State of California
The Resources Agency
Department of Fish and Game

Evaluation of Petition: Request of the Center for Biological Diversity to list the Pacific Fisher (*Martes pennanti*) as Threatened or Endangered

Wildlife Branch
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Department of Fish and Game
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EVALUATION OF PETITION: REQUEST OF THE CENTER FOR BIOLOGICAL DIVERSITY TO LIST THE PACIFIC FISHER (*Martes pennanti*) AS THREATENED OR ENDANGERED

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EXECUTIVE SUMMARY

The Center for Biological Diversity submitted a petition on January 23, 2008, seeking action by the California Fish and Game Commission (Commission) to list the Pacific fisher (*Martes pennanti*) as threatened or endangered under the California Endangered Species Act. Pursuant to Fish and Game Code (FGC) section 2073, the Commission referred the petition to the Department of Fish and Game (Department) for its evaluation and recommendation.

The petition recommends listing of the fisher as threatened or endangered in California primarily because of petitioner's conclusion that long-term forest management and timber harvest activities have reduced the acreage of late successional forests that tend to have the bulk of the structural elements (high canopy cover and mature/old trees) that fisher use for denning and resting; that logging and other factors have caused and are causing a decline in fisher range; and that the population in California is small, isolated, and declining or at risk of decline because of these effects. The petition also reviews timber harvest regulatory mechanisms, and other identified factors.

Conclusions and Recommendation:

In accordance with FGC sections 2072.3 and 2073.5, the Department reviewed the petition and evaluated the sufficiency of the information presented in the petition and supporting data. In evaluating the petition on its face and in relation to other information the Department possesses or received, the Department concludes the status of fisher is and has been of concern, particularly the southern Sierra Nevada population. However, there is not sufficient information at this time to indicate that the petitioned action may be warranted.

When evaluated either independently or collectively, the data were insufficient to provide reliable estimates of population trend, population size, abundance, or distribution. The information provided, and that was evaluated by the Department, did not indicate an immediate or substantial change in either population or distribution of fisher since the selected benchmark analysis period beginning with the assessment provided by Grinnell et al. (1937). Studies were narrow in scope and duration such that inference and extrapolation about the population or distribution of fisher throughout their

range, or over the long-term, was not possible. The Department's standard for evaluating the petition is to use the best available scientific information which, in this case, was insufficient to evaluate these important population attributes. Therefore, the Department relied on the information in the petition, known existing information, and on information received during petition evaluation to render a recommendation based on its judgment of the adequacy and applicability of the best available information.

Based on this information, the Department finds that the fisher has sustained itself since the Grinnell period, with no evidence of recent, immediate, or significant change in population or distribution, despite a decline in late successional forest. Available information suggests this may be the case for a number of reasons. Recent studies of fisher habitat use, occurrence, and movement patterns indicate fisher also use managed forest habitats of mixed tree age structure and canopy closure, which have essential attributes such as snag/large tree attributes remaining for resting/denning. Fisher are no longer subject to the significant mortality factors of trapping and poisoning of prey that were common in past decades. Forest management in California has been trending toward more retention of late successional stands and this change in management activity likely has been, and will be, beneficial to species such as the fisher in the future.

Therefore, although the Department has concerns about the fisher, there is insufficient information at this time to indicate that the petitioned action may be warranted. As such, the Department respectfully recommends the Commission reject the petition.

Life History:- The fisher is one of the larger members of the weasel family (*Mustelidae*) and a forest carnivore that inhabits conifer, mixed-conifer, and hardwood tree habitats that are interspersed with associated habitats and forest openings represented by herbaceous plant communities, riparian areas, and shrubfields. Concerning the life requisites of breeding, cover, and feeding, the fisher is regarded as needing large, old trees, snags, or down logs with small cavities for denning and resting in stands that have high canopy closure (e.g., late successional forest); and preys on small mammals in the forest understory or in adjacent openings.

The petition characterizes the life history, taxonomy, reproduction, survivorship, diet, and behavior of the fisher reasonably well.

Of interest in California and related to the level of use of non-old growth habitats is the apparently substantial feeding by fisher on species not typically associated with dense, old growth forests, notably reptiles, and mule deer in winter. Jordan (2007) for example noted "Throughout their range, they have been observed to forage in areas of early- to mid-successional vegetation, as a vegetated understory and large woody debris appear important for prey species." Additionally, contrary to reports in the literature, it appears in California at least under current conditions, the fisher does not rely heavily on porcupine or snowshoe hare for food. It is widely reported, but the effect poorly studied, that the porcupine (now considered an uncommon species) and other rodents were

specifically targeted for poisoning in past decades.

Also of relevance to fisher conservation and management is the reportedly low reproductive capability of the fisher (described in the petition and in supporting available literature) and limited dispersal behavior that would influence the species rate of recolonization of historical ranges.

Range and Distribution:- Historically, the fisher was distributed throughout the west slope of the Sierra Nevada, north into the Southern Cascade Range, and west to the forested ranges of the Klamath and Coastal ranges north of San Francisco Bay. By the 1920's, fisher numbers and distribution were reduced to areas they generally inhabit to this day (about 57 percent of their historical range). This is largely attributed to high levels of trapping activity.

The petition's description of the distribution and range of the fisher is generally accurate, with certain exceptions specified in this report. The Department concurs with the petition's conclusion, and the conclusion of other fisher investigators, that there has not been substantial change (increases or decreases) in fisher distribution since the 1920's, and natural re-colonization of fisher to these historical areas in any detectable number has not occurred for some unknown reason.

The reduction in distribution resulted in what are now considered to be two spatially separated populations (northern California and southern Sierra Nevada) because of the significant gap in fisher occurrence in the central and northern Sierra Nevada. In this gap of approximately 270 miles of Sierra Nevada range, the fisher is considered to be very rare if not extirpated. This central and northern Sierra Nevada region has had occasional reported observations over the decades since the Grinnell et al. (1937) work of the 1920's.

Habitat Necessary for Species Survival:- The petition describes the kinds of habitat considered necessary for survival of the fisher based on information available to petitioners and their representation of the various studies and reviews on fisher habitat use and modeling efforts. The Department generally agrees that late successional forests of high canopy cover provide an important part of the diverse habitats that fisher likely require.

The Department agrees that forests in California have undergone significant change since the monumental settlement period brought about by the California Gold Rush. That era and the post- World War II era are considered particularly significant in terms of forest change. The Department agrees that the absolute amount and distribution of late successional forest communities has declined over the decades as a result of timber harvest and forest management. On many of these forests, regeneration of conifers has occurred and resulted in dense canopy stands of younger age (second-growth) trees. However, information received during review of this petition suggests

fisher also inhabit forests that are not considered late successional and are possibly more adaptable to forest change than previously perceived. Tree age and canopy closure of habitats being used were typically lower than those reported in the literature from researchers working largely on public lands and lower than that reported in the petition. The U.S. Forest Service in its recent Conservation Assessment has similarly indicated that contrary to the long-held perception of fisher being essentially dependent on late successional forests, fisher are using, for at least some of their life requisite requirements, forest systems that are not considered late successional. Still, these studies on public and private timberlands indicate that elements typical of those occurring in late successional forests (e.g., snags and decadent standing trees) that were retained in these stands are important habitat attributes for fisher.

To meet their life requisites, the fisher requires habitat diversity including quality foraging habitats to prey on small mammals, reptiles, and carrion throughout the year. It is possible that proximity of foraging habitats to den/rest habitats could result in smaller home ranges and greater densities of fisher.

Abundance and Population Trend:- Fisher abundance and population size are unknown in California.

The petition estimates there are between 850 and 1,250 animals statewide (with 100-500 in the southern Sierra Nevada and approximately 750 in northern California). The Department considers this estimate to be low. The only known statewide estimate of the population from a "historical" (1920's) era was fewer than 300 animals. The relatively low number was largely attributed to intensive trapping of fisher (Grinnell et al (1937). Dixon (1925) and Grinnell et al. (1937) recommended a cessation of trapping because fisher had become so rare and estimated at most, there were 1 to 2 fisher per township (approx. 3-6 fisher per 100 sq. miles). Current fisher population estimate efforts are based on localized study of fisher home range and minimum density estimates. These estimates, and they vary depending on source, suggest there are at least 1,000, to approximately 4,500, fisher statewide. Estimates of density range from approximately 15 to 51 fisher per 100 square miles. Consequently, it is reasonable to conclude that there are at least as many fisher in California now, if not more, than there were during the Grinnell et al. (1937) period.

The petition provides no information on population trend and there are no trend data for the fisher in California.

Therefore, definitive fisher population trends remain unknown. In this absence of empirical data, the petition expresses population trend estimates for the southern Sierra Nevada, an area where the petition considers fisher to be most at risk, based on studies that were not comprehensive throughout the range. Data and information received from all sources during petition evaluation also lack sufficient rigor and methodology to calculate population trend in any part of the fisher range. A current effort is underway to attempt establishment of a reasonably accurate baseline population estimate for future

reference and trend analysis. The petition refers to this analysis and multiple methods of estimating a base population upon which future trend may be able to be assessed.

Factors Affecting the Ability of the Population to Survive and Reproduce:- There are numerous factors that can affect the ability of fisher to survive and reproduce. These factors are addressed in the threat sections of this evaluation report.

The petition infers that in particular, changes in forestlands have contributed to range retraction of the fisher, that these changes are a risk/threat to the fisher population, and that the population is declining or will decline, and precludes recolonization of historic range. In essence, the lack of structural attributes in terms of resting/denning habitat is considered by the petition to be limiting fisher populations and placing them at risk.

The Department recognizes the importance of these habitat attributes, but finds there is not sufficient information to indicate they are limiting the fisher population. There is not sufficient evidence in the petition, or in the other information received, that the number of snags, den sites, or resting sites are now, or would in the immediate future, limit fisher population growth or range expansion.

Degree and Immediacy of the Threat:- The petition identifies timber harvest, roads, urban development, fire, population isolation, and other factors as threats to the fisher. The Department considers historic trapping, poisoning of carnivores and prey, and unregulated timber harvest to have had the greatest impact (threat) on fisher. Trapping and poisoning are illegal and, therefore, are not currently significantly affecting the fisher. Timber harvest activities have been more carefully regulated on both public and private forestlands for at least 2-3 decades with significant progress in recognizing the importance of conserving a wide variety of habitat elements, especially late successional forests that are relied upon by wildlife. This change in activities compared to the past decades reduces the threat, and likely more so on public forestland as compared to private forestland.

The petition suggests that habitat modification as a result of timber harvesting and the decline in late successional forest habitats is a surrogate for fisher population trend and/or suitable range, and that as old forest is harvested, the fisher population has, or will also decline. This hypothesis might hold if the fisher was entirely dependent on late successional stands and did not have other habitat available, but it is increasingly apparent there are other forest habitats that are suitable for the fisher; and also that timberland management practices in California are giving greater consideration to protecting the remaining late successional habitats.

The petition has not demonstrated an immediate or significant detection or occurrence of negative change in the amount of inhabited fisher range or apparent population in California since the Grinnell period of 80+ years ago.

Impact of Existing Management Efforts:- The petition describes many management efforts by agencies and their regulatory processes. The most substantial issue described focuses on the California Forest Practice Rules (FPRs) adopted by the Board of Forestry and Fire Protection and implemented by the California Department of Forestry and Fire Protection (now CAL FIRE, but also and hereafter referred to as CDF) in regulating private land timber management.

Private lands comprise about 37 percent of the fisher's historic range in California. Forests on these lands are primarily regulated under the FPRs. The petition states the FPRs "do not regulate logging on private lands in a manner that is adequate to maintain fisher habitat or populations on private lands in California." In particular, the petition states the FPRs do not offer specific protections for fisher or their habitat, do not provide a mechanism for identifying significant impacts (including cumulative impacts) to fisher, and provide for and encourage extensive and intensive harvest of forests using methods that remove or degrade fisher habitat suitability, and that protections for certain listed species are not adequate to protect the fisher.

The Department acknowledges that the rules do not require retention of certain habitat elements specifically for the fisher. However, this does not indicate *per se* that private timberlands will be managed such that they chronically reduce habitat suitability for fisher. Harvest history, market conditions, site productivity, company philosophy as well as other factors, including the application and enforcement of FPRs and the California Environmental Quality Act (CEQA), also influence how private timberlands are managed and their suitability for fishers. Additionally, old forest components and potential fisher habitat on private lands are more likely to be conserved now and in the future, than in decades past, as a result of environmental regulation. Harvest activities are not exempt from CEQA or from the FPRs. The information available to the Department indicates fisher do inhabit these managed landscapes. Additionally, awareness and management direction to conserve and manage for late successional forest has increased dramatically on public forest lands in the past 2-3 decades.

The petition also discusses the U.S. Fish and Wildlife Service (USFWS) "Candidate Conservation Agreement with Assurances for Fisher" with Sierra Pacific Industries regarding possible translocation of fisher from the existing northern California population to the northern Sierra Nevada. The USFWS has recently indicated its analysis suggests stability in the fisher population. The Department does not view this potential management strategy/action as a threat, but as a significant opportunity to reintroduce fisher to unoccupied historic range and further reduce the risk of population isolation. Fisher have been a frequently translocated species in North America. Such a translocation could re-establish the species in more of its former range. This could reduce potential risk to the existing, isolated population in the southern Sierra Nevada as well as to the northern California population. While there are no guarantees of success in wildlife translocations, they have proven to be very effective management strategies in wildlife conservation.

Suggestions for Future Management:- The petition listed several suggestions for future management of fisher (page 71). The Department is implementing some management actions now, and will be developing more actions in the near future in the effort to further enhance the status of fisher in California.

INTRODUCTION

The Center for Biological Diversity submitted a petition on January 23, 2008, seeking action by the California Fish and Game Commission (Commission) to list the Pacific fisher (*Martes pennanti*) as an endangered or threatened species under the California Endangered Species Act ("CESA"; Fish and Game Code (FGC) § 2050-2116). Pursuant to Section 2073 of the FGC, on January 31, 2008, the Commission referred the petition to the Department of Fish and Game (Department) for its evaluation and recommendation. FGC section 2072.3 establishes the content of such petitions as follows:

> "To be accepted, a petition shall, at a minimum, include sufficient scientific information that a petitioned action may be warranted. Petitions shall include information regarding the population trend, range, distribution, abundance, and life history of a species, the factors affecting the ability of the population to survive and reproduce, the degree and immediacy of the threat, the impact of existing management efforts, suggestions for future management, and the availability and sources of information. The petition shall also include information regarding the kind of habitat necessary for species survival, a detailed distribution map, and any other factors that the petitioner deems relevant."

CESA specifically requires the Department to "evaluate the petition on its face and in relation to other relevant information the Department possesses or receives", and to recommend to the Commission whether the petition contains sufficient information to indicate the petitioned action may be warranted (FGC, § 2073.5(a); see also Cal. Code Regs., tit. 14, § 670.1, subd. (d)(1)). In accordance with these requirements, this report analyzes and evaluates information contained in the petition and other relevant information known to the Department, and includes the Department's recommendation.

The petition recommends the listing of fisher as threatened or endangered in California primarily because of petitioner's conclusion that long-term forest management and timber harvest activities have reduced the acreage of late successional and old growth forests that tend to have the bulk of the structural elements (high canopy cover and mature/old trees) that fisher use for denning and resting; that logging and other factors have caused a decline in these attributes and in fisher range; and that the population in California is small and isolated.

In effect, the petition considers late successional forest habitat change as a surrogate for empirical data on fisher that would directly indicate population trend; and that areas of California subjected to late successional forest harvest are (or will) no longer suitable habitats for fisher. Habitat as a surrogate to infer a species trend or pattern can work for those species that rely on such habitat. However, this requires adequate knowledge of how the species uses all the available habitat types within its range. Evaluation of that knowledge is an important component of this Department review.

In 1986, the fisher was designated a Species of Special Concern (Williams 1986), and the species account noted: "Attention should focus on the Sierra Nevada, as evidence

suggests declining populations there (Schempf and White 1977)". The account also included the following: "Effects of various forest harvesting practices on fisher populations should be determined over a broader area"….and "Snags, damaged and senescent trees with large cavities, and hollow logs are probably important for fisher, especially where talus and rock crevices are unavailable". The fisher is still a mammal species of special concern, and is included on the Department's Special Animals list: http://www.dfg.ca.gov/biogeodata/cnddb/pdfs/SPAnimals.pdf

The Department considers the taxa on this list to be those of greatest conservation need. Species on this list were considered in the development of California's Wildlife Action Plan (CDFG 2007). The wildlife action plan report reviewed wildlife species of concern in each bioregion of the state to identify conservation challenges, and develop a strategy or framework that will highlight stewardship activities necessary to halt species' declines and to maintain species diversity. Portions of the account from this report are as follows: "…the status of the Pacific Fisher is one indicator of the status of forest conditions of the Sierra, particularly the old-growth component. The fisher requires specific features of mature forest, such as large trees with cavities for nesting…", and "Conservation of the Pacific Fisher is dependent upon the approaches to and success of restoring healthy and diverse forest ecosystems along the Sierra range" (CDFG 2007:301).

In 2004, the USFWS issued a 12-month finding on a petition for listing the fisher under the federal Endangered Species Act (ESA) in California, Oregon, and Washington (USDI 2004). The USFWS in evaluating the fisher population in the three states determined that the petitioned action was warranted, but precluded by higher priority actions to amend the Lists of Endangered and Threatened Wildlife and Plants. The Federal standard for listing requires a petition to present "substantial scientific or commercial information indicating that the petitioned action may be warranted." The fisher is currently designated a candidate species under ESA.[1]

Petition Evaluation Scope and Frame

In reviewing information contained in the petition and information received during petition evaluation, the Department is required to "evaluate the petition on its face and in relation to other relevant information the Department possesses or receives", and to recommend to the Commission whether the petition contains sufficient information to indicate the petitioned action may be warranted (FGC, § 2073.5(a); see also Cal. Code Regs., tit. 14, § 670.1, subd. (d)(1)). In doing so, the Department evaluated all information received through May 29, 2008. Data and information received by the

[1] Recent federal case law in California indicates the candidacy standard under ESA is lower than the state candidacy standard in California under CESA. (See, e.g., Center for Biological Diversity v. Kempthorne (N.D.Cal. January 19, 2007, No. C 06-04186 WHA) 2007 WL 163244. And compare Natural Resources Defense Council v. Fish and Game Commission (1994) 28 Cal.App.4th 1104.)

Department generally consisted of published/unpublished studies, raw data (e.g., camera station results, telemetry results, home range analysis, and density estimates) from industrial land owners, observations or lack thereof of fisher from government and non-government entities, and reviews/opinion letters on the fisher status or the available science from various sources.

In determining whether the petition demonstrates a decline/increase in California fisher populations or range/distribution, the Department selected the time frame (1920's-present) based on the work done in the 1920's and published by Grinnell et al. (1937) to the present as the evaluation frame. While any number of time frames could have been selected for the evaluation, none provided a statewide benchmark against which to compare current information. Data and information prior to publication of Grinnell et al. (1937) were largely anecdotal and represented scattered occurrence information that often could not be verified. The Grinnell work itself, is limited in its inferential power.

