

## Sierra NF Interim Pacific Fisher Habitat Maintenance and Improvement Approach

by Mark T. Smith, Kim Sorini-Wilson and Kevin Williams

### Purpose and Background

The purpose of the Pacific fisher habitat maintenance and improvement approach is to create interim recommendations from forest staff sufficient to assure forest restoration through commercial and precommercial tree thinning, silvicultural activities such as mastication of small trees and brush, piling and burning of forest debris and prescribed fire have at most insignificant adverse effects on fisher habitat functionality and through most activities, enhance it.

Based on advice from the Regional Ecosystem Conservation Staff, this interim approach will be recommendations until completion and issuance of a Southern Sierra Fisher Conservation Strategy, currently anticipated towards the end of 2009. This Conservation Strategy will be created as a geographically specific application of the West Coast Fisher Conservation Strategy, currently under development. Adjustments to this interim approach may occur at any time in response to new best available science or large scale wildfire that affects a significant area of fisher habitat.

There are usually several objectives that are proposed for accomplishment by an individual project and lead to development of the purpose and need statement in a NEPA analysis. This interim approach is intended only to guide these analyses as they require recommendations on maintenance and improvement of fisher habitat functionality.

### Objectives

1. Maintain and enhance fisher habitat functionality while applying a cautious but effective approach to forest restoration of which fuels management is a key component.
2. Maintain high levels of canopy cover in areas that are most important to fisher habitat functionality, CWHR MC4D & MC5D and riparian areas associated with perennial streams.
3. Provide for heterogeneity across the landscape by retaining shrub/understory patches and higher densities of 20-30" dbh trees when they are associated with clumps of larger trees (>30" dbh), and utilize opportunities to create small openings as they occur on the landscape and when not at the expense of the large tree clumps.

4. Strive to increase the extent, value, and contiguity of fisher habitat throughout the Forest (and perhaps beyond, to the north) to maximize population persistence and enable population growth.

## Habitat Status

Following is the habitat status from the executive summary of “Final Report: Baseline Evaluation of Fisher Habitat and Population Status in the Southern Sierra Nevada” (2007) by the Conservation Biology Institute which is available at [www.consbio.org](http://www.consbio.org):

*Baseline Habitat Assessment - Our analyses corroborate existing published descriptions of the current state of fisher habitat in the southern Sierra Nevada, and provide some new insights and additional tools for assessing current as well as future conditions. Fisher habitat in the southern Sierra Nevada is restricted to a relatively narrow band of mid-elevation forests, mostly on the western slope of the range, particularly on mesic topographic positions (i.e., slopes experiencing relatively low annual exposure to solar radiation), and especially where older stands of mixed conifers, sequoia, or ponderosa pine tend to abut or intermix with montane hardwoods, especially black oak. The zone of predicted suitable habitat broadens in more northerly portions of the study area (Stanislaus NF), although this area is not currently occupied by fishers.*

*Predicted coarse-scale fisher habitat is broken into somewhat discrete blocks or segments, with gaps generally corresponding to major river canyons. Some of these segments are occupied (south of the Merced River) whereas others (north of the Merced) are not. Among the occupied segments, the one comprising parts of the Kings River Administrative Study Area (between the Kings and San Joaquin Rivers) appears to be particularly vulnerable to disruption, as it is a relatively long and narrow stretch of variable but mostly moderate quality habitat according to our models. None of the FIA plots in that area have very high resting microhabitat value, although the sample size is small (~22). Highly suitable resting microhabitats are relatively rare even within areas of predicted suitable habitat at the coarse scale.*

*Much of the predicted suitable habitat on Sequoia and Sierra NF (roughly 192,000 ha total) appears to be occupied by fishers, whereas large areas of predicted suitable habitat on the Stanislaus NF (about 84,000 ha) are not.*

Habitat monitoring relies on tracking changes in habitat quality using a combination of remotely-sensed vegetation data and plot data collected in conjunction with the ongoing Forest Inventory and Analysis program. Habitat monitoring on the Sierra and Sequoia is being conducted in collaboration with the Pacific Southwest Research Station (R5 Status and Trend Monitoring).

