latest vegetation information available at the time of project planning.