Receipt of Additional Information Related to the Petition

After receipt of the petition, the Commission issued a notice of receipt of the petition pursuant FGC section 2073.3, inviting interested persons to submit information to the Department relating to the petitioned species. Thereafter, in accordance with FGC section 2073.4, the Department and Commission began to receive additional information on the fisher and its habitats, particularly on private "industrial" timberlands in California. This was, and is, information that neither the petitioners nor the Department (except for limited information on studies in which the Department was a cooperator) had access to beforehand. Additionally, the Department held a stakeholder meeting in Sacramento on May 7, 2008 during which additional information was provided and became available. Consequently, the petition could not reflect the full knowledge available of the fisher's status, particularly as it related to habitat use and relationships on private lands, and study of home range and density. Several investigators on these private lands (typically biological employees of the landowner company either working within the company and/or with university and agency collaborators) conducted "hands-on" work in conjunction with the Department as a collaborator.

Department Recommendation

When evaluated either independently or collectively, the reviewed data on fisher were insufficient to provide reliable quantitative estimates of population trend, population size, abundance, or distribution. What information was provided, and that was evaluated by the Department, did not indicate an immediate or substantial change in either population or distribution of fisher in more than 80 years. Nor was an immediate threat to their population or distribution sufficiently demonstrated. Studies were narrow in scope and duration such that inference and extrapolation about the population or distribution of fisher throughout their range, or over the long-term, was not reasonably possible. The Department's standard for evaluating the petition is to use the best available scientific

information which, in this case, was insufficient to evaluate these important population attributes. As such, the Department relied on the information in the petition, known existing information, and on information received during petition evaluation to render a recommendation based on its judgment of the adequacy and applicability of the best available information.

In accordance with FGC sections 2072.3 and 2073.5, the Department reviewed the petition and evaluated the sufficiency of the information presented in the petition and supporting data. In evaluating the petition on its face and in relation to other information the Department possesses or received, the Department concludes, that there is not sufficient information to indicate that the petitioned action may be warranted. Therefore, the Department respectfully recommends the Commission reject the petition.

Life History

The petition covered life history aspects of the fisher on pages 3-7. The Department has reviewed this information and finds it generally adequate. Of interest in California as it relates to the petition, is the apparent substantial feeding by fisher on prey species not typically associated with late successional forests, notably reptiles, and mule deer in winter (e.g., Zielinski et al. 1999, Golightly et al. 2006). The foraging ecology and foraging habitats of fisher in California has been given limited attention in studies of fisher habitat relationships although as Jordan (2007) states “Throughout their range, they have been observed to forage in areas of early- to mid-successional vegetation, as a vegetated understory and large woody debris appear important for prey species.”

Unlike reports in the literature, it appears in California at least under current conditions, the fisher does not rely much on porcupine or snowshoe hare for food. It is widely reported, but poorly studied, that the porcupine and other rodents were specifically targeted for poisoning in past decades (e.g., Anthony et al. 1986). Additionally, porcupines are classically associated as a prey species for fisher, yet observations by experienced biologists in California indicate that porcupine abundance has decreased to the point that an observation of one now is notable (see for example Green et al. 2008). Another well known prey species of fisher, the snowshoe hare, is also rare in California fisher food habits analysis. Whether this is simply because there isn’t much overlap in the two species ranges, or snowshoe hare have declined is unknown. If the fisher has had to adapt to significant dietary switches to address prey availability in California this could have had implications to life history and population status.

Also of relevance to fisher conservation and management is the reportedly low reproductive capability of the fisher and limited dispersal behavior that would influence the species rate of recolonization of historical ranges (e.g., USDI 2004). This could contribute to the apparent inability of fisher to recolonize in a time-frame that investigators would be able to detect in the short-term (years).

Mortality factors as part of the life history are discussed on page 7 of the petition, and

will be addressed in this report in the “Threats” section.

Range and Distribution

The petition depicts the historic and current range and distribution of the fisher in California (Figures 1 and 2 in the petition), and cited the historic and recent literature on fisher range and distribution. The petition also contained a map demonstrating habitat loss/landscape level changes in forest conditions in the central Sierra and Cascades (Figure 3 in the petition). The Department considers the petition generally adequate in its presentation of most of the available information with some exceptions and missing information as described below. However, there is considerable uncertainty about the range and distribution of fisher.

For a more comprehensive perspective, the Department analyzed and developed additional information and maps (figures) to further describe the estimated historic and current range/distribution. It is impossible however, to completely and accurately define the range and distribution of this (and most other) species because the historical information and/or current information is incomplete. Overall, as the petition indicated (page 14), the population had already been reduced by the time Grinnell et al. (1937) assessed fisher distribution and it has not changed much since that time.

Knowledge of the historic distribution of fisher in California is primarily informed by Grinnell et al. (1937). Grinnell and his colleagues produced a map of fisher distribution which included specific points where fisher were trapped from 1919-1924, and a more general boundary of the “assumed general range within past seventy-five years” (roughly 1862-1937). The authors acknowledged that in some cases the points may have represented a trapper’s residence or postal address rather than an actual location where a fisher was taken.

Grinnell et al. (1937:214-215) described fisher distribution: “In general, forested areas of the higher mountain masses north of the Thirty-fifth Parallel. In detail, in the northwestern part of the State south from the Oregon line to Lake and Marin counties and east to and including Mount Shasta; not often in the immediate coastal region (redwood belt) nor, so far as known at present, in the Warner Mountains, Modoc County; south from Mount Shasta and Lassen peak throughout the main Sierra Nevada to Greenhorn Mountain, in north central Kern County…Belongs to middle altitudes, 2000 ft. (near sea level occasionally) to 5000 ft. at the north, ordinarily 4000 ft to 8000 ft. in the Mount Whitney region, although vagrant individuals go beyond these limits; for example, to as high as 10,900 ft. near Mount Lyell”.

Concern over fisher populations occurred during the course of Grinnell’s field work. Dixon (1925, who was one of the co-authors of the 1937 work) separately concluded that the California fisher population was dangerously close to extinction and proposed that measures be taken to protect the species from trapping (also, see Abundance section). However, it was not until 1946 that trapping for fisher was prohibited (Gould

1987). Of interest is that “trapping” of fisher was apparently accomplished primarily through the use of dogs trained to tree fisher or with traps specifically set for the fisher (Grinnell et al. (1937).

Grinnell et al. (1937) appeared to infer trapping as the main reason for the reduction of fisher in California (Dixon certainly did), but they also indicated the habitat was being reduced by logging. They believed the decrease in the fisher population was not local, but involved “…nearly the entire habitat of this animal”. They noted the following in describing the reduction in fisher: 1) The fisher is by nature a solitary animal; 2) Its food habits and requirements are such that each fisher requires a large amount of forage territory in order to live; 3) The areas suitable for fishers to live in are limited; 4) The rate of reproduction of the fisher is relatively low; and 5) The forests in which the fisher lives are being reduced by timber-cutting. They noted that all of these factors tend naturally to limit the fisher population.

When the Grinnell et al. (1937) range map is displayed with the natural forest vegetation of California **(Figure 1)**, it becomes apparent that reliance on trapping records and interviews with trappers for depicting range likely omitted some forested areas that were occupied by fisher, at least prior to non-aboriginal influence in California. As an example, the map in Grinnell et al. (1937) omitted the western coastal zone of Mendocino county, and yet included coastal Sonoma and Marin counties that contain coast redwood forest. It is difficult to envision fisher presence in Sonoma or Marin counties without construing that fisher probably occupied the coastal redwood forest throughout its natural range. It appears Grinnell and colleagues were depicting the most recent range of fisher in California, and they included the following items as evidence that fisher occurred historically in the coastal zone of California: “From reliable testimony we conclude that formerly the fisher ranged south along the coast of northern California to Marin County. A Mr. McCall, who resided at Fort Ross, Sonoma County, for thirty years, knew of the presence of fisher at that locality in previous years…In 1913 John Briones of Point Reyes reported that a fisher was active three mile west of Inverness, Marin County. The nature of the vegetation there, together with the occurrence of mountain beaver (*Aplodontia*) and other good Canadian Zone species of animals, indicates the suitability of that locality for fisher” (Grinnell et al. 1937:220). Further notation is as follows: “In 1909 Mr. Allen Sherwood, a lifelong resident of Mendocino County, told one of us (D.) that forty years previously fisher were found all along the ridges on the coastal slope of Mendocino County, but they had been trapped so relentlessly that only a very few were left. This has been the history of the fisher in many other localities” (Grinnell et al. 1937:227). Records from trappers indicated that fisher were taken almost at sea level in the northwestern coast belt (Grinnell et al. 1937:218). Additionally, an early publication on California mammals describes fisher range as: “...found in the Pacific coastal region from northern California to Alaska. In California, they are limited to the high Sierras and the cool forest region north of San Francisco”. A map contained in this publication notes one of the faunal distribution zones of fisher as the “Humboldt” zone, which extends narrowly along the coast from Del Norte to Marin County (Stephens 1906).

It is well documented that timber harvesting began early in the coast redwood ecosystem of California. Hilgard (1884:56) noted "The redwood belt is at present the most important timber region of the state, redwood being one of the chief varieties of lumber used in construction". He also noted: "The valley of Russian river, in southern Mendocino and northern Sonoma counties…for 15 miles from its mouth had originally a timber growth of redwood, but now [1884] has only scattered groves of oak". Carranco (1982:13) noted coast redwoods "…are highly conducive to logging and have provided commercial lumber since the 1770's". By the first half of the 1800's, California's northwestern forests had been known to non-aboriginals for almost a century, and the latter were making increasing use of the towering redwoods (Carranco 1982:15). Along the Mendocino coast, by the 1880's there was "a mill in every gulch", and during that decade, seventy-six landings existed between Bodega head and Humboldt Bay (Carranco 1982:105). From 1860 to 1884, "tremendous quantities of timber were cut, and over 300 schooners worked the coast" (Carranco 1982:107). Thus, by the time Grinnell and colleagues were attempting to map fisher distribution in California, significant habitat changes had occurred, and undoubtedly trapping was in progress. Land use changes were also occurring in the Sierras around the same time. Hilgard (1884:60-61) noted the following regarding the Sierras: "The entire Sierra region, as a whole, is sparsely inhabited …In summer time large herds of stock, especially sheep, are driven to the mountain pastures from the plains…Lumbering and mining constitute the chief industries of the extremely sparse population…". Further details on the progression of substantial land use changes in the Sierras (e.g., timber harvest, fire suppression, and sheep grazing) are summarized in McKelvey and Johnston (1992).

From the information described above, and from forest vegetation maps, the Department's "California Wildlife Habitat Relationships" (CWHR) program prepared a range map for fisher in California **(Figure 2)** to compare range with the Grinnell et al. (1937) range map. As part of analyzing the current range and distribution of the fisher in California, and in order to better estimate the proportion of range no longer inhabited, we compiled as much information as possible for review of the petition. We used records from the California Natural Diversity Database (CNDDB) and other databases on fisher maintained by the Department. Additionally, we digitized occurrence points from reports that were provided during the petition review period, and contacted researchers and private and public sources for fisher occurrence information **(Figure 3)**. For this analysis, the records were partitioned into date periods as follows:

- 1896 - 1924 covers the first records of fisher in California through the end date of the Grinnell et al. (1937) map and the time when concern about fisher abundance was first described;

- 1925 -1946 covers the period after the Grinnell et al. (1937) map through the end of the trapping season for fisher (see also Lewis and Zielinski 1996);

- 1947 - 1987 covers the post-trapping period, and compilations of sighting information by Schempf and White (1977) and Gould (1987);

- 1988 – 2008 covers the more recent period (last twenty years) when many radio-marking studies and distribution surveys were initiated for fisher throughout California.

Maps that depict "sighting" information must be viewed with caution and in conjunction with additional information to determine if the records have been screened for reliability in some manner. Some observations may be an error where the forest visitor or biologist actually observed an American marten (*Martes americana*), or another mustelid, or some other forest carnivore. Aubry and Jagger (2006) noted that anecdotal occurrence records such as sightings and descriptions of tracks, cannot be independently verified and thus, are inherently unreliable. They and others have promoted the use of standardized techniques that produce verifiable evidence of species presence (remote cameras and track-plate boxes). The Department fully supports such an approach, but we also recognize the value of sighting information provided over the decades by experienced/trained biologists, naturalists, foresters, and trappers. Though the records in Figure 3 have not been screened and ranked for reliability, we believe the majority of these occurrences are reliable and provide a good overview of the variety of forested habitats occupied by fisher over the period of 1896-2008; and help define the range of the species in California. Records of fisher from trappers in the Cape Mendocino area provide a good example (western-most yellow points).

Additional information on fisher distribution was provided to the Department during the petition review period and is contained in Appendix A (maps created by the USFWS as part of the Candidate Conservation Agreement with Assurances with Sierra Pacific Industries). An important caveat that also applies to Figure 3 is included in the legend of the map in Appendix A: "*Points represent presence only and do not imply abundance or density*". Comparing these maps reveals two main areas of fisher occurrence in California today: northern California and the southern Sierra Nevada.

Intensive and systematic efforts to detect fisher by verifiable and repeatable methods have occurred since about 1989 by a number of different entities, including Beyer and Golightly (1996). The most systematic and broad-scale work so far was conducted from 1989-1994 by Zielinksi et al. (1995), from 1996-2002 by Zielinski et al. (2005), and from 2002-2005 (USDA 2006) **(Figure 4)**.

Fisher were not detected across an approximately 270 mile region, from the southern Cascades (eastern Shasta County) to the southern Sierra Nevada (Mariposa County. As noted in Zielinski et al. (2005), a comparison of historical and contemporary records for fisher supports a gap in the distribution of fisher in the Sierra Nevada. This gap is more than four times the known maximum dispersal distance for fisher (100 km; York 1996) and is in contrast to the range map and statement in Grinnell et al. (1937:215) that fisher occurred "…throughout the main Sierra Nevada". The Department suspects that some fisher may inhabit this gap in the Sierra Nevada, however, their numbers may be so low as to make them undetectable using any methods less than intensively

repeated survey methods. Thus, the amount of range in California that is not inhabited now compared to historic times is estimated at approximately 43 percent **(Figure 5)**. Finally, the review here on the fisher has been more comprehensive and thorough than that used as the basis for the case study in the California Wildlife Action Plan. As such, the plan's identification of logging as the reason for extirpation of fisher in much of the Sierra Nevada (page 301 of plan) did not have the benefit of the consideration and evaluation of the information involved in this review. Therefore, the conclusion of the plan regarding the reason for extirpation of fisher in much of the Sierra Nevada must be qualified in this respect.

Northern California

Grinnell et al. (1937) stated "the fisher is found at the present time coastwide from the Oregon line south to southern Mendocino County." However, the authors also concluded "from reliable testimony" the fisher had previously ranged south along the coast to Marin County. The authors noted a 1913 report of a fisher near Inverness in Marin County, and an undated report of fisher occurring in the vicinity of Fort Ross in Sonoma County. Grinnell et al. (1937) also cited a report suggesting that fisher were common "along the ridges on the coastal slope of Mendocino County" in the 1870s, but were trapped "so relentlessly that only a very few were left" in these areas by 1909.

On page 15, the petition states that the range of the fisher "in northwestern California" has "contracted northward" and currently extends southward to the northern portions of Mendocino County. As evidence of this contraction, the petition cites reports by Zielinski et al. (2005) and Weinberg and Paul (2000) (cited in the petition as 2007). Zielinski et al. (2005) addressed historic and current carnivore distribution in the southern Cascades and Sierra Nevada, however, we found no reference in the paper to a range contraction for fisher in northwestern California.

Weinberg and Paul (2000) conducted carnivore surveys in two watersheds within the Mendocino National Forest: the "Black Butte" watershed in western Glenn County and northeastern Mendocino County, and the "Stony" watershed in northwestern Colusa County and northeastern Lake County. During those surveys, fisher were detected in the Black Butte watershed but not in the Stony watershed. Thus, the lack of fisher detections in the Stony watershed is the primary evidence cited in the petition for a northward range contraction of fisher distribution in northwestern California. However, the petition did not reference the more recent carnivore surveys conducted on the Mendocino National Forest (Slauson and Zielinski 2007). Those surveys detected fisher in the Stony watershed, and also at other locations in northern Lake County south of the Black Butte watershed. In light of their results, Slauson and Zielinski (2007) stated "Overall, fisher appear to be distributed throughout most of the historical range included in the geographic extent of our surveys."[2] Their southernmost 2006 fisher

2 Although Slauson and Zielinksi concluded that fishers are largely distributed throughout their historical range in the area, they also cautioned that their results do not permit an evaluation of "whether or not

detections are less than 8-10 air miles north of the southernmost point locations provided by Grinnell et al. (1937) and the southernmost historical records included in the California Natural Diversity Database (February 2008 data). Other recent surveys in Mendocino County failed to detect fisher in the county, and due to the few records in CNDDB for coastal Sonoma and Mendocino counties (refer to Figure 3), it appears that fisher are rare or absent in this area of California.

The distribution of recent (1995-2008) fisher observations were mapped from several studies and surveys conducted throughout northwestern California (Beyer and Golightly 1996; Dark 1997; Carroll et al. 1999; Zielinski et al. 2000; Slauson and Zielinski 2001; Slauson et al. 2001; Hamm et al. 2003; Slauson et al. 2003; Slauson and Zielinski 2004; Lindstrand 2006; Slauson and Zielinski 2007; Farber et al. 2008; USDI Fish and Wildlife Service, unpublished). **Appendix A** illustrates two fisher distribution maps that were contained in supporting documents written by the USFWS for the Sierra Pacific Industries Candidate Conservation Agreement with Assurances. These locations were compiled by S. Yaeger (USFWS, Yreka, CA). Some points were mapped from GPS coordinates provided by the authors of individual studies, while some are approximate locations digitized from maps included in each of the reports. The distribution of these (1995-2008) fisher observations mapped from several studies and surveys conducted in northern California is roughly similar to the distribution of 1919-1924 trapping locations mapped by Grinnell et al. (1937). However, neither the modern observations nor the historic trapping locations represent comprehensive surveys of fisher distribution during each period. The historic records, in particular, only represent the fisher reported to have been trapped during a five year period. These records and other records housed by the Department largely remain the best data available on the historic distribution of fisher in California, and comparisons of historic and current distributions can provide valuable information regarding the current status of a species (Zielinski et al. 2005).

Although the range of the fisher in northern California may have contracted northward from its distribution at the beginning of the 20th century, it appears that the overall geographic area occupied by fisher in northern California has changed relatively little since the Grinnell work of the 1920's. Additionally, the range of fisher may have expanded westward in coastal northwestern California. Slauson and Zielinksi (2004) compared the location of recent fisher detections to the range map provided by Grinnell et al. (1937) and other unpublished trapping data and concluded that fisher may have recently increased their distribution into coastal redwood forests in Humboldt and Del Norte Counties.

Of interest, in the late 1960s and early 1970s, it was noted that fisher were increasing in Humboldt and Trinity counties possibly related to the increase in porcupines throughout these counties (Yocom and McCollum 1973). The spread of porcupines appears to have been associated with the cutting of the virgin stands of redwood and Douglas fir forest. An abundance of food was created by plant succession which resulted from logging; thus, porcupines invaded the entire area even to the ocean beaches (Yocom

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there has been a reduction in the overall number of locations historically occupied by fishers."