## Population Status

Following is the population status from the executive summary of “Final Report: Baseline Evaluation of Fisher Habitat and Population Status in the Southern Sierra Nevada”:

*Baseline Population Assessment - Equilibrium population estimates from the population dynamics model PATCH were relatively insensitive to assumptions about initial population size, dispersal distance, and most age-specific fecundity and survival rates, but were highly affected by territory size and survival rates for adult females. Based on the most biologically defensible ranges of parameter values, we estimate that currently occupied habitat areas in the southern Sierra Nevada can support about 71-147 adult females (the most critical sex-age class for sustaining a population). Assuming a 1:1 sex ratio (which probably overestimates the number of adult males) yields an estimate of 142-294 adults fishers. Accounting for subadult animals provides a rough estimate of 220-360 total fishers in the southern Sierra Nevada. Although this estimate accords reasonably well with other estimates of the Sierra Nevada fisher population, it has several important sources of uncertainty and should be viewed with caution. We suspect that several assumptions may tend to inflate this estimate (e.g., assumed 1:1 sex ratio, average territory sizes of 860-1,200 ha, optimistic age-specific fecundity and survival rates, and no accounting for increased mortality during dispersal). On the other hand, the under-representation of habitat value for Kern Plateau and Sequoia-Kings Canyon NP may tend to slightly underestimate the total population.*

*Extrapolating fisher density estimates supplied by Jordan (2007) over our modeled habitat area (using the 0.5 cutpoint in probability of occupancy for model LAND14 south of the Merced River) yielded population estimates of 57-86 adult females and 285-370 total fishers. Although*

*this estimate accords fairly well with those from PATCH and other methods, it is a very uncertain calculation, because (1) we are extrapolating density from only a single sample location, which may not be representative of density over the entire area; (2) using a single probability cutpoint to define occupiable habitat is overly simplistic; and (3) the extrapolation area includes small and isolated areas of predicted habitat that are probably not occupied.*

*Finally, the preliminary estimate supplied by R. Truex (personal communication) by applying sampling theory to the fisher monitoring data is 160-250 total fishers in the study area. This also matches fairly closely with our estimate using PATCH.*

*PATCH results suggest that potential source habitat (where births exceed deaths) are fairly well distributed in association with the larger, more contiguous areas of predicted high-value habitat, with sink habitats (deaths exceed births) in more peripheral and isolated habitat areas (Figure ES-3). The Kings River study area, between the San Joaquin and Kings Rivers, appears to be a fairly narrow and tenuous set of territories relative to more contiguous blocks of high-value habitat north and south of there. This area should be managed to prevent loss or further fragmentation of habitat value and to increase the contiguity of dense, older forest stands. Overall, forest management should strive to increase the size and connectivity of source habitat areas.*

The R5 Status and Trend Monitoring of fisher population involves two components: intensive sampling on Sierra and Sequoia National Forests (the portion of the Sierra Nevada currently occupied by fisher) designed to monitor population trend and additional sampling at 'sentinel sites' in the central and northern Sierra (the area assumed to be unoccupied by fisher) focused on documenting population expansion.

Population monitoring data have been used to develop habitat models for fisher that will be used to explore relative effects of different land management approaches on fisher habitat in the southern Sierra. Population monitoring involves conducting presence/ absence surveys throughout the region to estimate the proportion of sites (primary sample units) annually occupied by fisher and marten, and detecting declines over the proposed 10 year monitoring period.

Population monitoring program, sampling effort for both species (fisher and marten) has been greater in Sequoia and Sierra National Forests (672 sample units) than in the central and northern Sierra Nevada (244 sample units). Fishers have been detected at 103 locations during 181 different sampling occasions. Continued monitoring will be critical not only to understand trends in the southern Sierra fisher population, but also to document fisher population expansion into the central and northern Sierra Nevada should it occur. By June 2008, the first formal analysis of fisher population status and trend should be complete (R5 Status and Trend Monitoring).

The PSW Kings River Fisher Project and the parallel University of California Sierra Nevada Adaptive Management Project (UC SNAMP) fisher study are designed to monitor changes in the distribution of fishers in the Sierra Nevada and detect potential regional declines in fisher abundance. As a collaborative regional approach, these research projects will provide larger sample sizes, will facilitate a better understanding of the cause and effect relationship between fishers and their environment and will lead to management recommendations.