1971). Unfortunately, it is impossible to validate for certain the relationship between fisher and porcupine as described.

An additional area in need of survey effort to better define current fisher distribution is the forested region of eastern Siskiyou and western Modoc counties. Though excluded by Grinnell et al. (1937), the forested region is naturally connected to occupied fisher habitat to the west. This gap in historic and current knowledge of fisher distribution was illustrated by fisher survey efforts in the vicinity (Davis et al. 2007:Figure 1). The Department's GIS analysis indicates approximately 10.6 million acres of range for the fisher in northern California based on California Wildlife Habitat Relationships range.

Sierra Nevada

The petition's assumption that the fisher is extirpated from the northern and central Sierra Nevada (page 3) could be correct, but the Department does not believe survey efforts have been extensive enough to detect populations of very low abundance. The fisher may be extirpated, or, it may be extremely rare in the geographic area, but extirpation has not been adequately evaluated through systematic and repeated surveys throughout the range. The central and northern Sierra Nevada represents a large portion of the historic range of the fisher (Grinnell et al. 1937), but recent observations or occurrences based on surveys conducted in relation to US Forest Service FIA plots in the Sierra Nevada are few (Figure 4) (Zielinski et al. 1995), the last being an incidental sighting from a credible source in 1997 in El Dorado County. Consequently, this portion of the Sierra Nevada was also considered to be unoccupied by fishers by other investigators (Truex et al. 1998, Zielinski et al. 1997b, 2000, 2005a, Campbell 2004).

The petition states (page 14, citing Zielinski 2005a), and the Department concurs, that the fisher population had been reduced in number from all but the southern Sierra Nevada by the time of the Grinnell work of the 1920's and may have prompted the call to end trapping (Dixon 1925). Dixon (1925) reported that two trappers "…on the border of California's most famous national park…" (Yosemite) were responsible for an apparently unusually high proportion of the (reduced number of) animals taken in 1924, suggesting the southern Sierra Nevada was perhaps the primary inhabited range at the time (and that Yosemite may have been a protected source of fisher). Since that time, there was the occasional reported observation in the Sierra Nevada. The decline in range regularly inhabited by the fisher appears to have occurred around the time of the benchmark Grinnell assessment and appears to have been largely due to intensive trapping, although logging and poisoning of porcupines and other rodents are also implicated. Poisoning was evidently employed on both public and private timberlands lands, however the Department was unable to find many references on the topic (Anthony et al. 1986) making it impossible to fully understand such impacts (**Figure 6** illustrates ownership patterns in fisher range). Zielinski et al. (1995) noted the difficulty in trying to interpret the distributional changes using the available information because the type and quality of reporting methods were different.

In order to better understand fisher distribution in the context of ownership patterns in the southern Sierra Nevada, the Department developed **Figure 7**. From work by Boroski et al. (2002), Green (2007), and researchers noted in the legend for Figure 7, it is known that fisher occur primarily in a continuous band of low to mid-elevation forest on the western slope, rarely ranging above 3,000 m. Based on information available to the Department, the distribution of fisher in the southern Sierra Nevada appears to be south of the Merced River with only limited current knowledge about fisher distribution in the national parks (Yosemite and Sequoia-Kings Canyon). More detailed maps of modeled habitat suitability for this population can be found in Spencer et al. (2007). Fisher have rarely been detected very far north of the Merced River in the last 20 years (L. Chow, pers. comm; Zielinski et al. 2005a), and some limited surveys on the Stanislaus National Forest have not detected fisher (J. Buckley, pers. comm). Thus, for unknown reasons, fisher have not moved northward of the Merced River and persisted at any detectable level. There is no information to indicate a change in distribution since the 1920's in the southern Sierra Nevada from the areas they currently inhabit. The Department's GIS analysis indicates approximately 2.6 million acres of range for the fisher in the southern Sierra Nevada based on California Wildlife Habitat Relationships range below 3,000 meters in elevation. Spencer et al. (2007) estimated that approximately 1,080,000 acres of fisher range were considered suitable habitat for fisher in the southern Sierra Nevada.

Summary of Range and Distribution

Fisher distribution in California today is limited to two populations, the northern California population and the southern Sierra Nevada population. These two populations are separated by approximately 270 miles. Fisher apparently no longer inhabit Marin, Sonoma, and most of Mendocino County, and generally between the Pit River in the northern Sierra Nevada/Cascades to the Merced River in the southern Sierra Nevada. Thus, approximately 43 percent of historic range is either not inhabited by fisher, or they are extremely rare. In this geographic area, there have been a handful of reported observations since the 1920's. The Department cannot agree with the petition's contention that timber harvesting is largely responsible for the absence of fisher in much of the Sierra Nevada because the most compelling argument based on the science available, implicates historic trapping activity. Overall, the Department concurs with the petition's observation that there has been little apparent change in fisher distribution since the Grinnell period of the1920's, and natural recolonization of fisher to their historical range in any detectable number has not occurred.

Habitat Necessary for Species Survival

The fisher requires forested habitats that will fulfill its life history for breeding, resting, and foraging to survive. The petition (pages 7-12) addresses the habitat associations of the fisher and key elements used based on the information available to them in

preparing the petition. However, the habitat necessary for survival is at issue related to this petition. As has been noted in other reviews of habitat requirements of forest carnivores (e.g., Ruggiero et al. 1994), use of terms like “old-growth” and “late successional” forest has been inconsistent. The perception, based on past research is that the fisher was associated with late successional forests of dense canopy (e.g., Green et al. 2008). Fisher in California are well known for selecting late successional forests for resting and denning, but also younger age forests for foraging (Zielinski et al. 1999). More recent information, such as received in response to this petition, indicate fisher also inhabit forests that are not late successional (Appendix C).

As it relates to the petition, the status of late successional forests in California is used as a habitat surrogate to infer conditions for the fisher population. However, use of a specific habitat as a surrogate to infer a species trend risks being incorrect if new information is advanced that the relationship may not be as clear or specific as originally believed. In the case of the fisher, there are now increasing examples of fisher occupying other forest habitats that are not old growth.

Still, the primary habitat of the fisher is dense, coniferous forest, usually with a deciduous component and abundant physical structure near the ground. The fisher is considered a forest habitat specialist, limited in distribution to forest and habitat nearby (Buskirk and Zielinski 2003:208). High canopy closure and a general avoidance of areas with low canopy closure are important components of fisher habitat relationships, especially at the rest site and den site level (Powell and Zielinski 1994, Truex et al. 1998, Carroll et al. 1999, Mazzoni 2002, Zielinski et al. 2004b).

High canopy cover may be an important habitat component for foraging habitat although foraging habitat requirements are not well understood as indicated in the petition. Presumably, fisher are usually foraging when detected with track plate devices or cameras. In a track plate study in the southern Sierra Nevada, canopy cover ≥40 percent was associated with fisher detections (Green 2007). Placement of track plate devices and cameras however, may/may not be representative of all habitats available to the fisher. In the southern Sierra Nevada there potentially could be a broader use of habitat types than in Northern California (Davis et al. 2007); this is also supported by the varied diet reported in the petition (citing Zielinski work) that included reptiles and mule deer, species not regarded as late successional dependent species.

It has been hypothesized that tree species composition is less important to fisher than aspects of forest structure which affect prey abundance and vulnerability and provide denning and resting sites. Such forest structure can be characterized by a diversity of tree sizes and shapes, light gaps and associated understory vegetation, snags, fallen trees and limbs, and limbs close to the ground (Buskirk and Powell *in* Powell and Zielinski 1994). Fisher have to balance their need to obtain prey resources year-round and to avoid predation while maintaining homeostasis by selecting favorable microclimates within the forested landscape for foraging, denning, and resting. Their movements and habitat selection are also likely influenced by innate behaviors designed to avoid or minimize intra- and interspecific competition.

Fisher occur in a wide variety of forest types in California, but rest and den site characteristics are similar throughout their range, and cavities in large-diameter conifers and hardwoods are important habitat components. Rest and den structures include live trees, snags/broken-top trees, stumps, downed logs or downed large limbs, log piles, and rock structures/crevices. Large limbs on live trees are used as rest sites (**Figure 9**), but rest sites also include mistletoe clumps, witches brooms, and cavities. Cavities used by fisher for resting and denning include cavities associated with all the structure types noted above (Grinnell et al. 1937, Truex et al. 1998, Mazzoni 2002, Ewald 2003, Zielinski et al. 2004a, Reno et al. 2008). Female fisher raise their young in protected den sites with no help from the males (**Figure 10**). Female fisher will use 1-3 dens per litter of kits and are more likely to move litters if disturbed (Paragi *in* Powell and Zielinski 1994).

A number of natal and maternal den trees for fisher have been identified in California and include the following species: California black oak (*Quercus kelloggii*), Canyon live oak (*Quercus chrysolepis*), Oregon White Oak (*Quercus garryana*), Tanoak (*Lithocarpus densiflorus*), Pacific Madrone (*Arbutus menziesii*), Golden Chinquapin (*Chrysolepis chrysophylla*), Douglas-fir (*Pseudotsuga menziesii*), Big-leaf maple (*Acer macrophyllum*), Incense Cedar (*Calocedrus decurrens*), White fir (*Abies concolor*), Port Orford Cedar (*Cupressus lawsoniana*), Western Red Cedar (*Thuja plicata*), Sugar Pine (*Pinus lambertiana*), Ponderosa Pine (*Pinus ponderosa*), and coast redwood (Truex et al. 1998, Ewald 2003, Matthews et al. 2006, Reno et al. 2008).

Appendix B contains a compilation of den and rest site attributes from some studies in California and elsewhere. A summary table description of natal and maternal dens and surrounding habitat from 3 study areas in California is in this appendix (Truex et al. 1998: Table 4). The mean dbh of 9 conifer den sites was 45 in (31-58 in), and the mean dbh of 8 hardwood den sites was 25 in (16-39 in). Across the 3 study areas, canopy cover at these natal and maternal den sites was high, ranging from 70-100%. The means from the Truex et al. (1998) study correspond fairly closely with results from other fisher studies in California (see Table 2 from the SPI CCAA, and Table 13 from Matthews et al. (2006); den sites on Hoopa Tribal Forestry land, in Appendix B). A comparatively larger sample of natal and maternal den sites exist for the Hoopa Reservation.

Fisher rest sites were also compiled for three study areas by Truex et al. (1998: Table 6). This information is also in Appendix B, along with table 7 from the same study. From table 6, it can be seen that dbh of fisher rest sites in conifers across the 3 studies averaged 30-44 in., and the dbh of rest sites in hardwoods across the 3 studies averaged 19-34 in. Table 7 in appendix B shows that even at rest sites, canopy cover was high, approximately 88-94%. Table 1, a compilation by the USFWS for SPIs Candidate Conservation Agreement with Assurances is also included in Appendix B for comparison with other studies. In general, for all these studies, the mean dbh of conifer species exceeds the mean dbh of the hardwood species.

In a study of fisher rest sites in the southern Sierra Nevada, fisher used the largest woody structures for resting bouts, but they also used numerous structures. The observation that individual resting structures were rarely reused is similar to that reported elsewhere (e.g., Seglund 1995) and suggests that fishers do not restrict use of their home range to a few central locations but instead require multiple resting structures distributed throughout their home ranges (Zielinski et al. 2004a). Also in the southern Sierra Nevada, Mazzoni (2002) noted that infrequent re-use of rest trees suggested a need for numerous quality rest sites within the home range of an individual fisher. Mazzoni (2002) suggested large trees (related to occurrence of large snags and logs), along with dense and multi-layered canopies contributed to resting habitat for fishers. Stand level habitat characteristics found to be associated with fisher rest sites were high crown volume, canopy layering in stands with >60% cover, basal area, log cover, and a high number of large snags.

Two literature reviews of fisher habitat associations were submitted as comments in response to the petition (Mader 2008, Gorham and Mader 2008). Both papers concluded that fisher are typically associated with dense canopy forests and rely upon relatively large and decadent trees for resting and denning, but that some studies have also observed fishers in more open habitats. The Department believes the petition is generally accurate in its characterization of the habitat associations of fisher based on the information available to petitioners.

Some comments (e.g., Carr 2008, Tomascheski 2008, Ewald 2008) disagreed with the petition's characterization of fisher as associated with forests with late successional characteristics, such as dense canopy and abundant large snags, decadent trees, and logs. The letters cited reports submitted during the evaluation period (Self et al. 2008, Diller et al. 2008) as demonstrating fisher lacked a strong association with late successional forests. Most of these studies (see Self et al. 2008) indicate fisher occur on industrial timberlands. The Green Diamond occupancy model indicated increasing use by fisher of patches with increasing amounts of forest in the 21-40 year age class within 800 m of track plate stations. In general, track plates in stands classified as "redwood" (versus all other stand types) had a lower probability of detecting fisher in this study. Other variables such as stand age, slope position, tree height, and stand interior area did not affect the probability of detecting fisher. The results related to amount of 21-40 year old stands do not contradict the characterization of fisher as preferring dense canopy forest; in the coastal forest types where the study was conducted high canopy closure can be achieved within about 20 years of regenerating a stand.

A study of fisher den sites in the Sacramento Canyon and Hayfork Summit study areas of northern California submitted by SPI (Reno et al. 2008) was consistent with the information that fisher use large hardwoods and conifers for den sites. Mean diameter at breast height (dbh) for conifer den sites in the two study areas was about 41 inches. Mean dbh for hardwood den sites was about 24 inches. The range in conifer and hardwood den tree dbh was not provided by Reno et al. (2008), but these average values are above the average dbh reported for trees in the den sites (near vicinity of the den trees). Other quantitative habitat information from SPI cruise plots provided by

Self et al. (2008, “Case Study 1”, tables 3 and 4) is intended to show that habitat conditions on SPI lands are similar between areas occupied by fisher and areas within the extirpated range in the Sierra Nevada. How the areas identified as “occupied” were determined to be occupied is unclear.

Another essential habitat element for fisher in California is fire-maintained habitats. Fire is a natural and essential ecological component of California forest lands inhabited by fisher, and fisher evolved with natural fire patterns in California. However, years of fire suppression activities have led to a build-up in fuels that could lead to large wildfires that have the potential to significantly modify fisher habitat (see the Threats section of this report for further discussion of fire). Pictorially, Gruell (2001) illustrated how coniferous forest landscapes in the Sierra Nevada have increased in canopy cover through a series of “photo-retake” examples comparing historic (1800s) photographs to recent conditions. From these photos, it is generally apparent that many areas of the Sierra Nevada zone had lower canopy closure decades ago than they do now, with the increase in fire suppression. Campbell et al. (2000) noted that fisher must be adapted to the (now missing) natural frequent fire pattern historically common in low to mid-elevations due to long-term persistence in these habitats, but that the present situation was unique in that fisher are now being affected by human-caused changes with which they have not evolved.

Summary of Habitat Necessary for Species Survival

The Department concludes the fisher’s association with late successional forest attributes for denning/resting is a key factor in the management of the species, and that other habitats are needed to fulfill the fisher’s habitat requirements as well. Among them, foraging habitats and alternately available non-old growth forest need further study to determine their contribution to overall fisher habitat requirements.

Several pieces of new information were submitted to the Department for consideration in the Department’s petition review. Some of these items were reviews, some were results of studies or surveys. Virtually all submitted information to the Department contended that fisher also inhabit forest systems that were not late successional forest, bringing in to question the habitat specificity of the fisher. Conversely, the Department did not receive additional new information indicating that fisher only inhabit late successional forests.

Research on the fisher as a species is broadening to let the fisher inform us of how they are using the entire forest ecosystem. For example, the relationship of prey distribution/abundance for fisher with available habitat types and consequent fisher home range size (and ultimately density) is not well advanced in the fisher literature; and studies of fisher in areas of second growth are on the increase. The available literature and the petition indicates that fisher habitat appears to be evaluated primarily on the basis of denning/resting attributes and canopy cover with little attention paid to availability of food resources, because “…foraging habitat requirements are difficult to

study…" (petition page 10).

The Department concludes that the habitat necessary for survival as advanced by the petition underestimates the role of habitats that are available in forests other than late successional habitat. From the information made available to the Department, these younger, second growth forests are being used by fisher. Over the years, researchers have acknowledged that fisher do inhabit forest communities that are second growth (e.g., Powell and Zielinski 1994) and that they do use habitats that are not old growth for foraging activities. In the Department's view, this does not diminish the importance of late successional habitat elements on their own merit as part of a community, or for the benefit of wildlife such as the fisher.

Abundance

The petition provides estimates of fisher abundance (i.e., "how many" or population numbers) for the two populations in the state as evaluated below.

Grinnell et al. (1937) provide the earliest estimate of fisher population in California, based on their 1920's assessments of trapping. They suggested fisher were nowhere abundant in the State with 1 or 2 animals per township (36 square miles) in good fisher range; and fewer than 300 statewide. Lewis and Zielinski (1996) in summarizing historic trapping data, reported that fisher harvest declined substantially after the 1920's until trapping was finally halted in 1946 (**Figure 10a**). The value of each fisher pelt during the era was high such that the fisher would be a valued resource.

There are no rigorous studies on historic fisher populations in California. What is generally understood is that fisher were not considered to be common anywhere, and that fisher population densities are low relative to other mammals, and undergo fluctuations that are related to their prey (Powell 1993:78, Powell and Zielinski 1994). The low estimates, and the recommendation from Dixon (1925) and Grinnell et al. (1937) to cease trapping in the State, are suggestive that intensive trapping was the primary mechanism affecting fisher numbers. It is perhaps instructive to also note the apparent numbers of fisher being routinely captured for radio-collaring/study purposes in various studies in the present day (both Sierra Nevada and northern California) and compare to the Grinnell et al. (1937) accounts of low trapping success in the mid-1920's and decreased ability of trappers to find fisher (even despite the logical differences in value of the fisher in terms of effort, trapping methodologies, and intensity of effort).

Northern California

The petition includes an estimate of approximately 750 fisher in northern California and in the adjacent Klamath/Siskiyou region of southwestern Oregon. The source was a draft status assessment of the fisher in California prepared for the Department in October 2006. The Department considers this number to be speculative and not

supportable.

The petition also cited a preliminary estimate of 1,000-2,000 fisher in northern California that was based primarily on a model of likelihood of fisher detection (Carroll et al. 1999) and density estimates derived primarily from the Hoopa Valley Indian Reservation. Carroll et al. (1999) assumed fisher had access to all suitable habitats and that the Hoopa fisher population was in equilibrium. Both of these assumptions are unlikely to be true, which may affect the accuracy of the population estimate. The Carroll population estimate is substantially higher than the estimate cited in the petition, and assumptions notwithstanding, is based on empirically derived models and density estimates. Carroll (April 2008) indicated his analyses of fisher data from both the Hoopa Reservation and the Six Rivers National Forest suggest a regional (northern California and a small portion of adjacent Oregon) fisher population of 1,000-3,000 animals (Carlos Carroll, personal communication). This estimate represents the rounded outermost bounds of the 95% confidence intervals from the analyses. Carroll acknowledged a substantial lack of certainty regarding the population size, as evidenced by the broad range of the estimate, yet believed the estimate is useful for general planning and risk assessment.

Additional information (Self et al. 2008) derived two separate preliminary estimates of the fisher population. The authors used fisher density estimates from field studies to develop a “deterministic expert method” and an “analytic model-based approach” to estimate regional population values. The “deterministic expert” approach involved extrapolating the density estimates values from the studies to larger geographic areas in the vicinity of the study area, such that a density value was estimated for all areas within the currently occupied portion of the fisher’s range. The area of conifer and mixed conifer-hardwood forest below a specific elevation (from 5,000 feet in the north to 8,000 feet in the south) was calculated within each of these areas, and multiplied by the estimated fisher density to calculate a fisher population number in each area.

In the model-based approach, Self et al. (2008) generated hypotheses about environmental conditions that might affect fisher density. For each hypothesis they described independent variables which could be used to explain and test it, and developed a regression model to determine the combination of independent variables that best explained estimated fisher density in each study area. They then applied the regression model across individual Public Land Survey townships within the range of the northern and southern fisher populations (excluding some areas due to elevation and habitat constraints, as done in the deterministic expert approach). The overall fisher population estimate was calculated from the estimated number of fisher within each township in the occupied range.

The expert method provided an estimate of 3,079 fisher in northern California, and the regression method estimate was 3,199 (95% confidence interval [CI]: 1,602 - 4796) fishers. Estimates for the southern Sierra Nevada fisher were 598 and 548 (95% CI: 193 – 903) fishers, respectively. While cautioning that their estimates are preliminary, the authors emphasized the similarities between the separate estimates. It is unclear if

the density estimates from the underlying studies are particularly robust. Estimating fisher density was an explicit goal of a few of the studies used in the meta-analysis. For example, the density values for the North Coast and Southern Sierra study areas were described in the original paper as “grossly estimated” (Zielinski et al. 2004) for the purposes of providing readers a general idea of comparative densities at different sites (B. Zielinski, pers. comm.). Another potential source of error in the expert method involves extrapolating the density values from specific study areas to much larger landscapes. Survey data suggests that fishers are generally not uniformly distributed across all conifer and hardwood/conifer habitats in California (Carroll et al. 1999, Dark 1997, Slauson et al. 2003, Slauson and Zielinski 2007, USDI Fish and Wildlife Service, unpublished data).

The Self et al. (2008) estimate suggested that there are more fisher in northern California and also in the southern Sierra Nevada than proposed in the petition. Although none of the estimates have been peer-reviewed or published, the data and methods used to derive the Self et al. (2008) estimates appear to have been more rigorous than those used to derive the estimate presented in the petition.

Thompson (2008) in a recently completed telemetry study (thesis) of fisher in north coastal California reported substantially higher densities of fisher than studies using similar methods conducted in the 1980’s. Thompson (2008) further cautioned about the methods used to calculate density using home range versus mark-recapture methods and advocated consistent approaches to calculate what the Department would consider to be “minimum” density estimates.

Sierra Nevada

The northern and central Sierra Nevada is considered by some investigators to be currently unoccupied by fisher (Truex et al. 1998, Zielinski et al. 1997b, 2000, 2005a, Campbell 2004). As indicated previously, the Department is not prepared to make that conclusion without additional surveys that are more comprehensive in terms of evaluating the entire potential range for fisher. However, for purposes of this review, the Department will consider that there are no confirmed fisher in this geographic area at the present time.

The balance of this section focuses on the southern Sierra Nevada. There is no empirical data presented in the petition on the population size of fisher in the southern Sierra Nevada. The petition relies on model estimates of population that are derived from short-term studies of fisher using telemetry and or detection methods. There are no comprehensive and objective surveys of the fisher population throughout their range in the southern Sierra Nevada. Particularly missing in the analyses of populations are surveys/studies in the national parks in the Southern Sierra Nevada, and their role or contribution to the population. For the southern Sierra Nevada fisher population, a modeling exercise, an analysis of fisher habitat suitability, and fisher population estimates were recently completed in an effort to establish a baseline population

(Spencer et al. 2007). There were many caveats associated with this modeling exercise, and the authors weighed the various uncertainties in all their assumptions and concluded a population estimate of 160-360 total adults (not including juveniles). The number of adult females was estimated at 57-147 individuals, but additional studies are needed.

Three different methods were used to derive the best estimate of population size noted above:

One static approach was to extrapolate fisher density estimates from the Kings River study (Jordan 2007) over the area predicted to be suitable by habitat models. Another static approach supplied by R. Truex was to apply sampling theory from southern Sierra fisher monitoring data to calculate annual fisher occupancy rates, adjusting for detectability and characteristics of the sample population, to derive a total population size based on the number of fishers presumed to be detected at each sample unit. A dynamic approach applied the spatially explicit population model PATCH to estimate the equilibrium population size (or carrying capacity) of fishers in currently occupied habitat areas, and to identify likely source, sink, and population expansion areas. The three methods yielded the following population estimates:

- Jordan: 285-370 fisher, young and adults, with 57-86 adult females;
- Truex: 160-250 fisher, young and adults.
- PATCH modeling: 142-294 adult fishers, with 71-147 adult females; accounting for subadult fishers provides a rough estimate of 220-360 total fishers for the southern Sierra population.

Lamberson et al. (2000) is also cited in the petition; it is an exploratory population viability model and the paper estimates the fisher population to be 100-500 animals, the basis for this range of estimates is unknown, but it is assumed they were selected primarily as options for the model runs.

While there is reason to be cautious about the validity of the estimates for population size in the southern Sierra Nevada, they are the only available scientific information. Spencer et al. (2007) recommend: “continued monitoring of the fisher population, with special attention to its northern frontier, roadkill along Highway 140 and other roads, and dispersal movements of fishers to better determine the potential for natural northward expansion versus active translocation of fishers”. From the Department’s perspective, some of the methodology and assumptions used in the Spencer et al. (2007) analysis (as well as the authors statements about limitations) limits our reliance on it—such as eliminating areas thought unlikely to support fisher, relying on inferences from studies that used a 100 percent minimum convex polygon estimate of home range based on small sample sizes, or assuming that female fisher have no spatial overlap in their home range. The Department received a comment letter on the southern Sierra Nevada fisher population that took issue with the petition findings (that the estimate is too low).

Summary on Abundance

The Department considers the petition estimates of fisher population in California to be low. Current fisher population estimation efforts are based on localized study of fisher home range and minimum density estimates. These estimates are not well-founded on long-term monitoring data and are not based on extensive data points or comprehensive information collected throughout inhabited fisher range but they are what is currently available. This is not surprising given the difficulty of using conventional radio telemetry techniques on a wide-ranging, forest dwelling species that inhabits rugged terrain. The estimates vary widely depending on source and suggest there are at least 1,000 to approximately 4,500 fisher statewide. Estimates of density ranged from approximately 15 to 51 fisher per 100 square miles of fisher range as extrapolated from several studies (e.g., Self et al. 2008).

Consequently, it is reasonable to conclude that there may be at least as many fisher in California now, if not more, than there were estimated to be 80+ years ago.

Population Trend

As there are no empirically-based numbers monitoring the fisher population in northern California, the Sierra Nevada, or statewide, there similarly is no capability to determine population trend. Inferences to trend are made through a variety of analyses based on several studies.

Northern California

The petition refers to studies documenting fisher fecundity rates, mortality rates, and density changes over time as the basis for inferences about fisher population trends. Unfortunately, these studies are largely short-term efforts of a localized study area. There is no comprehensive assessment across the range of the fisher populations to infer trend. Specifically, the petition states “although population growth rates have not been modeled, high female mortality in combination with low and highly variable observed fecundity rates (Truex et al. 1998) indicate that fisher populations in northern California are probably declining or will do so in the future”. The petition cited a report suggesting that female fisher survival has declined over time on the Hoopa Indian Reservation in northeastern Humboldt County. The petition also indicated that habitat modification caused by timber harvesting has resulted in reduced fisher density, thereby implying that fisher populations in northern California have declined.

Fecundity

Citing Truex et al. (1998), the petition indicated that fisher fecundity rates in northern

California are low and highly variable. In northwestern California, Truex et al. (1998) compared reproductive rates in two successive years at a study site in the Six Rivers National Forest. In 1995, 8 of 11 (73%) of captured females were lactating, while only 1 of 7 (14%) captured females were lactating in 1996. Denning rates in two successive years were also substantially different in interior northwest California (Reno et al. 2008; K. Rulon, personal communication). Two of nine (22%) monitored females denned in 2006, and 8 of 10 (80%) denned in 2007. In contrast, fisher fecundity on the Hoopa Reservation varied little during a recent two year study period (Higley and Matthews 2006). Seven of 8 (88%) and nine of eleven (81%) adult females monitored denned during 2005 and 2006, respectively.

Other studies also suggest it is not uncommon for fisher fecundity to fluctuate from year to year. In an introduced fisher population in southern Oregon, 2-4 adult females were monitored each year for seven years (Aubry and Raley 2006). The percentage of females giving birth to kits in a given year varied from 33% (2 years) to 50% (3 years) to 100% (2 years). In Maine, Arthur and Krohn (1991) also found that fecundity varied annually. They followed four adult females in 1985 and 1986, and five females in 1987. None of the females denned in 1985, three (75%) denned in 1986, and three (60%) denned in 1987. Only one of the monitored females denned in both 1986 and 1987.

Mortality and survival

Truex et al. (1998) documented higher female than male mortality rates at three study sites - the Eastern Klamath site in the vicinity of Trinity Lake, the North Coast site near Mad River, and a site in the southern Sierra Nevada. Although the authors stated that the higher rate of female mortality at these sites "raises concern", they primarily expressed that concern for the isolated southern Sierra Nevada population, where female mortality rates were highest. Annual female survival was 72.9% at the Eastern Klamath site and 83.9% at the North Coast site.

Similar rates of female survival have been reported for other studies in California and southern Oregon. However, these estimates should be viewed with caution due to relatively small sample sizes and lack of reported confidence intervals. Annual non-juvenile female survival on the Hoopa Reservation was 72.2% for 18 fishers monitored from January 1 2005 to January 1 2006 (Higley and Matthews 2006). Reno et al. (2008) documented annual female survival at two sites in interior northern Calfornia. In the Sacramento River Canyon, pooled annual survival was 100% (3 females with known fates in 2006, 2 with known fates in 2007). In the Hayfork Summit area, pooled annual survival was 91.7% (6 females with known fates in both 2006 and 2007). In southern Oregon, average annual survival for female fishers >1 year old was 78% (Aubry and Raley 2006).

In the eastern U.S., reported survival rates are slightly higher. In Maine, Krohn et al. (1994) found adult female survival to be 87% in the non-trapping season (79% in the trapping season). In a "lightly trapped" population in Massachusetts, pooled annual

survival rates for adult females averaged 90% (95% confidence interval [CI]: 80–100%) (York 1996).

Evidence suggests that the ratio of female to male fishers at the Hoopa Reservation has recently declined (Higley and Matthews 2006). Trapping data collected in 2004 and 2006 indicated a change in the fisher sex ratio (from 1 male:2.6 females to 1 male:1 female) since the mid- and late 1990s. Higley and Matthews (2006) speculated that females may be preyed upon disproportionately. Female fishers are generally about half the size of males, and due to their smaller size may be more frequently killed by bobcats and other potential predators.

Density

The petition refers to fisher work on the Hoopa Reservation that documented substantial declines in trapping success and estimates of fisher density in recent years. Capture success declined from 12% in 1996-1998 to 5.5% from 2004-2006 (Higley and Matthews 2006). In 2005, estimated population density was 0.16 fishers/km^2, while similar estimates were 0.45, 0.37, and 0.29 fishers/km^2 for the years 1997-1999, respectively (Matthews et al. 2006). Researchers at Hoopa have speculated that the decreased trapping success reflects a lower number of fisher on the reservation, and may be a result of local increases in predation, disease, or the effects of timber management (Higley and Matthews 2006).

The petition does suggest the changes in trapping success on the Hoopa Indian Reservation between the mid-1990s and 2006 is indicative of population decline, but the Department considers such a conclusion based largely on variability in trapping success to be unreliable as well as site-specific.

Sierra Nevada

The petition provides no information on population trend in the southern Sierra Nevada. The petition refers to the Spencer et al. (2007) model in discussing the fisher population in the Sierra Nevada. Spencer (2007) describes a primary objective of their report is to establish a "…baseline assessment of the current condition of fisher habitat and the fisher population occupying the southern Sierra Nevada." This baseline would be used to develop trend over time.

Summary of Population Trend

Due to the lack of historic and current population estimates, it is not possible to ascertain population trends for the fisher in California, nor can expected population trends be modeled adequately due to a lack of demographic data from the population. However, the petition provided no empirical evidence indicating that either population in California is declining. Lastly, the petition (page 19) describes population vulnerability to

logging, however multiple submissions of information on fisher monitoring and telemetry from industrial timberlands that were received after the petition was filed contradict the conclusion that fisher are not persisting in such habitats.

In neither northern California, nor the southern Sierra Nevada, was there substantial empirical evidence to indicate that timber harvesting, loss of den/rest trees, prey abundance, or long-term decline in late successional forest are limiting fisher population growth.

Short-term and site specific studies suggest that annual fecundity rates in northern California sub-populations are variable, although similar variation appears typical in other populations. Within populations exhibiting variable fecundity, fecundity is relatively high in some years. Several studies suggest annual female survival in northern California appears to be >70%. The Department's assessment of the available data on fisher fecundity, reproductive potential, mortality and density levels is that: year-to-year variability is high, site/location variability is high, that there have not been enough samples at a comprehensive scale to thoroughly conclude a trend (or an average/mean/median as an appropriate "standard" for comparison), or, all of the above.

Although the change in sex ratio and lower estimates of fisher density on the Hoopa Reservation have been documented and suggest that the Hoopa fisher could be declining, there is no compelling reasons to believe these results, apparently based on trapping success, can be extrapolated to the larger northern California population. For example, data from Green Diamond lands suggested that fisher abundance did not decline there during a similar period. Localized changes in wildlife populations are not necessarily indicative of corresponding changes at the regional or rangewide level, and fisher populations are known to exhibit marked fluctuations in size (Powell 1994 cited by Powell 2003; Bulmer 1974 and Bullmer 1975 cited by Powell and Zielinski 1994; deVos 1952). While the cause of such fluctuations has generally been ascribed to fluctuating prey densities, changes in other environmental conditions (e.g., increased predator and/or competitor density, disease, habitat change resulting from land management or natural events such as fire, etc.) may also play important roles.

Factors Affecting the Ability of the Population to Survive and Reproduce

These factors are discussed under the "Degree and Immediacy of Threats" section.

Degree and Immediacy of Threats

Below are potential threats to the fisher as identified in the petition and the Department's assessment of those threats.

I. Timber Harvest and Forestland Management

The petition primarily addresses timber harvesting with respect to its effects on late successional forest and associated habitat elements. While the petition acknowledges that fisher inhabit areas not specifically classified as late successional forest, they suggest that fisher are "strongly associated with unfragmented forests with late successional characteristics". Thus, the decline of late successional forests in California is "an indicator of severity of loss of fisher habitat" according to the petition.

The Department believes the harvest of late successional forest especially key habitat elements (large conifers and hardwoods with cavities and other structures suitable for resting and denning) can be a potential threat to fisher. This threat can result from various silvicultural treatments and can occur at various scales. The selective removal of large trees, decadent trees, snags, and other important habitat elements from managed stands during selection or salvage harvests can reduce available denning and resting sites. Regeneration harvests may remove both overstory and understory vegetation, potentially rendering harvest units unsuitable for fisher reproduction for many years and unsuitable for foraging and cover until relatively dense overhead cover is re-established. Site preparation and plantation management may remove and/or simplify the understory, thereby affecting forage and cover value for fisher. These activities and their related impacts on fisher could be significant to fisher under CEQA on a project-specific or cumulative basis, depending on the individual circumstance. However, while the potential for significant impacts may exist under CEQA, the Department does not believe such potential affects rise to level at this juncture to support a determination under CESA that the petitioned action may be warranted.

At the landscape scale, the abundance and distribution of fisher is likely to depend on the size and suitability of patches of preferred habitat, and the location of those patches in relation to areas of unsuitable habitat. Additionally, fisher may be able to effectively use less desirable habitats at various scales. For example, in stands in which overall resource availability is relatively low, fisher appear to compensate by focusing on atypical patches of higher-quality habitat within those stands (Weir and Harestad 2003). Relatively young stands with dense canopy can provide suitable foraging and dispersal habitat, while stands with sufficient late successional habitat elements may be suitable resting and denning habitat.

Northern California

The petition describes the extent to which timber harvesting has occurred (and continues to occur) on public and private lands in northern California, and the amount of late successional forest remaining in the region. The petition states that "loss, degradation, and fragmentation of late successional forests because of clearcutting and selective logging in northern California have resulted in substantial loss of fisher habitat with likely negative effects on the fisher" and that logging "continues to present a major threat to the continued existence of the species." Recent U.S. Forest Service timber sales within the occupied range of the fisher are described in the petition. Because U.S.

Forest Service environmental documents may conclude that a particular timber project may affect individual fisher, but is not likely to lead to a trend toward listing, the petitioners state that cumulatively these projects "potentially had a substantial impact on fisher habitat." However, there is no evidence presented that the fisher population has actually been negatively impacted by these activities such that listing under CESA may be warranted.

The petition cites two studies as indicating that habitat modification resulting from timber harvesting has resulted in the reduction of fisher density and survival. Truex et al. (1998) reported that fisher in their Eastern Klamath study area had larger home ranges, tended to rest in smaller-diameter trees and logs, and were captured less frequently than fisher in their North Coast study area. The authors concluded that fisher in the Eastern Klamath area appeared to occupy "poorer" quality habitats than those in the North Coast area. Although the authors speculated that historic patterns of timber harvesting created "poorer" habitat conditions in the interior portions of northwestern California relative to conditions nearer the coast, they also recognized that differences in climate and forest productivity between the study areas may have affected habitat quality. Thus, the Department believes that the uncertainty regarding the impacts of the specified habitat modifications on the fisher makes it difficult to draw conclusions.

The petition also cites Buck et al. (1994) as indicating that logging resulted in habitat loss that has affected the fisher population in northern California. Buck et al. (1994) compared fisher habitat use of "lightly" and "heavily harvested" areas. The heavily harvested study area had a greater proportion (25%) of "presalvage" logging (a selective harvest that targeted most of the largest conifers and retained most of the midstory hardwood component within treated stands) than the lightly harvested area (12%) and a substantially greater road density (4.7km/km^2) than the lightly harvested area (1.0km/km^2). Within the lightly harvested areas, fisher used habitats in proportion to their availability. Within the heavily harvested area, fisher used habitat types with overhead canopy more frequently than expected based on availability. Additionally, greater numbers of fisher mortalities documented during the study occurred within the heavily harvested area. All fishers that died during the study were found in either clearcuts, areas without overhead canopy, or hardwood-dominated stands. The authors concluded that the more intense harvesting reduced habitat quality more compared to the lightly harvested area. However, it was not obvious that conditions within the heavily harvested site affected the fisher. Other studies have similarly shown that fisher tend to avoid some managed areas (e.g., recent clearcuts, but see Buck et al. mortalities mentioned above) (Kelly 1977; Weir and Harestad 1997; Simpson Resource Company 2003), but the extent to which avoidance of areas within home ranges adversely affects fisher fitness is unknown.