On the High Sierra Ranger District, PSW reported capturing a total of 25 fishers 13 females and 12 males from February 2007 to February 2008, all of which were fitted with radio collars. To date, there have been 6 confirmed mortalities, 5 due to predation. Four necropsies have been completed and coyote and bobcat have been confirmed as predators. Seven of ten adult females appeared to have reproduced in 2007.

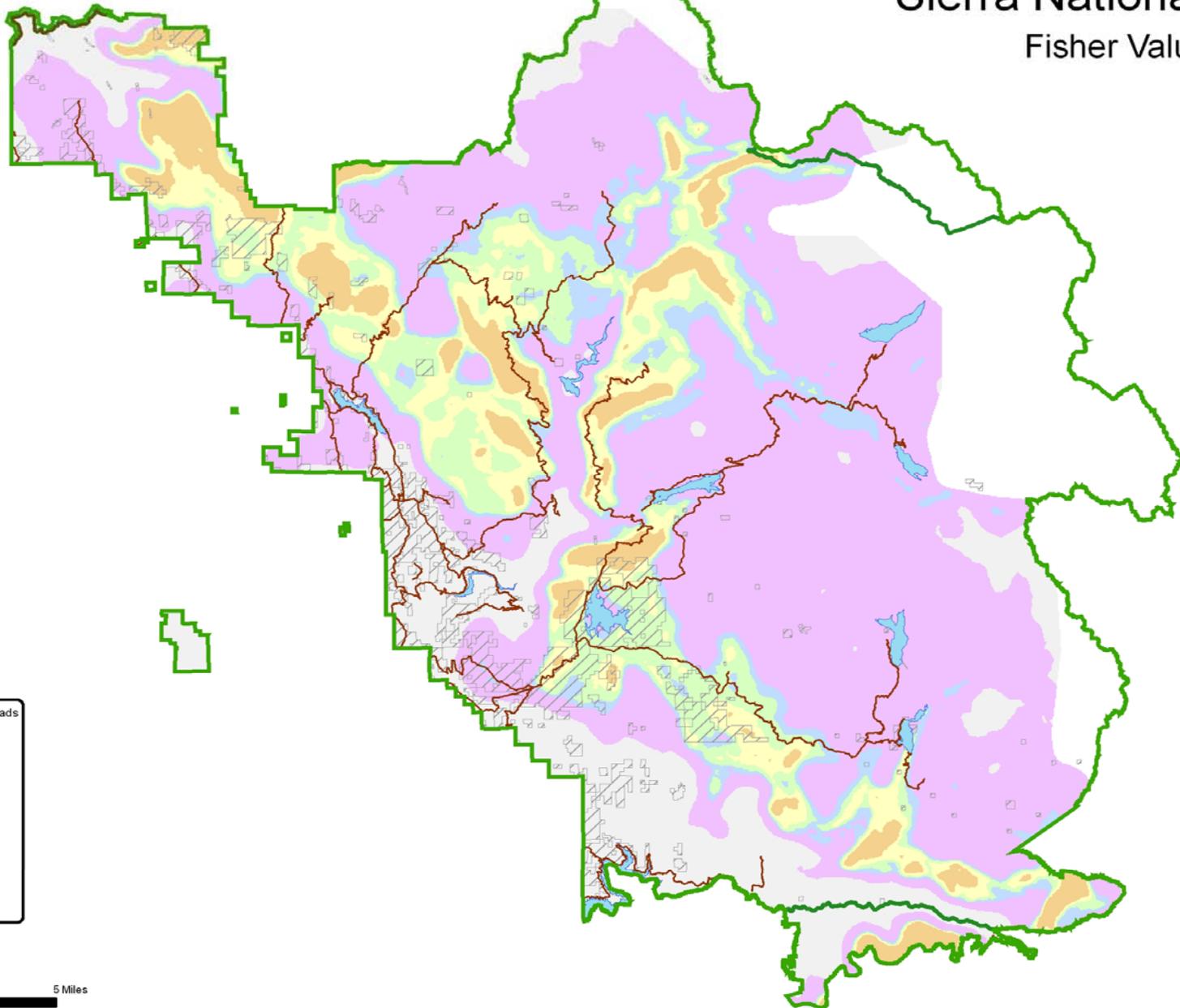
On the Bass Lake Ranger District, UC SNAMP reported nine individual fishers have been captured and radio collared since December 23, 2007. One of the 9 radio collared fishers was struck and killed by a vehicle on Highway 41 adjacent to the Miami Motorcycle Area in late February, 2008. They are currently monitoring 8 radio collared fisher by regular aerial radio telemetry and ground-based telemetry. As of late February, 2008, automatic cameras have been used to survey 90 different 1 km<sup>2</sup> grid cells, primarily within the Nelder Creek, Sugar Pine, and White Chief Branch watersheds. Fisher activity has been detected in 51 of the grids surveyed so far.