Cause-and-effect studies of land use upon the fitness of wide-ranging animals are few, and both of the studies cited are essentially correlative in nature and of limited duration. The petition contention that habitat modification has resulted in a decline in fisher population, or has had a negative effect on the population for purposes of CESA does not appear to be supported by substantial data at this time. While harvesting can

adversely affect components of fisher habitat at particular scales (harvest unit, stand, patch, and element), the extent to which these and other studies show that harvesting has adversely affected fisher populations or rendered large areas of habitat (e.g., the size of average fisher home ranges) unsuitable in northern California is unknown. Fisher continue to inhabit lands managed primarily for timber production, including industrial timberlands that have extensive harvest histories. Other managed timberlands are apparently not currently occupied by fisher (e.g., Self et al. 2008) or have not been recolonized by fisher since their significant reductions decades ago.

Fisher have been studied on industrial timberlands in Humboldt and Del Norte counties since 1994 (Klug 1997, Hamm et al. 2003, Diller et al. 2008). In addition to repeated track plate surveys quantifying rates of fisher detection, these studies have documented fisher reproduction, characterized den trees and structures, and estimated fisher density via mark-resight techniques. These studies indicate fisher have inhabited these timberlands over the past 14 years, and suggest that fisher abundance on these industrial timberlands has not significantly changed during this period.

Fisher habitat use and rest sites were also studied on land managed by Sierra Pacific Industries (SPI) in northern Shasta County in the early 1990s (Self and Kerns 2001). From 2006 to 2008, SPI studied fisher in northern Shasta County and also in eastern Trinity County (Self and Callas 2006, Reno et al. 2008). In northwestern Siskiyou County, Timber Products Company (TPC) has studied fisher since 2005, primarily in a "checkerboard" matrix of industrial timberlands and U.S. Forest Service lands (Farber and Franklin 2005, Farber and Criss 2006, McKnight 2008). By re-surveying an area that had been surveyed one decade earlier, Farber and Franklin (2005) demonstrated the persistence of fisher in a checkerboard landscape. Current projects on and adjacent to lands owned by TPC involve non-invasively collecting fisher genetic samples to better understand fisher abundance and population structure (Farber et al. 2007). All these studies indicate the persistence of fisher on managed timberlands.

It is evident that the structural characteristics required by fisher for foraging, cover, and/or reproduction continue to occur on many managed timberlands. It is unclear if these characteristics are present because 1) they are purposefully retained within harvest areas, 2) they are maintained as a consequence of protection provided for other resources (retention areas for spotted owls or other sensitive animals, Watercourse and Lake Protection Zones, etc.), 3) they result from typical forest management, or 4) they simply have not yet been removed by harvesting.

Sierra Nevada

The percentage of the land base in the Sierra Nevada that is private industrial timberland increases substantially from the Merced River going north to the Pit River which is generally considered the area separating occupied habitat from the area not currently occupied (Figure 5).

The petition sufficiently describes the degree to which late successional forests have been modified over the decades, and is based on published literature. Specific information regarding loss of these forests is presented for both public lands in national forests and parks, and private lands. The petition describes how approximately 38 percent of the land base north of Yosemite is private industrial timberland and fisher are absent, versus the area south of the Merced River where there is little or no industrial timberland and where a fisher population exists in the southern Sierra Nevada. The Department reminds the reader that two large national parks have been present in the southern Sierra Nevada for decades and prohibit uses such as logging, hunting, and trapping.

The petition cited Bias and Gutierrez (1992) and Beardsley (1999) in making the point that late successional forests are generally lacking in the central Sierra Nevada and that less than 9-percent of the private timberlands possess a mean dbh greater than 21 inches. Further evidence of this was presented by referencing Zielinski et al. (2005), and the Weislander Vegetation Map Survey (1946) with comparisons to modern data (Sierra Nevada Ecosystem Project,1996).

The reference to Greenwald's (2000) analysis of 204 timber harvest plans that logging was having an impact on the fisher habitat is supported by reference to Britting (2002) who reviewed 765 timber harvest plans. While Britting (2002) was considering the effect of timber harvest on spotted owls, the parallels drawn between spotted owl habitat and fisher habitat allow some comparison. The attributes of habitat used by spotted owls has been characterized in northern California (LaHaye 1988, Ripple et al. 1991, Buchanan and Irwin 1993, Iverson 1996, North and Reynolds 1996, Forsman and Giese 1997, LaHaye and Gutiérrez 1999, Thome et al. 1999); and in the Sierra Nevada (Verner et al. 1992). In much of the spotted owl range, old forests have been described as having certain attributes including decadence, snags, downed logs, multi-and dense canopies, a high percentage of hardwoods, and having large patch sizes providing ample interior forest away from edge. These same attributes have been described for fisher (Verner et al 1992, Campbell 2004), making the comparison between spotted owl and fisher, as it pertains to the specific habitat attributes (snags, logs, large trees, canopy), valid. In addition, information presented by SPI in response to the petition (Self 2008b) makes the same comparisons between spotted owl and fisher habitat.

The petition's contention that logging over the decades in the Sierra Nevada has resulted in substantial declines in late successional forests and key components including large trees, snags, downed logs and multi-canopied old growth forests on both public and private lands is not in dispute. However, while logging practices in individual circumstances raise the specter of potentially significant impacts under CEQA, there is no direct evidence that the logging activities of the past and present are limiting the fisher to a degree where heightened protection of the species under CESA may be warranted. The petition identifies the number of timber harvest plans approved by county, by silviculture type, and by ownership (Petition Table 8, 9, 10). The information in the petition demonstrates that even-aged harvesting has increased annually since 1999, while Table 11 and Figure 4 indicate an overall decline in harvest since 1992.

Approximately 40 percent of the private lands in the central Sierra Nevada within CDF's southern Forest District were harvested under a timber harvest plan between 1992 and 2003. Much of the habitat in the central Sierra Nevada has been fragmented and thinned and consists of primarily smaller trees. Britting (2002) identified the percentage of acres harvested under the various silvicultural treatments that are allowed in California for the Sierra Nevada, with even-aged harvesting being the highest.

Greenwald et al. (2000) indicated the percentage of acres planned for harvest under an approved timber harvest plan (four percent) was dwarfed by the percentage of acres harvested under exemptions (94%) (see Petition Table 14). CDF advised the Department this is an inaccurate way to portray exemption harvest. For example, large acreage ownerships may want to remove trees damaged and may file one exemption for their entire ownership. They may be exempt from a THP, however as indicated by CDF, they are not exempt from CEQA or the FPR. CDF indicated large landowners typically get an exemption for their entire property annually for convenience; however, it does not mean they will be harvesting all the dead wood out of that acreage. CDF stated that the volume rather than acres was the more appropriate figure to use in assessing the impact of exemption harvest. Trees typically harvested under an exemption are dead, dying or diseased trees or hardwoods used for fuelwood.

There are restrictions concerning the circumstances and volume of trees that can be harvested under exemption harvest, although there is little review by CDF, the Department, or the public. The most common exemption requested by timberland owner's limits harvest to less than 10% of the pre-treatment tree volume. Harvest operations must still comply with all aspects of the FPR. References made in the petition to the number of acres harvested under the timber harvest plan review process do not include harvest operations conducted under salvage and emergency notices. Many times the number of acres harvested under approved timber harvest plans are permitted under salvage or emergency notices each year in the central Sierra Nevada.

The southern Sierra Nevada is primarily US Forest Service land and is experiencing significantly changing forest management strategies over the past two decades designed to protect late successional forest and associated habitat components. Additionally, presence of two large national parks, where trapping and timber harvest has not occurred for many decades, also provide protected habitat for fisher.

II. Forest Wildfire

The petition states fire (pages 42-43) is a risk to fisher and their habitat due to high intensity crown fire. However, this risk is not presented as a primary or significant threat to the species' persistence in California, because the petition notes (citing Weatherspoon et al. 1992) that the late successional forest stands where fisher are found are less vulnerable to high severity fire than other forest types and (citing Dark 1997) that the fisher's aversion to areas of high human use keeps fisher from areas of

high fire frequency. Wildfire is also noted to have a beneficial effect on fisher through the maintenance of hardwoods in later seral forest stands (Zielinski et al. 2004a, as cited in the petition). Hardwoods are important for resting and denning sites and as habitat for prey species.

The petition urges a cautious approach to fuel reduction projects which may compromise fisher habitat in the short-term, in order to prevent significant modification of habitat from wildfire over the long term. An emphasis on prescribed fire and thinning of small trees in areas of highest risk is suggested (p. 43, p. 71) as well as development of modeling efforts to predict potential effects on the fisher (Spencer et al. 2007).

The Department considers wildfire a threat to fisher and their habitat, particularly in the southern Sierra Nevada, and believes it deserves the significant management consideration being given to it by the US Forest Service to reduce the risk. The recent, severe wildfire years in California, combined with the current efforts to address and adapt to drought conditions and possible climate change effects have brought wildfire to the forefront in wildland management concerns. The uncertainty however, of when, where, and how large a fire may, or will occur, makes it challenging to plan responses, contingencies, or management strategies in advance. Greene et al. (2008) state: "Arguably, the greatest threat to fisher in the Sierra Nevada is loss of habitat due to uncharacteristically severe wildfire." They further note that the negative effects of wildfire on fisher habitat such as the loss of large live and dead trees can last for more than 100 years. Needless to say, the uncertainty of an "uncharacteristic" fire also makes it difficult to know the true threat in terms of immediacy or scale. **Figure 11** displays the extent of fires in California since 1950 (CDF 2003), many in areas where fisher persist today. The figure is a conservative display of recent fire extent because many fires were not reported. Again, what is unknown is whether, or when, the southern Sierra Nevada will experience its next large fire in the approximately 2.6 million acre range of the fisher, or whether the fuel reduction efforts currently being initiated will successfully ensure protection of fisher habitat at a landscape level. The largest fire on record in the Sierra Nevada was approximately 150,000 acres (CDF records), which if overlaid on fisher range, would be about 6 percent of the range.

Large wildfires could negatively impact the fisher population through a variety of pathways, including: direct mortality to fisher, modification of habitat, direct mortality to and short term population depression of prey species, and fragmentation of suitable fisher habitat (Greene et al. 2008). The modification and isolation of fisher habitat from a wildfire could exacerbate problems of low population size and increase the risk to fisher in the southern Sierra Nevada (Conservation Biology Institute, pers. comm., 2008).

While the studies cited in this section largely apply to the Sierra Nevada, the threat of wildfire to fisher also applies to the occupied range in northern California with the possible exception of the near-coastal redwood zone. For example, Courtney et al. (2004) state that wildfire is currently the primary source of habitat loss to owls and note that the Klamath province is particularly vulnerable to wildfire. Although there is

uncertainty whether recent fire patterns in the relatively remote Klamath region are outside the natural range of variability (Frost and Sweeney 2000), recent compilations of fire data for the North Coast Ranges (Stuart and Stephens 2006), Klamath Mountains (Skinner et al. 2006), and Southern Cascades (Skinner and Taylor 2006) suggest higher fuel loads and increasing areas of high intensity fires have resulted from decades of fire suppression in these areas. Extensive timber management created forests more prone to high severity fires in these regions (Frost and Sweeney 2000, Stuart and Stephens 2006). Together, these conditions suggest some risk to fisher habitat in northern California from wildfire.

Wildfires are expected to become more frequent and larger in the future (Syphard et al. 2007b). Additionally, as residential development and recreation continues to expand in rural California human-caused wildfire ignitions can be expected to become more frequent (Syphard et al. 2007a). The southern Sierra Nevada fisher population is potentially vulnerable to habitat isolation if a large wildfire occurred and bisected their range because of the narrow linear arrangement of suitable habitat along the west slope of the range. A similar narrow band of habitat can be found east of Lake Shasta in northern California. A large fire could further isolate extant fisher populations by burning across a narrow suitable habitat zone.

III. Small Population Size and Isolation

California's fisher populations are currently isolated from each other and from fisher elsewhere in North America. The petition (page 43-44) states "this isolation precludes genetic interchange, increasing the vulnerability of the northern California population," and states it is "small enough that inbreeding and population viability may be serious problems." The concern was articulated as early as the mid-1990's (Zielinski et al. 1995) and the fisher in the southern Sierra Nevada appear to be persisting. There is no information presented in the petition to show that inbreeding and/or population viability currently are serious problems, and the Department does not agree with the petition's low estimate of population size.

Drew et al. (2003) concluded that California fisher populations have become isolated from fisher in British Columbia and the Rocky Mountains due to extirpation in Oregon and Washington, and that one haplotype detected in historic California specimens appears to have been lost from current populations. The authors suggested that this haplotype was likely lost "because of genetic drift and a lack of gene flow." Although genetic isolation may permit populations to adapt to local conditions, Drew et al. (2003) concluded the risks of continued isolation, including susceptibility to catastrophic events, were greater than the potential benefits of local adaptation.

High levels of genetic structure (an indication that there has been very little historic contact between individuals of separate populations) between Pacific coast fisher populations and decreasing genetic diversity within populations distributed from north to south were noted by Wisely et al. (2004). Heterozygosity and allelic richness

(measures of genetic diversity) were greater in south-central British Columbia (considered to be part of the core of the fisher's distribution) than in California populations. Wisely et al. (2004) sampled four nominal subpopulations in California: two from the northwestern California population ("Klamath-Siskiyou" and "California Coast Range") and two from the southern Sierra Nevada ("Southern Sierra – North" and "Southern Sierra – South"). Overall, heterozygosity was relatively low in the California populations, but somewhat higher in the Klamath-Siskiyou and California Coast Range populations than in southern Sierra populations. Allelic richness was slightly higher in northwestern California compared to the southern Sierra Nevada. Wisely et al. (2004) found statistically significant genetic distances between all four California subpopulations, though genetic distance between the Klamath-Siskiyou and California Coast Range populations was the lowest in the state.

Small, isolated populations are at increased risk of extinction due to demographic stochasticity (unpredictable changes in sex and age ratios, distribution of individuals and geographic structure of a population (Mace and Lande 1991)) and genetic stochasticity (random changes in gene frequencies and fitness which are amplified in small populations) (Pimm et al. 1988). These inherent risk factors are compounded by other risk factors which could reduce population size or increase fragmentation and isolation (wildfire, disease, urban development, roads, timber harvest, etc. as discussed elsewhere in this document).

Pimm et al. (1988) found that demographic stochasticity alone can drive small populations to extinction. Further, Pimm et al. found that the estimated time to extinction shortens with increased environmental stochasticity (unpredictable changes in a species environment, for example large wildfires); extinction risk is increased for species with naturally low rates of population growth; and extinction risk is increased for species with low theoretical maximum populations. All three of the above conditions are theoretically possible for the fisher in California. If population density decreases below a threshold, the Allee effect may occur, resulting in a decrease in the reproductive rate of the population due to the inability of individuals to find mates (Hanski et al 1996).

Genetic stochasticity can increase the risk of extinction to a population through several mechanisms. Inbreeding depression, the increased probability of combining deleterious recessive genes within a genetically depauperate population can occur resulting in fewer viable offspring. Genetic drift, the random loss and retention of genotypes from generation to generation within a population is predicted to occur, which generally further reduces the genetic variability of small populations. Accumulations of deleterious mutations may occur lowering the fitness of the individuals within the population (Higgins and Lynch 2001).

Loss of genetic diversity over time reduces the ability of a population to adapt to changes in the environment. Wisely et al. (2004) from the petition, summarizes the threat related to low population size:

> "[e]rosion of remaining genetic diversity threatens these populations with inbreeding, inbreeding depression, and a reduced ability to adapt to changing environments…Of equal concern is the demographic fate of these isolated populations. Populations in the south have a smaller effective population size than northern populations. Small population size coupled with low migration rates increase vulnerability to stochastic demographic events and environmental changes."

Wisely et al. (2004) mentioned several potential adverse ramifications of population isolation and reduced gene flow (such as inbreeding depression, reduced ability to adapt to changing environments, increased vulnerability to stochastic demographic events and environmental changes) and suggested that "immediate conservation action might be needed…" for Pacific coast fisher populations. However, the authors did not provide specific thresholds or guidance for determining when such action would be necessary, or what those actions would be.

Wisely et al. (2004) stated that the low genetic diversity and high genetic structure of southern Sierra populations suggested that they are "vulnerable to extinction". In contrast, northern California fisher populations have slightly elevated genetic diversity and exhibit less genetic structure. These characteristics, in combination with larger population sizes, suggest that the potential threats faced by fisher in the northern populations related to size and isolation are likely not as acute as those faced by the southern Sierra population (personal communication, S. Wisely; personal communication, C. Carroll). The Department is not aware of studies indicating that fisher fitness in northern California is currently compromised due to population size or genetic composition. However, because diversity is lower than that found within British Columbia populations, continued study and monitoring of the fitness and genetic status of fisher in northern California is warranted.

The Department is aware of only one study that has directly addressed the viability of the fisher population in northern California. Powell and Zielinski (2005) used the population matrix modeling software VORTEX to evaluate the population and to investigate the potential effects of removing animals from that population. The authors cautioned the model's output is an index of population viability for the purpose of investigating possible effects of translocation projects, not a dependable estimate of the probability of extinction of the population. Assuming an initial population size of 1000 fisher in northern California and a carrying capacity of 2000 (±250) animals, the authors modeled a 5% probability of extinction over the 100 year modeling period. Halving the initial population size increased the probability of extinction by 1%. The authors also estimated that the removal of 20 fisher per year (five fisher from each of four different subpopulations) for 8 years would increase the probability of extinction less than 5% and would not jeopardize the population.

The model used by Powell and Zielinski (2005) rests on various assumptions about the population and environmental conditions, and the authors expressed concern about their assumptions regarding the effects of timber harvest, the rate of timber harvest,

fisher vital rates, and the sex ratio of adult fisher. In particular, they stated the difficulty of building multi-year effects of timber harvesting activities on fisher subpopulations into the model "may lead to somewhat optimistic forecasts on the viability of the northwestern California population". For context, Traill et al. (2007) found in their analysis of 95 mammalian population viability analyses a mean estimated minimum viable population of 3,876 individuals (with a 95% confidence interval of 2,261–5,095 individuals).

IV. Roads

The petition (page 37-38) includes roads as part of the threats discussion and indicates they may have a significant effect on fisher habitat. The petition states that the four major highways crossing the Sierra Nevada probably contributed to the decline of the fisher in northern and central Sierra and are now likely a barrier to reconnecting populations. This is doubtful considering the historic decline in fisher attributed to trapping decades ago (before major high-speed highways). The Department is of the understanding that the only information related to fisher avoidance or preference of roads/highways is based on the specific animals killed and recovered. In actuality, it isn't known whether roads may also be an attraction to fisher because of the potential availability of a food source as a result of road-kill.

Reports of road-killed fisher in the central Sierra Nevada are so rare that the conclusion that roads and infrastructure pose significant threats to fisher remains unsupported. However, the Department agrees that if dispersing individual fisher are moving through the central Sierra Nevada, there is the possibility that highway mortality could occur and efforts at prevention are desirable. A possible threat from roads is their potential effect as a barrier to movements by fisher. This could be the case with major highways such as Interstates 5 and 80, and highways 4, 49, 50, 88, 299 (see previous section on road effects), but has not been studied.

The USFWS's 12-month finding for a petition to list the fisher in 2004 included a discussion on roads (USDI 2004). The potential effects of roads include direct loss of habitat, displacement from noise and human activity, direct mortality, secondary loss of habitat due to the spread of human development, increased exotic species invasion, and creation of barriers to fisher dispersal.

Figure 8 depicts various levels of roadways in California fisher range, from Interstates to unpaved U.S. Forest Service roads. Of conservation interest, the figure illustrates fewer roads in northwestern California, Mendocino National Forest/Yolla Bolly Wilderness, and the southern Sierra Nevada, all areas where fisher still exist today. The petition (page 38) indicates the northern Sierra Nevada in particular is dissected by roads; the Department concurs.

V. Urban Development

The petition discussion of urban development threats (page 38) focuses on the reduction of forest canopy cover and tree density resulting from development and states that the impact to fisher from urban development is similar to that resulting from logging. Development impacts are described as occurring throughout the species' range. Noise, traffic, and human disturbance impacts are also noted to be associated with urban development.

The petition states that the human population is increasing in fisher range, for example noting the human population in the Sierra Nevada doubled from 1970 to 1990 and is predicted to more than triple between 1990 and 2040 (Duane 1996). A range-wide reduction in fisher habitat from forest land conversion to urban uses is described, citing the loss of 47,000 acres of forest land in north coastal California between 1984 and 1994 (MacLean 1990). Impacts related to low density residential development are alluded to and described as human invasions of fisher habitat.

The finding by Zielinski et al. (2005; Figure 17) that fisher distribution in the Sierra Nevada is correlated to human density patterns is noted by quoting the authors' finding that the currently unoccupied, historic fisher range in the northern Sierra Nevada, aligns well with the area of high human influence. The petition concludes by describing the threats to fisher from the increase in roads and development-associated infrastructure noting fisher have been found dead apparently struck by vehicles and drowned in stock tanks.

The Department finds the citations and conclusions in the petition to be generally correct. CDF estimates that between 2000 and 2040, 343,000 acres of undeveloped California conifer forests will be impacted by residential development (or 6 percent of the year 2000 undeveloped California conifer forests) along with an additional 17,000 acres (4 percent) of conifer woodland (CDF 2003). The human population growth rate in the Sierra Nevada is expected to continue to exceed the state average (California Department of Fish and Game 2007). Development pressure in the range of fisher is noted to be high in the foothill areas adjacent to metropolitan areas such as Redding, Sacramento, Stockton, Merced, Fresno, and Bakersfield (California Department of Fish and Game 2007). Increased residential development, particularly ranchette-type (low density) has been noted extending out from Redding into the Sierra Nevada and Cascades along major highway corridors (California Department of Fish and Game 2007).

Residential development is not evenly distributed through fisher habitat. Private property, and thus development pressure is concentrated in the oak woodland and low elevation (less than 3,000 feet) conifer zone on the western slope of the Sierra Nevada (California Department of Fish and Game 2007). Developments include year-round residences, vacation residences, resorts, golf courses, and commercial developments.

In the central Sierra Nevada, residential development adjacent to two national forests, the Tahoe and Stanislaus, has been identified as a future risk of wildfire and invasive

species; impacts to water quality; high use from recreational users; increased trash and traffic; and disruption of natural processes and disturbance to wildlife (Stein et al. 2007). Throughout California, there are projects and development activities within fisher range. Also, there has been an acceleration of conversions of oak woodlands to vineyards on lands zoned for agricultural. Duane (1996) identified at least five ways development is known to negatively impact wildlife (and potentially the fisher):

1. Reduced total habitat area through direct habitat conversion.
2. Reduced habitat patch size and increased habitat fragmentation.
3. Isolation of habitat patches by roads, structures, and fences.
4. Harassment of wildlife by domestic dogs and cats.
5. Biological pollution from genes of non-native plant species.

To this list the Department would add the following:

6. Increased disease exposure risk from domestic animals (Brown et al. 2008, Gabriel et al. 2008).
7. Direct mortality from vehicles (USDI 2004).
8. Disruption of normal behavior from human presence; disturbance during critical periods of the fisher's life cycle (e.g., the denning period for females with kits) would be most critical impact.
9. Blockage of, or interference with migration and dispersal (California Department of Fish and Game (2007)).
10. Increased frequency of wildfires and associated impacts (Syphard et al. 2007, Syphard et al. 2007a)

The potential effects of residential development on fisher extend beyond the physical footprint of the structures. Urban development should be considered a threat to the fisher. In their 12-month finding on the petition for federal-listing of the fisher, the USFWS found that development effects and associated habitat fragmentation resulting from roads has possibly had a role in the loss of fisher from the central and northern Sierra Nevada and in the species' failure to recolonize those areas (USDI 2004). Additionally, the effects of urban development (e.g. fragmentation, disease exposure, fire threat, habitat loss) could potentially compound the threats to the species related to low population size.

VI. Recreation

The petition acknowledges the disturbance potential of recreation activities occurring in fisher habitat but focuses primarily on the National Parks with emphasis on the southern Sierra. In the central Sierra Nevada, the Department has commented on proposed recreational projects on the Stanislaus, El Dorado, and Toiyabe National Forests. Recreational activities of greatest concern are motorized activities including snowmobiles in the winter, various ORVs, dirt bikes, ATVs during the remainder of the year, and noise from all of the above. Indirect impacts may be causing species to move

to suboptimal habitats where they are more vulnerable to predation or starvation, pollution/contamination of important habitats, and erosion and degradation to aquatic habitats. Recreational activities on private lands are considered minimal.

VII. Illegal Take and Incidental Capture

Fisher are relatively easy to trap and their pelts have historically been valuable (Rand 1944, Lewis and Zielinski 1996). By 1925, trapping had been identified as a threat to fisher populations in California (Dixon 1925). Licensed trappers reported taking 229 fisher in California between 1920 and 1924, and during that period the price of a fisher pelt was much higher than that of any other furbearer in the state (Grinnell et al. 1937). Dixon (1925) proposed a three year closed trapping season to benefit fisher, and Grinnell et al. (1937) suggested "much needed, prolonged closed season." In 1946, fisher trapping in California became illegal (Lewis and Zielinski 1996).

Fisher are known to be incidentally captured in traps set for other furbearers (Lewis and Zielinski 1996). Between 1946 and 1998, fisher captured in this fashion may regularly have been injured or killed when captured in body-gripping traps. In such cases, injury or mortality may have occurred from the trap itself, from botched releases, or from predation upon the trapped animal.

In 1998, body-gripping traps (including snares and leg-hold traps) were banned in California for commercial and recreational trappers (Fish and Game Code § 3003.1). Trappers in California are now effectively limited to the use of live-traps. Fisher captured in box traps are infrequently injured (DFG, unpublished data on file at the Redding office), and commercial trappers are required to visit all traps at least once a day. Therefore, most trapped fisher should now be released unharmed. Additionally, the sale of trapping licenses in California has declined from over 3,000 in the 1970s and 1980s to approximately 200 presently (**Figure 12**).

Licensed nuisance/pest control operators can use body-gripping traps (conibear and snare) in California. Where such operations occur in fisher range, incidental capture and take could occur. However, use of body-gripping traps is restricted throughout the range of the Sierra Nevada red fox (*Vulpes vulpes necator*), thus, any incidental capture or take would be limited to northwestern California, including the Mendocino National Forest area, outside of the range of the fox. The Department is not aware of the level of incidental fisher capture or take, if any, that may be occurring during any nuisance trapping activities in fisher range in California because reporting is not required. Although the Department has no data on the topic, it is possible that some illegal take of fisher through poaching may be occurring (Lewis and Zielinski 1996, Truex et al. 1998).

VIII. Predation

The Department agrees that predation is a normal part of interspecific interaction of

fisher with other predators and will be a source of mortality. As indicated in the petition, it would be instructive to assess whether predation rates on fisher are influenced by management activities that affect forest cover. The Department is unaware of any conclusive work that attributes predation on fisher to condition or structure of fisher habitat, or that predation as influenced by forest management, has a significant effect on fisher.

IX. Disease

The Department agrees with the petition that little is known regarding the past or potential effects of disease on fisher (e.g., IERC 2008). The Department believes the concern about moving fisher into an extirpated area and them coming into contact with extant animals would be manageable with the Department's wildlife veterinary expertise, and the concern is unwarranted. For example, one mechanism to reduce any potential disease risk to southern Sierra Nevada animals from a translocation north of the Merced River is to move southern Sierra Nevada animals to those northern areas.

X. Climate Change

The petition did not address the threat to fisher posed by climate change. Experts predict global climate change will have significant effects on species and habitats resulting in altered precipitation patterns leading to vegetation change. For the fisher, vegetation changes may lead to changes in type and availability of prey, availability of den and rest sites, canopy cover, and altered microclimates. California fisher populations may be faced with challenges stemming from a changing climate in the coming years. Climatic projections for the next 90-100 years suggest that annual mean temperature in California will increase and spring snow pack in the Sierra Nevada will decrease (Cayan et al. 2006).

Predictions of mean annual precipitation are unclear; collectively, the results of several models suggest relatively little change except that more precipitation may occur in winter as rain rather than snow, a trend that will increase with increasing winter temperatures (Cayan et al. 2006, Safford 2006). Yeh and Wensel (2000) found that for the mixed conifer forest of northern California, conifer tree growth declined with decreases in winter precipitation and increases in summer temperature.

Other threats to fisher may be exacerbated by climate change, e.g., wildfire may increase in size, intensity, duration, and frequency. Fried et al. (2006) predicted that subtle shifts in fire behavior, of the sort that might be induced by climate change anticipated for the next century, are of sufficient magnitude to generate an appreciable increase in the number of large wildfires.

In forest ecosystems, disturbance such as insect disease and drought are expected to rise, and forest productivity is projected to increase or decrease depending on species

and region (Cayan et al. 2006, Lenihan et al. 2006). Models suggest that the extent of mixed evergreen forest (e.g., ponderosa pine/black oak forest, Douglas-fir/tanoak forest, tanoak/madrone/oak forest) will increase, while evergreen conifer forest (e.g., mixed conifer forest, ponderosa pine forest) may decline (Lenihan et al. 2003, 2006). Increased fire frequencies may benefit hardwoods, as many California hardwoods resprout after fire and subsequently encounter reduced competition if neighboring conifers are killed during fire events.

Other threats that may be exacerbated by climate change are: invasive plant species may find advantages over native species in competition for soils, water, favorable growing locations, pollinators, etc. Changes in forest vegetation due to invasive plant species may impact wildlife by corresponding changes to their prey species, both in type and number. The timing and duration of modified patterns in recreational activities by humans may have an effect on fisher by disturbing den or rest sites. Exposure to new diseases or increased susceptibility to disease may result from being stressed by inhospitable temperatures, unavailability or exhaustive searches for mates, water, prey, dens, and rest sites.

The effects of these potential changes on wildlife including the fisher are unknown. The interplay of increased ambient temperatures with fisher physiology may render specific sites more or less suitable relative to current conditions (Safford 2006). Decreased snowpack may increase the suitability of certain areas, though adequate canopy cover and den sites would still be needed. Lack of deep snow in winter may allow fisher to occupy sites that would otherwise be inaccessible. Fisher may benefit from the increased abundance of hardwoods in montane forests as they often provide important denning and resting structures. However, if wildfire becomes more frequent or more severe, important habitat features such as canopy cover, density of large or decadent trees, and abundance of surface woody debris may decline (McKenzie et al. 2004, Safford 2006). Such changes may adversely affect fisher. However, at least in the short term, some of these changes may improve conditions for fisher prey which primarily utilize early-seral habitats (e.g., *Spermophilus beecheyi*, *Thomomys bottae*, *Sylvilagus* spp., *Lepus* spp.) (McKenzie et al. 2004).

Restoring or growing/recruiting fisher habitat may be affected by potentially reducing the volume growth and timber yield of species like ponderosa pine and Douglas fir. Timber companies may, in response to lower growth and yields increase harvest levels, shorten rotations, or reduce monetary investments in maintaining a healthy forest (Battle et al. 2006). Changing the species composition and tree density are also actions that would, from an economic perspective, hedge against sustaining losses due to climate change. It is possible that climate change could affect the recolonization of historic range by fisher.

Summary of Degree and Immediacy of Threats

Each of the identified threats could potentially affect the fisher either singly or in combination over time; or alternatively, it is possible they may not affect the fisher population. These factors are currently affecting the environment, yet there is not any demonstrable evidence that they are currently having an impact on the fisher population in California.

The Department considers historic trapping, poisoning of carnivores and prey, and unregulated timber harvest to have probably had the greatest impact on fisher in the past. The history and the fate of many other species in California similarly and clearly demonstrates that the direct activities toward a species (such as excessive hunting, fishing, trapping, and poisoning) dwarf the indirect effects of habitat modification (such as regulated logging) in terms of impact. Trapping of fisher and poisoning of prey are illegal, and therefore, not affecting fisher to such a degree that the petitioned action may be warranted. Indeed, timber harvest activities have been more carefully regulated on both public and private forestlands for at least 2-3 decades with increased regulation and significant progress in recognizing the importance of conserving late successional forest and the habitat attributes within them that are relied upon by wildlife. This change in management philosophy compared to the past decades reduces the threat of timber harvesting.

Consideration of future threats such as large wildfire, development, climate change, and disease can and are being addressed and can likely be ameliorated to the extent possible through management strategies, planning, and implementation of on-the-ground actions to reduce those threats. The threats are not unique to fisher, but would affect all wildlife and all habitats within an affected area. These strategies may include such things as large-scale fuel treatments to reduce fire risk, corridor planning, climate change adaptation and management strategy development, translocation of fisher to non-occupied historic range, and research and monitoring to better understand the relationship between fisher and their available habitats, and their response to management practices such as timber harvesting.

The petition describes Board of Forestry, FPRs in California and states that existing legal protections for old forest attributes and habitat features or elements desirable for the fisher on private land are inadequate to protect the fisher. The Department agrees that the rules do not require retention of certain habitat elements specifically for the fisher. However, this does not indicate *per se* that private timberlands will be managed such that they chronically reduce habitat suitability for fisher. Harvest history, market conditions, site productivity, company philosophy as well as other factors also influence how private timberlands are managed and their suitability for fishers. Additionally, protections for old forest components and potential fisher habitat on private lands are anticipated to be in a better state now, and in future decades than in decades past as a result of environmental regulation such as the FPRs and CEQA. However, more work can be done to improve implementation of FPRs and CEQA on timberlands.

Finally, although difficult to quantify because they are not mandated, the regulations do not adequately represent or allow “credit” for the level of voluntary efforts to conserve

late successional and/or habitat attributes that may go above-and-beyond what the rules require. Voluntary efforts may simply be individual landowner decision, or are those agreed to in partnerships and collaborations to achieve a mutually desired outcome outside of a regulatory process to achieve wildlife accommodations.

The petition infers that timber harvest and the decline in old forest habitats is a surrogate for fisher numbers and/or suitable range, and that as old forest is harvested, the fisher population has, or will also decline. This hypothesis might hold if the fisher was dependent on old growth stands entirely and did not use other habitat. However, it is increasingly being demonstrated that there are other forest habitats that are suitable for the fisher; and also that timberland management in California is giving greater consideration to protecting the remaining late successional habitats, important wildlife elements, and working toward increasing canopy cover in forest stands. The petition contention could also hold true if demonstrable impact of the reductions in old growth on the fisher population or on fisher distribution were available, but it is not.

Timber harvesting remains widespread within the range of the fisher population. On private timberlands owned by industrial landowners, even-aged timber management is common. While harvesting has the potential to reduce or even remove the suitability of fisher habitat for some amount of time at particular locations and scales, the consistency of fisher detections over time and documentation of reproduction on northern California timberlands suggests that suitable habitat features are present at levels that allow fisher to continue to use these lands. However, if the presence of habitat features needed by fisher is not maintained over time, those lands may become less suitable or even unsuitable for fisher.

Much remains unknown about fisher use of managed timberlands. Because systematic surveys have not been conducted across ownerships or over long periods of time, the overall distribution of fisher in northern California has not yet been fully determined. On private lands, the information available on harvest history and presence/absence of fisher should continue to be developed to gain a better understanding of the relationship. Timberland management practices and regulations have changed over the past two decades, and which practices will continue in the future is uncertain.

In the central and northern Sierra Nevada, significant logging activities have similarly occurred and the fisher population has not recolonized the region. Whether timber management practices over the decades has precluded the fisher from returning to portions of historic range is a hypothesis that has not been explicitly tested however.

The petition has not demonstrated an immediate or significant detection or occurrence of negative change in the amount of inhabited fisher range or apparent population in California since the Grinnell period of nearly 100 years ago. The information provided in the petition (such as Table 11 and Figure 4 on page 30) and conservation strategies being implemented by the U.S. Forest Service, and timber harvesting regulations of the Board of Forestry suggest modern management strategies have been working to reduce impacts on forests and particularly late successional systems and habitat

attributes such as snags and den trees. In addition, the Department believes existing FPRs and CEQA can protect essential habitat elements such as snags and den trees, where the laws are applied appropriately and consistently on timberlands.

In deductive form, a fundamental contention of the petition is:

1) Due to timber harvesting, there is a decline in late successional forest, and the attributes such as snags or large trees with cavities suitable for denning;
2) Fisher require these late successional forests that are being subjected to timber harvesting for resting/denning structures;
3) Therefore, fisher are declining or will decline.

The Department however, has reviewed the information available and concluded:

- Recent studies of fisher habitat use, occurrence, and movement patterns indicate fisher also use intensively managed forest habitats of lower tree age structure and canopy closure, but with snag/large tree attributes remaining for resting/denning;

- Fisher are no longer subject to the significant mortality factors of trapping and poisoning of prey that was common in past decades; there is no evidence of a recent, immediate, or significant change in population or distribution of the fisher;

- Forest management in California has become more late successional forest "friendly" in the past 2-3 decades and this change in management philosophy likely has been, and will be, beneficial to species such as the fisher in the future;

The Department believes the potential for large wildfire is a threat for the fisher in California, and especially in the Sierra Nevada. The Conservation Biology Institute has modeled fire risk in Sierra Nevada fisher habitat, and in the absence of fuel reduction projects, catastrophic wildfire may result in the extirpation of fisher from the southern Sierra Nevada with significant population reductions (>50 percent) possible over the next 50 years (Conservation Biology Institute, pers. comm., 2008). Consequently, the Department supports the U.S. Forest Service program to reduce fuel loads in the region. Also, as indicated in Figure 11, fisher have been subject to many large fires throughout most of their current range over the past several decades.