### Landscape Level Predicted Probability of Fisher Occupancy

The following map from “Final Report: Baseline Evaluation of Fisher Habitat and Population Status in the Southern Sierra Nevada” (2007) by the Conservation Biology Institute shows the predicted probability of fisher occupancy by twenty percent classes (value: 0 – 0.2, 0.2 – 0.4, etc.).

# Sierra National Forest

## Fisher Values



Primary Roads

PVT

**Fisher**  
**<VALUE>**

- 0
- 0 - 0.2
- 0.2 - 0.4
- 0.4 - 0.6
- 0.6 - 0.8
- 0.8 - 1

5 2.5 0 5 Miles



NO SCALE, 10/2007

### New Information

New information and clarification related to the Pacific fisher are contained in two documents: 1) “Final Report: Baseline Evaluation of Fisher Habitat and Population Status in the Southern Sierra Nevada” (2007) referred to above; 2) “Lessons Learned Regarding Fisher Habitat Maintenance and Development” by Cheryl Carrothers & Diane Macfarlane (12/11/2007).

A new paper titled *An Ecosystem Management Strategy for Southern Sierra Mixed-Conifer Forests* by North, M., P. Stine, K. O’Hara, W. Zielinski and S. Stephens addresses that:

*In recent years, there has been substantial debate over the appropriate management of Sierran forests and this debate inevitably cites “sound science” as a necessary foundation of any approach chosen. The intention of this paper is to propose a management strategy based on recent research findings and opportunities to implement new forest management practices in southern Sierran mixed-conifer forests. Many relevant research projects have published findings in dozens of scientific outlets, yet these have rarely been synthesized or presented in a form that speaks directly to current land management challenges.*

*Objectives of forest management also invariably cite a “healthy forest” as one of the primary purposes of whatever strategy that is chosen. It is difficult, however, to define forest health, and as a broad concept its implementation will vary depending on the management objectives and ecological conditions that a given area is capable of supporting. A premise of silviculture is that forest management prescriptions can be tailored to fit a wide variety of land management objectives, once those objectives are defined. Thus in this paper, we summarize some of the key forest management objectives on National Forest lands in the southern Sierra and how they might be approached through particular silvicultural prescriptions.*