Regarding isolation of populations, whether the southern Sierra Nevada population of fisher is as low and at risk as suggested by the petition is unknown. Although the southern Sierra Nevada fisher has been described as at risk of extirpation, it has been persisting since at least the 1920's with no documented increase or decline in overall numbers. Finally, no matter what the status of the fisher population in California is, it would still be separated from the nearest other population of any size, in British Columbia, and would be occupying approximately 10-20 million acres of the state.

Regarding roads, more studies are needed in order to adequately understand the impact that roads and transportation corridors have on fisher. It is unknown whether they are avoided, are a barrier, serve as an attractive nuisance and source of carrion along the roadway, or are irrelevant to the fisher in its travels. A number of studies have reported road-killed fisher, but none have reported the number of fisher that have safely crossed roads (or number of times crossed), so it is impossible to determine whether it is significant to the population. Still, the Department is of the opinion that highway road mortality of this species, or any species, can be cause for concern and this mortality factor would justify working to remedy the situation where feasible. While the Department is unaware of any data to support the contention that roads in the Sierra Nevada have played a significant role in the loss of fisher, the Department does agree that roads could be a factor.

As it is for every species, urban development can be a threat and the fisher is no exception. Fortunately, the majority of fisher habitat is on public land that will remain as wildland. It is impossible to forecast or determine the impact of such potential development on the fisher given the lack of study on the topic. To date, the Department is unaware of any data that indicates urban development has significantly affected the fisher.

Impact of Existing Management Efforts

The perceived impact of existing management efforts on the fisher are discussed in the petition section titled “Inadequacy of Existing Regulatory Mechanisms.” This section evaluates the petition’s information on forest management on federal, private, and tribal lands. Additionally, Self (2008) submitted an analysis of these management efforts in response to the petition.

Sierra Pacific Industry Candidate Conservation Agreement with Assurances (CCAA)

The petition discusses the USFWS “Candidate Conservation Agreement with Assurances for Fisher” (CCAA) with Sierra Pacific Industries regarding possible translocation of fisher from the existing northern California population to the northern Sierra Nevada. This agreement is between SPI and the USFWS and was approved on May 15, 2008. CCAAs are intended to enhance the survival of a covered species into the future and would provide incidental take authorization from the USFWS if the fisher is listed under the federal Endangered Species Act during the 20-year permit period. The CCAA covers timber management activities on SPI’s Stirling Management Area, an approximately 160,000-acre tract of second-growth forest in the Sierra Nevada foothills of Butte, Tehama, and Plumas counties. This tract is in the northern portion of the gap in the fisher distribution, and it is apparently not currently occupied by fisher.

The CCAA identifies the Stirling Management Area as a potential location for receiving translocated fisher at some time in the future in the effort to re-establish fisher in the

northern Sierra Nevada. The Department is assessing the feasibility of translocating fisher to the Stirling Management Area. Any decision to translocate fisher would involve approval of an implementation plan and any required compliance with CEQA.

Concern expressed that the CCAA would involve translocation to less than optimal habitat was countered by the recent information demonstrating fisher use of habitat that is not old growth. The information received from several private timber companies indicated substantial fisher use of intensively managed forests. Stand characteristics in terms of tree age and canopy closure being inhabited were typically lower than those reported in the literature from researchers working largely on public lands and lower than that reported in the petition. The U.S. Forest Service in its Conservation Assessment has similarly indicated that contrary to the long-held perception that fisher specifically inhabit late successional, fisher are using forest systems that are not considered old growth. Still, these studies on private timberlands do indicate that old elements that were retained in these stands, such as large, old oak trees, are important attributes of the habitat for the fisher whether for resting or denning.

The CCAA obligates SPI to maintain a minimum of 20% of the tract in a condition known as “Lifeform 4” and to increase the amount of Lifeform 4 to 33% of the tract over the permit period. Lifeform 4 stands have trees with a quadratic mean diameter of at least 13 inches, at least 60% canopy closure, and at least 9 trees per acre (on average) at least 22 inches diameter at breast height (dbh). Where even-aged management is practiced, the retention standard is at least 20 trees 22 inches dbh or greater per acre (on average). Lifeform 4 stands must also have at least one potential fisher den tree (conifer at least 30 inches dbh or hardwood at least 22 inches dbh).

The Department believes stands meeting the Lifeform 4 criteria could be suitable fisher habitat, although whether a landscape containing 20- 33% of such habitat will sustain a reintroduced fisher population would be part of the translocation experiment and would depend on the spatial arrangement of the retained trees and the Lifeform 4 stands, as well as whether the retained trees are mostly hardwoods. Although modeled by Davis et al. (2007) as an area of apparent low habitat suitability for fisher based on their input variables, some of the recent information on fisher inhabiting industrial timberlands indicates that less than optimally-predicted habitats are inhabited by fisher—indicating the models do not represent the entire breadth of suitable habitat characteristics.

The SPI CCAA was mentioned in three comment letters regarding this petition (Self 2008a, Tomascheski 2008, Carr 2008). Self (2008a) summarizes the CCAA from SPI’s perspective including identification of what they consider inaccuracies in the petition regarding the CCAA development process and intent. Carr (2008) mentions the CCAA and its provision to increase denning habitat from 22-33% of the Stirling Management Area.

The Department is supportive of the CCAA and does not consider translocation a threat to the species as suggested by the petition. Translocation would help ensure managers of the two populations in California are provided every opportunity to address future

potential risk of significant loss of population by working to eliminate the "isolation" of either currently existing population. Fisher have been among the most frequently translocated animals in North America (Drew et al. 2003). The Department's Wildlife Investigations Laboratory (WIL) has over the decades led many successes at translocating species that were less numerous than the fisher (Sierra Nevada bighorn sheep, desert sheep, tule elk) to re-establish populations in former range; recent efforts with the gray wolf in the Yellowstone ecosystem indicate how successful such efforts can be with carnivores. The WIL is comprised of wildlife capture techniques specialists, wildlife veterinarians, and biostatisticians trained in animal capture, handling, translocation, and study design. Rather than waiting for the fisher, which isn't known to be a very good disperser, to hopefully recolonize their former ranges, management agencies should facilitate it to ensure the populations in California have their best chance at sustaining themselves in the future. Zielinski et al. (1995), Jordan (2007), and Drew et al. (2003) among others, advocate that translocation of fisher may be one of the most effective management tools at our disposal in California. Fisher have been a frequently translocated species in North America.

Private Lands

The petition discusses regulatory actions on private lands (pages 61-66). The Department estimates that approximately 38 percent of current fisher range in California encompasses private or State lands regulated under the California Environmental Quality Act (CEQA), the Z'berg-Nejedly Forest Practice Act (FPA), and associated regulations. As indicated in the petition, the California Forest Practice Rules (Title 14, California Code of Regulations [14 CCR] Chapters 4, 4.5, and 10, hereafter generally referred to as the FPRs) are the primary set of regulations for timber management projects on private and State lands in California. The petition describes the FPRs sections considered most relevant to fisher management and concludes the FPRs "do not regulate logging on private lands in a manner that is adequate to maintain fisher habitat or populations on private lands in California." In particular, the petition states the FPRs do not offer specific protections for fisher or their habitat, do not provide a mechanism for identifying significant impacts (including cumulative impacts) to fisher, and provide for and encourage extensive and intensive harvest of forests using methods that remove or degrade fisher habitat suitability. The petition also states protections within the FPRs for other listed species are not adequate to protect the fisher. The petition covers these general areas in discussing the FPRs:

- Regulations and their protection of fisher habitat (p. 61-63)
- Exemptions to the Timber Harvest Plan (THP) process (p. 63-64)
- Mitigation and assessment of impacts to fisher habitat (p. 64-65)
- Retention of snags (p. 65)
- Protections in place for other species that would accommodate and protect fisher habitat (p. 65)
- Conservation plans (p. 66)

The Department reviews each of these general areas:

- Regulations and their protection of fisher habitat (p. 61-63)

The petition indicates the fisher is not a “sensitive species” as defined under FPR 895.1. Sensitive species can be designated by the Board of Forestry and Fire Protection (Board) under a process described in 14 CCR 919.12, 939.12, and 959,12. It is possible that, were the fisher a sensitive species, protection measures could be crafted to minimize impacts of timber harvesting to fishers and their habitat. The petition correctly indicates the Board’s consideration of feasible mitigation measures for a sensitive species might, but would not necessarily, result in adequate protection for the fisher.

The petition states the FPRs do not offer specific protection of fisher den sites, except potentially under 1038(i) relative to old and large trees. This is correct, although some aspects of the FPR may contribute to fisher den tree retention. The petition does not address the provision in the FPRs for Watercourse and Lake Protection Zones (WLPZ). WPLZ are zones of selection harvest along streams intended to protect instream habitat quality for fish and may encompass 50 and 150 feet on each side of a watercourse (100 to 300 feet total width). Thus, WLPZ may encompass approximately 15% of the landscape (Department of Fish and Game, unpubl. data). Drier regions of the state with lower stream densities would be expected to have a much lower proportion of the landscape in WLPZ. Where they occur, and where they are managed to allow large trees with cavities and other den structures to develop, WLPZ may eventually provide fishers a network of older forest structure within the managed forest landscape. These lands are still recovering from previous practices in which no provision for streamside buffers was made. Some existing den trees may incidentally be retained in WLPZ along streams containing listed salmonids, where the 10 largest conifer trees per 330 feet of channel length must be retained. Outside of watersheds with listed salmonids, the FPRs require retention of two conifers per acre greater than 16 inch dbh and 50 feet in height in Class I and Class II WLPZs. Maintenance of FPR-specified canopy closure for WLPZ on other streams may also result in the incidental retention of some den trees. The FPRs do not require these trees to be permanently retained. Den trees may also be retained to help achieve post-harvest stocking standards after some harvests under the “decadent or deformed trees of value to wildlife” provision of FPR 912.7, 932.7, and 952.7. While some provisions of the FPRs address fisher den and cover trees and habitat elements, the effects of these laws on fisher population is unknown.

The petition states the FPRs allow for “degradation and destruction” of critical features of fisher habitat because the focus is on logging for “maximum sustained production.” Timber management can affect fisher both directly and indirectly through habitat modification. Timber harvests can alter habitat and make it unsuitable or less suitable for fisher, either by reducing the area of dense canopy forest within a fisher home range or by removing the critical habitat elements (trees with cavities or other den sites) supporting fisher use. Timber management can also affect fisher by establishing and

increasing road density (see section on roads). In general, the petition is correct to suggest the FPRs allow for the management of private and State forests in a condition of relatively young-aged stands isolated by openings created by regeneration harvests and with low densities of trees and snags suitable for denning fisher.

The petition addresses the silvicultural methods available under the FPRs and asserts most of these methods will negatively affect fisher habitat suitability. After harvest using an evenaged regeneration method such as clearcutting, a forest stand will not develop sufficiently dense canopy cover for fishers to travel and forage in for a period of a few to several decades, depending on the forest type. Evenaged regeneration methods also can be expected to remove habitat elements essential for denning and further reducing habitat suitability. The intermediate treatment of commercial thinning is considered a step leading toward evenaged harvest and could, over time, result in the same habitat suitability decreases.

The petition discusses the role of the FPRs (14 CCR 919.16, 939.16, and 959.16) in conserving late succession forest stands. Late succession forest stands are defined in the FPR (14 CCR 895) as moderate to dense canopy stands with a quadratic mean diameter at breast height of 24 inches or greater, at least 20 acres in area, and with large decadent trees, snags, and large down logs. Such attributes provide for the life requisites of fishers at the stand scale. The petition states this rule section does not provide appreciable protection for older forest stands and the Department concludes this can be true for two reasons. First, the limitation of the rule section to late succession stands 20 acres or greater in area precludes the obligation to assess and disclose the presence of late seral stands less than 20 acres in area. These smaller stands can provide some habitat value for fishers. Second, this rule section does not require any specific mitigation be applied to late succession stands where they do encompass 20 or more acres, and thus degradation to these stands may result.

Comments received (Self et al. 2008, Carr 2008) mentioned the role of sustained yield plans and Option A plans (under 14 CCR 1091.1 et seq., 14 CCR 913.11, 933.11, 959.11) in protecting fisher habitat. These plans are required for ownerships encompassing at least 50,000 acres and are intended to demonstrate over a 100-year planning period that timber growth at least matches harvest. Consideration of other resource values, including wildlife, is also given in these plans, which are publicly reviewed and approved by CDF. In the Department's opinion, these plans may not be sufficient to ensure the habitat needs of species like the fisher, which relies on the largest hardwoods and conifers not typically modeled in growth and yield projections; plans should work to model and include old forest attributes that are of importance to fisher life history. To the extent the Department believes that these plans are not sufficient to ensure habitat needs of species like fisher, the Department can identify the impacts as significant under CEQA, and recommend avoidance or other measures to mitigate significant impacts to below a level of significance. The Department's view is that, the FPRs and CEQA can provide necessary protection for fisher if the laws are applied appropriately and consistently. The Department is working with CDF to ensure that existing laws are appropriately and consistently implemented and enforced for the

benefit of the fisher.

In petition comment letters submitted by representatives of several northern California industrial timberland owners and managers and on behalf of the California Forestry Association (Self et al. 2008, Ewald 2008, Carr 2008), several voluntary management policies are mentioned that may contribute to conservation of fishers and their habitat. One or more of the companies represented in these comments have policies for retention of snags, green trees (including trees with structures of value to wildlife), hardwoods, and coarse wood debris. The variety and complexity of approaches taken by the companies, and the lack of specific information provided for some of the policies, precludes an adequate analysis of their efficacy during the petition evaluation period.

The Department acknowledges that many of these policies do result in better conservation of fisher habitat elements than are specifically required by the FPRs. However, whether such policies will ensure long-term persistence of fishers on these lands is unknown. Because these policies are, in most cases, voluntary (even those tied to third-party forest stewardship certification), there is no assurance the policies will be implemented consistently in the future. Non-industrial landowners, who comprise a significant proportion of the fisher's geographic range in California generally do not have comprehensive policies for wildlife habitat, so the minimal protections specifically required by the FPRs would apply to most of these timberlands. Therefore, as mentioned above, efforts to improve the implementation and enforcement of the FPRs and CEQA are important in avoiding and/or mitigating significant impacts to fisher.

Self (2008b) discussed several of the FPR sections and their contribution to protection of fishers and fisher habitat. Based on the Department's experience, the FPR sections dealing with mitigation measures, exemptions and large old trees, and late succession forest stands do not provide adequate assurance that fisher or their habitat will be conserved in the timber harvest review process. Self (2008b) suggested the FPR intent language under 14 CCR 897(b)(1)(B) provides an over-arching protection mechanism for all wildlife, including fisher. This rule section states forest management shall "maintain functional wildlife habitat in sufficient condition for continued use by the existing wildlife community within the planning watershed." Meeting this intent would provide for the viability of fishers although the FPRs do not provide specific direction on how to manage timberlands for fishers.

- Exemptions to the Timber Harvest Plan (THP) process (p. 63-64)

As previously stated (in the section on timber harvest as a threat), the CDF advised the Department that large acreage ownerships may want to take out trees damaged and are not exempt from the FPRs, but may be exempt from a THP. Hence large acreage would mean they could take out damaged trees on their overall property. The limit on removal under exemption is 10 percent per acre of volume. CDF indicated large landowners typically get an exemption for their entire property annually for convenience, and it does not mean they will be harvesting all the dead wood out of that acreage.

CDF recommended that the volume harvested, rather than acres under exemption, was a more appropriate figure to assess exemption harvest. Trees typically harvested under an exemption are dead, dying or diseased trees or hardwoods used for fuelwood. Additionally, extensive areas of wildfire burned area may be harvested under exemption and can be misleading in evaluating the effects upon wildlife such as the fisher. An example suggested by the CDF was the 64,000 acre Fountain Fire in northern California in 1992. It is difficult to suggest that such large burned landscapes are, or would be, fisher habitat for many decades.

Sanitation-salvage harvests target dead, diseased, and dying trees that are often the trees most likely to have suitable fisher den structures. As discussed in the petition, this could result in the removal of key habitat elements for the fisher. Sanitation-salvage as used in some exemption harvests under FPR 1038 is exempted from review by the interagency review team. As described in the petition, these harvests may be extensive and naturally target diseased/dead trees, some with a likelihood of providing suitable den sites for fishers. Harvest operations must still comply with all aspects of the FPRs and with CEQA. There are restrictions as to the circumstances and volume of trees that can be harvested under an exemption.

- Mitigation and assessment of Impacts to fisher habitat (p. 64-65)

The petition discusses the role of the FPRs (14 CCR 919.4, 939.4, and 959.4) in the development of mitigation measures for significant impacts to non-listed species. It also discusses the cumulative impacts assessment process in the FPRs. The Department believes the petition's discussion of mitigation measures for non-listed species to be correct. However, in the Department's experience, neither of these processes has resulted in the development and consistent application of specific mitigation measures for significant impacts to fisher, including impacts to the species' habitat. Technical Rule Addendum No. 2 is relevant to cumulative impacts. In the biological resources section, harvest plans must address factors such as snags, den trees, rest trees, downed large woody debris, multi-story canopy, road density, hardwood cover, late seral forest characteristics, late seral habitat continuity, and any other special habitat elements. Although this list is comprehensive and would result in disclosure of potential cumulative impacts to the fisher, the Department believes that most harvesting plans conclude that no significant cumulative impacts will occur because of mitigation and recommendation measures to reduce the impacts to less than significant. The Department believes that without additional regulations, policy, or guidance, Technical Rule Addendum No. 2 does not currently provide adequate protection for fisher habitat.

- Retention of snags (p. 65)

Snags (standing dead trees) are commonly used by fisher for denning and resting (for example, see Zielinski et al. 2004 and Reno et al. 2008). The petition correctly summarizes the FPRs (14 CCR 919.1, 939.1, 959.1) related to snag retention.

Although the FPRs requires “all snags shall be retained to provide wildlife habitat” within harvest areas, the FPRs also require any snag posing a safety, fire, insect, or disease outbreak hazard be felled, and also allow the felling of merchantable snags. Because certain tree species (such as coast redwood or western red cedar) with the longest period of merchantability after death also provide the longest-lasting habitat value, this provision effectively limits the number of snags that may be available for use by fisher. Regardless of the merchantability standard, the FPRs only require retention of existing snags when present – the recruitment of future snags to replace existing snags as they deteriorate and are lost is not a process for which THPs plan. However, as mentioned before, the Department believes that if CEQA were appropriately and consistently implemented in conjunction with the FPRs and review of THPs, significant and potentially significant impacts to fisher could be avoided and/or mitigated to a level of less than significant. This could help to ensure the retention of adequate supplies of snags for fisher.

- Protections in place for other species that would accommodate late successional habitat (p. 65)

The petition discusses the protections in place for the northern spotted owl and marbled murrelet and that there is no guarantee that protecting late successional owl habitat will result in substantial protection for the fisher. Although marbled murrelet nest stands are not available for harvest and should function as suitable fisher habitat, the total area of such stands on private lands is only a few thousand acres statewide. Protections in the FPRs for the northern spotted owl only apply to lands within the range of that subspecies, which includes the north coast, and the Klamath and southern Cascade mountains. If, northern spotted owls move their nest site or center of activity, the previously-occupied stand may become available for harvest. In such cases, the indirect protection of fisher habitat derived from that owl stand could be diminished or eliminated, and may be moved to a different area of protection.