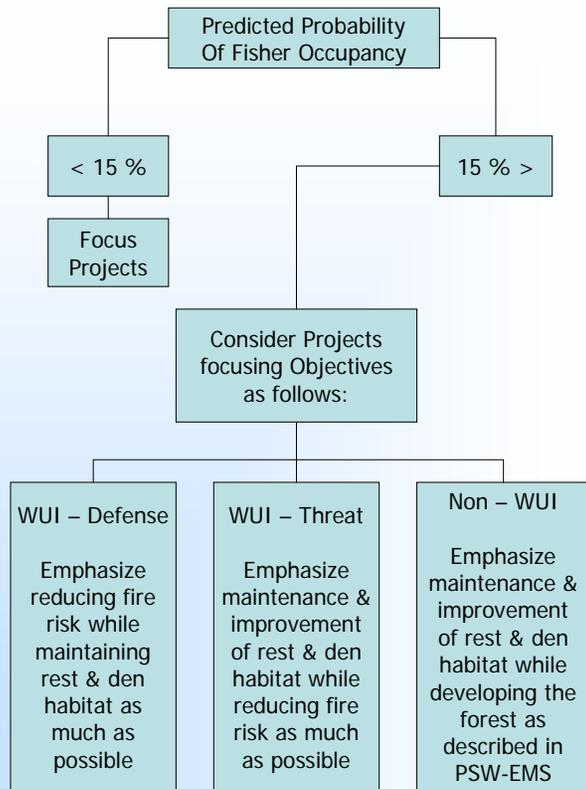
All the forgoing new information and clarification related to the Pacific fisher raises the question how it would modify the proposed action for the Sierra Nevada Adaptive Management Projects at Sugar Pine and Fish Camp and the implementation of the Reduction of Tree Harvest Size Alternative in the Kings River Project FEIS. To address these questions, principles have been drawn from the three documents with new information and the following table created to indicate how each principle would be implemented and the monitoring of that implementation on these projects. There is a need to validate that the project design measures applied the principle and that project implementation was consistent with what was designed.

Maintenance and Improvement Principles and Implementation Approaches

Landscape Level Habitat Maintenance and Improvement Principles and Implementation Approaches		
Principle	Implementation Approach	Monitoring
<p>Recognize there is a band of fisher habitat running from the southeast to the northwest through the Sierra National Forest between about 4500 and 6500 foot elevation that varies in width and within which there is a high probability of detecting fisher. At some places (i.e. the Kings River Project) this band narrows enough that it becomes a focal area for increasing habitat functionality (quality, quantity and distribution) so that fisher movement is not restricted (CBI Final Report).</p>	<p>Strive to increase the value, extent, and connectivity of fisher habitat between the Kings and San Joaquin Rivers. (CBI Final Report).</p> <p>Advance opportunities to reduce the risk of catastrophic fire breaking this band by focusing fuels management especially on the southwestern and somewhat on the northeastern landscape. Particularly in the southwest are the areas to sparingly reduce crown bulk density and increase tree crown separation in conjunction with reducing ground and ladder fuels to increase the effectiveness of fuel treatments.</p> <p>Advance projects in the WUI that are southwest of the band of fisher habitat and/or create stewardship contracting opportunities (i.e. Jose Central and West of Shaver on High Sierra, Initial Fireshed priorities on Bass Lake).</p>	<p>Applicable monitoring is beyond the life of this Interim Approach.</p>
<p>Allow piling and burning of activity fuels and prescribed fire to be considered for inclusion in the purpose and need in any project in any area of the landscape outside of wilderness. Prescribed fire, should consider effects to large downed logs and snags. These important features should be retained</p>	<p>Establish and maintain a pattern of area treatments that is effective in modifying fire behavior so that it interrupts fire spread and achieves conditions that reduce the size and severity of wildfire.</p>	<p>Established permanent plots to monitor prescribed burns using the Browns Planar Intercept Method.</p>

<p>wherever possible. However, the distribution of such features is spatially quite variable and need not be implemented uniformly across the landscape. When stands cannot be burned, reducing fuels to moderate fire behavior is still a key priority because wildfire is likely to burn the area eventually. (PSW EMS)</p>		
<p>The frequency distribution of tree diameters in Sierran mixed conifer forest subject to frequent low-intensity fire was highly variable but generally flat due to periodic episodes of fire induced mortality and subsequent recruitment. Treatment of stands would strive to significantly reduce the proportion of small trees and increase the proportion of large trees as compared to what is currently found in contemporary stands. A large proportion of the growing space would be allocated to the largest tree stratum. (PSW EMS)</p>	<p>During the time this interim approach will remain in effect, flat frequency distributions of tree diameters for use as growing space allocation targets will be under development for the different forest types (i.e. mixed conifer, ponderosa pine). Until they are completed and ready for use, traditional uneven-aged or thinning from below growing space allocation targets will continued to be used. For the Kings River Project a modified version of the J-curve, covering only diameters from 11” to 30”, that emphasizes reducing the proportion of small trees and increasing the proportion of large trees in a stand, as encouraged in PSW EMS, has been described and will be utilized.</p>	<p>Not Applicable</p>
<p>Marking rules are based on crown strata or age cohorts (a proxy for size/structure cohorts) and species rather than uniform diameter limits applied to all species. (PSW EMS)</p>	<p>Also, during the time this interim approach, the MultiAge Stocking Assessment Model, referred to in PSW EMS, will be under development. Until it is ready for implementation, traditional approaches to writing markings rules (i.e. crown canopy and/or basal area targets) and a list of species to favor retaining will continue to be used.</p>	<p>Not Applicable</p>

Plan the timing and emphasis of restoration projects using the following decision tree:



In habitat that appears to support high densities of fisher based on current research and/or are outside of the WUI - Defense (i.e. Bear-fen); postpone the commercial thinning portion of projects. Advance projects involved in the KREW and/or the WUI - Defense, especially if they have little or no current fisher population (i.e. KREW Bull, El-O-Win, KREW Prov). Recognize opportunities to improve fisher habitat functionality through restoration projects, especially in areas with a less than 40 % probability of detecting fisher, which can be accomplished by favoring development of large trees, diverse structure and retaining endemic levels of natural processes (insects, disease, wind damage, etc.).

Applicable monitoring is beyond the life of this Interim Approach

Plant Aggregation Level Habitat Maintenance and Improvement Principles and Implementation Approaches		
Principle	Implementation Approach	Monitoring
In the mixed conifer type, hardwoods and pines, with much lower densities in current forest compared with historical distributions, would rarely be thinned. The emphasis of thinning would be focused on firs and incense cedar. This would restore a more balanced distribution of tree species that was typical of active-fire conditions (PSW EMS). In the ponderosa pine type, this principle only applies to retention of hardwoods.	Silvicultural prescriptions will specify a list of tree species to favor retaining stand by stand.	As part of the timber sale preparation package, provide a comparison by tree species of the number of trees to remain after thinning versus found present by the initial stand examination for review with interested parties.
Trees within a stratum (i.e. canopy layers or age cohorts) would often be clumped, but different strata, for fuels reasons, would often be spatially separated horizontally across a stand (PSW EMS). Minimize the application of silvicultural prescriptions that produce homogenous residual stands, with attention to maintaining heterogeneity at multiple scales. Heterogeneous habitats expressed at multiple scales are more desirable than homogenous stands/landscapes. Available resting/denning structure is generally considered to be limiting. In stands lacking vegetative and structural diversity in	Retain higher basal area than otherwise prescribed in areas where large trees (>30" dbh) are clumped with 20 to 29" trees interspersed. Increase the basal area target to approximately 80 percent of full stocking in these clumps. Where large trees have been depleted or do not exist manage the next largest size so that they will grow into large trees and provide structural components for fisher and owl resting and roosting structures. Retain some patches of understory shrub, hardwoods and small trees across the stand with a rough target of 10 to 15% of the area to be harvested. (Cedar Valley)	Conduct a field review with interested parties to visually examine the results after the commercial thinning phase of the project is completed then again after the cultural and fuels treatments have been completed.

<p>the understory, prey abundance and distribution may be limited. Creation of small openings, usually less than a quarter acre, may encourage the development of shrubs which typically contribute to the diversity of food sources. (Lessons Learned)</p>		
<p>Trees providing suitable structure for wildlife include large trees, trees with broken tops, trees with cavities, trees with platforms, and other malformations that create structure for nests, dens, etc. are suitable nest, den and rest sites for wildlife. These structures typically occur in the oldest trees.</p> <p>Highly suitable resting microhabitats are relatively rare even within areas of predicted suitable habitat at the coarse scale. Management should strive to increase the distribution and abundance of forest stands that provide high-value resting sites and hopefully denning sites (Zielinski et al. 2004a, 2006, Aubry and Raley 2006) especially within areas predicted to be high value at the coarse-scale. (CBI Final Report).</p>	<p>A process for identifying and thus protecting trees providing suitable structure for wildlife has been developed for the Kings River Project with the technical advice of the Fish and Wildlife Service. It will be adopted for application across the Forest (PSW EMS). (The process is essentially the same approach referred to in PSW EMS as being used by Green Diamond.)</p> <p>Natural process such as endemic levels of insect and disease activity, wind damage on a small scale and low intensity fire help in developing suitable tree structure for wildlife. So, the importance of these natural processes will be recognized and defective medium and large size trees will not be targeted for elimination in silvicultural prescriptions when they occur in clumps identified as described in the previous section or along riparian corridors as described in the following section.</p>	<p>As part of the timber sale preparation, GPS the location of trees considered for protection using the process developed for the Kings River Project. Provide a comparison of the number considered versus the actual number selected for protection for review with interested parties.</p>
<p>Mesic conditions found along riparian corridors (600 feet in total width) associated with perennial streams as well as north and northeast-facing slopes contribute to greater site quality for tree growth and structure development. Mesic sites also tend to have greater biodiversity and greater biomass per area, providing better foraging habitat as well. Because</p>	<p>Retain greater than 60% canopy cover in habitat classified as CWHR MC4D &amp; MC5D by aerial photo interpretation (Cedar Valley), especially within and adjacent to the more mesic sites over other drier, less productive sites.</p> <p>Along perennial streams, leave the first 50' from the high water mark undisturbed, except an underburn would be</p>	<p>Design for each project using the Cedar Valley approach as a guide.</p>

<p>these sites provide greater opportunity for developing the structural elements, large trees and dense canopy cover components of fisher denning and resting habitat faster, consider proposing treatments that support this type of stand development within and adjacent to the more mesic sites over other drier, less productive sites. (Lessons Learned)</p>	<p>allowed to back into this zone; limit conifer thinning from 50' to 150' to trees 12" diameter or less; emphasize retention of canopy cover as described above from 150' to 300'.</p>																				
<p>Enhance patches of 20" – 30" diameter trees by thinning so that the remaining trees will grow faster into trees greater than 30" diameter and reduce the risk of insect induced mortality in these patches.</p>	<p>Using the approach of emphasizing what is left in a treated stand, rather than what is removed (PSW-EMS), the following are the desired no. of trees per acre by diameter classes for an average condition across several acres of a stand:</p> <table border="1" data-bbox="894 753 1694 935"> <thead> <tr> <th rowspan="2">Site Quality</th> <th colspan="4">Average No. Trees per Acre by Diameter</th> </tr> <tr> <th>18" – 21.9"</th> <th>22" – 25.9"</th> <th>26" – 29.9"</th> <th>30" +</th> </tr> </thead> <tbody> <tr> <td>High</td> <td>10</td> <td>7</td> <td>5</td> <td>11</td> </tr> <tr> <td>Moderate</td> <td>8</td> <td>6</td> <td>4</td> <td>9</td> </tr> </tbody> </table>	Site Quality	Average No. Trees per Acre by Diameter				18" – 21.9"	22" – 25.9"	26" – 29.9"	30" +	High	10	7	5	11	Moderate	8	6	4	9	<p>As part of the timber sale preparation package, provide a comparison by diameter class of the number of trees to remain after thinning versus found present by the initial stand examination for review with interested parties.</p>
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<p>To provide for species and structural diversity to maintain or enhance habitat suitability, retain large hardwoods, specifically black oaks, as available.</p>	<p>Two different oak management strategies described below may be applied, depending on overall availability of oaks and site specific objectives:</p> <ol style="list-style-type: none"> <li>1. When the objective is to maintain the health and/or extend the overall longevity of a particular oak, smaller, competing conifers may be removed to allow the oak better access to sunlight and other nutrients even though many of these oaks will not "release" (have a growth spurt) as a result of the thinning.</li> </ol>	<p>As part of the timber sale preparation package, provide a tally of black oaks treated by the two different oak management strategies for review with interested</p>																			

	<p>2. When the objective is to maintain the dark, closed canopy microclimate around a medium or large oak (usually about 20" diameter), retention of the smaller, competing trees may be warranted. Favored rest and den trees are utilized not just for the potential access to cavities they provide, but also for the high density of surrounding, adjacent trees. This guidance does not apply to the Defense Zone of the WUI or to fuelbreaks.</p>	<p>parties.</p>
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