The California spotted owl (*Strix occidentalis occidentalis*) in the Sierra Nevada is not listed as threatened or endangered and the Department is unaware of a habitat retention requirement for this species in the FPRs. Within the range of the northern spotted owl, the habitat retention requirements of the FPRs alone, as summarized by the petition, may not be sufficient to meet fisher life history requirements because fisher have a much larger home range, although the general practice of retaining a core patch of nesting and roosting habitat around northern spotted owl nest sites would contribute to the amount of habitat available to fishers in the area. Overall, the Department believes the FPR provisions for marbled murrelet and spotted owl can provide specific areas of protection, but alone, will not provide significant acreage protection specifically for fisher throughout its geographic range in the state.

- Conservation plans (p. 66)

The petition discusses two habitat conservation plans (HCP) developed by industrial

timberland owners on the north coast: Pacific Lumber Company (PL), which has a multispecies HCP and Green Diamond Resource Company (GD), which, as Simpson Timber Company, developed a northern spotted owl HCP. GD also recently completed an Aquatic HCP for anadromous salmonids and amphibians. The petition states that neither of these plans have specific protections for the fisher.

The PL HCP was designed to provide adequate habitat to ensure the fisher persists on PL lands. The HCP covers about 200,000 acres of mostly second-growth forest in Humboldt County, defines management of timber harvesting activities on a landscape scale, and provides protection for the northern spotted owl, marbled murrelet, listed salmonids, and a variety of non-listed species, including fisher. The HCP includes either or both habitat-based standards and performance-based standards for each of the covered species. For the fisher, the HCP points to the requirement to maintain at least 10% of several planning compartments on PL lands in a late seral condition and other HCP measures as sufficient to meet the landscape canopy cover needs of the fisher. HCP measures, including habitat standards for the northern spotted owl and marbled murrelet, and especially requirements to retain snags and trees of value to wildlife, are intended to contribute to fisher habitat quality. In addition to snags, snag replacement trees, and large hardwoods, the HCP specified the retention of up to four "live cull" trees per acre where they exist in timber harvesting plans. Issues regarding interpretation of the of the live cull tree retention requirement has affected implementation of this measure. However, efforts are underway to address the concern.

The Department believes the GD NSO HCP and Aquatic HCP alone are not sufficient to ensure the persistence of the fisher on GD lands. The GD HCPs cover mostly second and third-growth forest on about 440,000 acres in Humboldt and Del Norte counties. As described in the petition, the GD NSO HCP includes provisions for about 13,000 acres of NSO set-aside areas intended to protect existing NSO sites and to promote the development of NSO habitat. The recently-approved Aquatic HCP provides for increased streamside buffer areas on GD lands, along with provisions for retention of some hardwood trees along intermittent streams. These HCP measures contribute to fisher conservation, although long-term stability in the future is unknown and will be dependent on both GD lands and lands owned and administered by others where the fisher range. GD has also developed a policy (the Terrestrial Dead Wood Management Plan) to retain many of the trees of highest wildlife habitat value, which, though not an enforceable requirement during timber harvest planning, will contribute to fisher conservation. Comment letters (Ewald 2008, Self 2008b, Carr 2008,) were received that briefly describe the Green Diamond HCPs and Terrestrial Dead Wood Management Plan. The Department agrees the HCPs and the voluntary policies of Green Diamond contribute to habitat retention for the fisher, but no analysis has been conducted to ensure these measures are adequate for the long-term persistence of fishers.

Although not mentioned in the petition, Mendocino Redwood Company is developing an HCP/NCCP for its approximately 230,000 acres in Mendocino and Sonoma counties. Because this is a plan in development, its performance relative to fisher is unknown. Fisher have not been detected during recent mesocarnivore survey efforts in the coastal

redwood/Douglas-fir forests in proximity to the proposed plan area. In drafting the plan, MRC has chosen not to seek coverage for the fisher. Rather, the intent is to develop a plan that includes conservation measures devised for other purposes that should enable plan amendment to provide fisher coverage with minimal alteration. In addition to moving towards primarily unevenaged silviculture across the plan area, the plan includes conservation measures that should benefit fishers such as substantial aquatic management zones (i.e., enhanced WLPZ buffers) inclusive of high degrees of canopy closure and largest tree retention, retention of un-entered old growth stands and minimal harvest in lightly-entered old-growth stands, minimum standards for downed logs, maintenance and recruitment of wildlife trees (including all old-growth trees) and snags across the managed landscape, minimum standards for hardwoods, retention of productive spotted owl activity centers and increasing the area of nest-roost habitat over the plan period, and highly restricted silviculture in lower Alder Creek (an area occupied by marbled murrelets).

The petition describes the FPRs sections most relevant to fisher management and concludes the FPRs "do not regulate logging on private lands in a manner that is adequate to maintain fisher habitat or populations on private lands in California." In particular, the petition states the FPRs do not offer specific protections for fishers or their habitat, do not provide a mechanism for identifying significant impacts (including cumulative impacts) to fishers, and provide for and encourage extensive and intensive harvest of forests using methods that remove or degrade fisher habitat suitability. The petition also states protections within the FPRs for other listed species, such as the northern spotted owl (*Strix occidentalis caurina*), marbled murrelet (*Brachyramphus marmoratus*), and anadromous salmonids (*Oncorhynchus* spp.) are not adequate to protect the fisher.

The Department considers the petition's conclusions about the FPRs lack of protections specifically for the fisher to be correct and agrees that current silvicultural practices can reduce fisher habitat suitability. However, information submitted during our review of the petition indicates fisher do use industrial timber lands to meet all or some of their life requisites. The degree to which current FPRs and timber management of the landscape affects fisher habitat suitability and the fisher population remains unknown in the absence of both fisher population monitoring and sufficient compliance monitoring of the FPRs. Lack of retention of late successional stands could reduce local habitat suitability and the cumulative effect could reduce suitability over large areas; however, lacking sufficient monitoring, there is no evidence in the petition or information assessed for this evaluation that current practices have reduced, or will imminently reduce, long-term population viability.

Lastly, as it relates to management of private timberlands, implementation of the regulations does not mean *per se* that private timberlands will be managed such that they chronically reduce habitat suitability for fishers. Harvest history, market conditions, site productivity, company philosophy as well as other factors, including appropriate and consistent application of CEQA, also influence how private timberlands are managed and their suitability for fishers. Additionally, protections for old forest components and

potential fisher habitat on private lands are in a better state than in decades past as a result of environmental regulation.

CEQA

The petition described the role of CEQA in ensuring the environmental impacts of proposed projects are assessed and disclosed. As noted previously, most commercial timber harvesting on State and private lands with fisher habitat are subject to CEQA under CDF's certified regulatory program, which involves environmental review through CDF's functional-equivalent timber harvest review process. In addition, some projects not involving the commercial harvest of timber, such as highway projects, housing developments, and recreational developments could impact fisher habitat and would be assessed under CEQA. The petition's statements regarding the overall conclusion that impacts to fisher have been allowed under CEQA is true. However, CEQA can be implemented appropriately and consistently to avoid and/or mitigate significant impacts to fisher before such species reach the "brink of extinction." as stated in the petition. As such, contrary to the petition's statement, lead agencies under CEQA, including CDF, could require avoidance, compensatory or other mitigation under CEQA for significant project-related impacts on fisher, including but not limited to measures imposed based on findings related to CEQA Guidelines sections 15380 and 15065.

Treatment of cumulative impacts and alternative analysis are two areas that could be improved in the implementation and enforcement of the FPRs and CEQA, including the preparation of Timber Harvest Plans (THP's). Cumulative impacts are impacts that when considered individually may not be significant but when considered with many other similar projects with similar impacts, the resulting incremental or cumulative impact may be, or may become, significant. The Department has requested CDF to consider the potential for significant impacts associated with the incremental loss of late-seral forest habitat, snags, logs, and canopy during its review of individual THPs. Alternative analysis requires a description of a range of reasonable alternatives to the project, or to the location of the project that could feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project. The Department's experience has been that alternative analyses in THPs do not meet this guideline on a regular basis. Feasible alternatives in an area with fisher or fisher habitat could include retaining more hardwoods, snags, large trees and downed logs, or to modifying the time of entry to avoid denning season. These alternatives would benefit fisher and be supported by the Department.

The petition's conclusion that impacts to fisher have been allowed under CEQA is true. However, mitigation measures for the protection of declining species and their habitat can be developed and required by CDF under CEQA before such species reach the "brink of extinction" as stated in the petition.

U.S. Forest Service Regulations

The petition describes how the fisher was designated as a Management Indicator Species (MIS) on the Inyo, Lassen, Sierra, Stanislaus, and Tahoe national forests until the December 2007 adoption of a Final Environmental Impact Statement (FEIS) and Record of Decision (ROD) eliminating the fisher as an MIS on these national forests. The petition quotes the FEIS stating the fisher was dropped from the list of MIS because of the species "limited distribution in the Sierra Nevada" and the unlikely ability of population trend information to "provide useful information to inform forest service management at the Sierra Nevada scale." The petition states the removal of the fisher from the MIS would "eliminate any legal requirement for the U.S. Forest Service to conduct ongoing monitoring of fisher habitat and populations as part of forest plan implementation".

However, the Department understands the fisher is a U.S. Forest Service sensitive species, and as such must receive special management emphasis to ensure their viability and to preclude trends toward endangerment that would result in Federal listing. While there may not be a legal requirement for conducting intensive monitoring of fisher, continued trend monitoring is needed to inform forest managers in meeting the "special management emphasis" threshold. The current candidate status of the fisher by the US Fish and Wildlife Service adds incentive for the U.S. Forest Service to continue monitoring for fisher at its current level.

Habitat Management Areas

According to the U.S. Forest Service, these management areas for fisher are no longer used, especially as a stand-alone analysis during project review, or when managing for long term fisher habitat conservation.

Sierra Nevada Forest Plan Amendment (SNFPA)

The petition discusses the SNFPA in relation to perceptions of weakening of protections for fisher habitat. The Department is of the understanding that modifications are proposed that are intended to reduce long-term fuel issues and wildfire risk. Whether these prescriptions have a negative impact on the fisher is a significant component of the Sierra Nevada Adaptive Management Project (SNAMP).

The petition suggests the Sierra Nevada population is imperiled by the U.S. Forest Service Kings River Project (a part of the SNAMP). The Department does not consider the project a risk, and is supportive of the U.S. Forest Service project because of the over-riding importance of working to reduce long-term fire risk and fuel-loads in these forest systems.

Giant Sequoia National Monument Management Plan (SNMMP)

The petitioners assert the importance of the 327,769 acre Giant Sequoia National Monument to the southern Sierra fisher population noting that 24% of the positive fisher detections in Sierra-wide surveys (Zielinski et al. 1997), conducted from 1989-1994, came from the Monument area. They then summarize the land altering management activities and pre-monument designation timber sale contracts that would be allowed within the Monument under the 2004 Giant Sequoia National Monument Management Plan. Finally, the petitioners describe the court decisions which have ruled the 2004 Management Plan invalid.

The petition description is generally accurate. The key point to note is that the 2004 Management Plan has been invalidated and in June 2007, U.S. Forest Service initiated the planning process for a new Management Plan. The new management direction that will be proposed for the Monument is unknown, but in invalidating the 2004 plan, the Ninth Circuit Court of Appeals found that the U.S. Forest Service overemphasized timber harvest (Lockyer v. USFS et al.). Additionally, the new plan is subject to all Sequoia National Forest planning policies (including the Sierra Nevada Forest Plan Amendment) with the addition of an overriding purpose of protecting the scientific and historic objects identified in the Monument's enacting Proclamation. President Clinton's April 15, 2000 Proclamation specifically noted the fisher as an important scientific object in the Monument. Until the new plan is finalized, the Department cannot determine the benefits to the southern Sierra fisher population.

Northwest Forest Plan (NWFP)

The Department has reviewed the information in this section of the petition and finds it generally complete. The Department notes that the fisher is not a monitored species under the NWFP, and therefore, in contrast to the southern Sierra fisher population, there is no comprehensive monitoring program in place for fisher populations in northern California.

The Department understands that thinning in stands less than 80 years old in Late – Successional Reserves (LSRs) must be beneficial to the creation and maintenance of late-successional conditions, and such a prescription has the potential to provide some resting or denning habitat for fisher in the future. Zielinski et al. (2006) reported that the LSR system does not appear to provide the highest conservation value on the national forests in northwestern California for spotted owls or fisher. With particular regard for the fisher, the authors state the LSRs, "with their emphasis on geographic distribution may lack the connectivity necessary" for wide-ranging and non-flying mammals like the fisher. The authors note the LSR system was developed without the benefit of habitat suitability models for either species and with only an evaluation by species experts on the effects of the LSR proposal on species other than the spotted owl. Fisher were considered to be among the mammals with the lowest likelihood of remaining well distributed throughout the system (Zielinski et al. 2006).

Bureau of Land Management (BLM)

The petition concludes that fisher in Oregon may be affected by BLM actions, and that it will impact fisher in California. The Department believes this conclusion to be speculative. BLM lands are subject to the Northwest Forest Plan (NWFP) provisions and the fisher is a candidate species, although consultation with the USFWS is not required on projects that may affect fisher habitat. BLM will be conducting surveys for fisher in the Lack's Creek Late Successional Reserve and in the King's Range in 2008 (BLM has reported one observation of fisher to the Department). These surveys are voluntary and not required under the NWFP. BLM conducted fisher surveys in the Headwaters Forest in 1999, which was acquired specifically for high quality late successional forest habitat, but no fisher detections were made. There are no plans for additional surveys in Headwaters at this time.

National Park Lands

The Department has no comment on the petition's brief statements regarding the national parks. Based on current information, the Department is uncertain about the quality of habitat and status of fisher in Yosemite and Sequoia-Kings Canyon national parks. The national parks (Lassen Volcanic, Yosemite, and Sequoia-Kings Canyon) are areas where both trapping and logging have been prohibited for many decades.

State Lands

The petition cites recreation on state parks as a potential threat to the fisher. Recreation was previously addressed in this review.

Tribal Lands

The Department has no comment on the petitions description of tribal lands except to indicate support for ongoing research on the Hoopa Reservation on the fisher.

Summary of Impact of Existing Management Efforts

The Department considers the petition sections related to existing management efforts to be thoughtful and detailed. The efforts described at their worst, could have significant impacts on fisher habitat in California and directly/indirectly, on the fisher population. At their best, in terms of contribution to fisher conservation, they could provide beneficial habitat conditions for fisher and their populations over the long-term.

The Department concludes there is inadequate information, or cause-and-effect

relationship, to link the effects of the existing management actions to the fisher population, its abundance, its trend, range, or its distribution at the present time. There is insufficient evidence that the identified existing management efforts are having a negative, or a positive, impact on the fisher population in California.

Suggestions for Future Management

The petition listed 9 suggestions for future management of fisher (page 71). Several of the recommendations would require collaborative action on the part of various governmental agencies and other entities such as the Board of Forestry, CDF, U.S. Forest Service, USFWS, private timberland owners/companies, and/or university researchers. The Department believes that collaboration in conserving, protecting, restoring, and enhancing wildlife species and their habitats is desirable. The Department is implementing some actions now, and will be developing and proposing and/or implementing actions in the near future in the effort to further enhance the status of fisher in California.

CONCLUSION

Based on the Department's review of the petition and other available information, the Department concludes that there is insufficient information to indicate that the petitioned action may be warranted. The petition relies on the use of habitat as a surrogate and the perceived near dependence of fisher on late successional habitat; and seemingly infers that den/rest sites are limiting the fisher population. The petition lacks adequate knowledge of species abundance or population trend. The Department finds no immediacy as the fisher inhabits essentially the same range it inhabited approximately 80+ years ago. Potential threats identified are not substantiated as to their importance or effect on the fisher; they are generally threats faced by most wildlife species and may or may not become a reality. The Department found that additional information submitted in response to the petition offered new and previously unconfirmed information on fisher occupancy and use of industrial timberland habitats that are not late successional habitats indicating the fisher may have a broader tolerance and adaptability for forest habitats than previously thought. The evidence does not demonstrate that fisher are being subjected to a threat of sufficient degree or immediacy from timber harvest practices or any other factor or combination of factors and, thus, may warrant the protection of CESA. The Department recommends to the Commission that, pursuant to FGC section 2073.5(a), the Commission reject the petition.

Availability and Sources of Information

Appendix A: Fisher distribution maps that were contained in supporting documents written by the US Fish and Wildlife Service for the Sierra Pacific Industries Candidate Conservation Agreement with Assurances.

Appendix B: Habitat characteristics of fisher den/rest sites.

Appendix C: List of documents received by the Department in response to the petition.

The petition included the following elements:

1) Literature cited and a CD containing some of the publications cited.

2) Historical and current distribution maps (Figures 1 and 2); map of historical and contemporary old-growth forest cover in the Sierra Nevada (Figure 3); a number of tables and figures related to timber harvest; a table of loss of forest land to roads, agriculture, and urban development on private lands in the range of the fisher; a figure on housing densities; number of visitors to national parks; and a table on status of fisher habitat management areas in Sierra Nevada National Forests.

In evaluating the petition, the Department used information from knowledgeable Department staff, published and unpublished information, and communication with researchers, biologists, and managers. Additionally, numerous submissions of information were sent to the Department to use in reviewing the petition.

The petition and supporting information used for this report are available through the following address and telephone contact: Department of Fish and Game, Wildlife Branch, Subject: Fisher Petition, 1812 Ninth Street, Sacramento, CA., 95811.

Detailed Distribution Map

The petition included a historic and current range map (Figure 1 in the petition). It also contained a map depicting the distribution of historical records and contemporary locations for fisher in the Sierra Nevada (Figure 2 in the petition). The petition cited a number of publications important to describing fisher distribution, e.g., Aubry and Lewis 2003, Beyer and Golightly 1996, Campbell et al. 2004, Drew et al. 2003, Grinnell et al. 1937, Truex et al. 1998, Weinberg and Paul 2000 (incorrectly cited in the petition as 2007), Wisely et al. 2004, Zielinksi et al. 1997a, Zielinski et al. 2000, Zielinski et al. 2005a and others).

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Dr. Carlos Carroll, Klamath Center for Conservation Research. Email reply to Pete Figura, California Department of Fish and Game. April 14, 2008.

Dr. Lowell Diller, Green Diamond Resource Company. Email to Eric Loft and others, California Department of Fish and Game. May 16, 2008.

Dr. Richard T. Golightly, Humboldt State University. Phone conversation with Esther Burkett, California Department of Fish and Game. May 28, 2008.

Dr. Samantha Wisely, University of Kansas. Email to Richard Callas, California Department of Fish and Game . May 9, 2008.

Dr. William Zielinski, U.S. Forest Service, Pacific Southwest Research Station, Redwood Sciences Lab. Email reply to Pete Figura, California Department of Fish and Game. May 13, 2008.

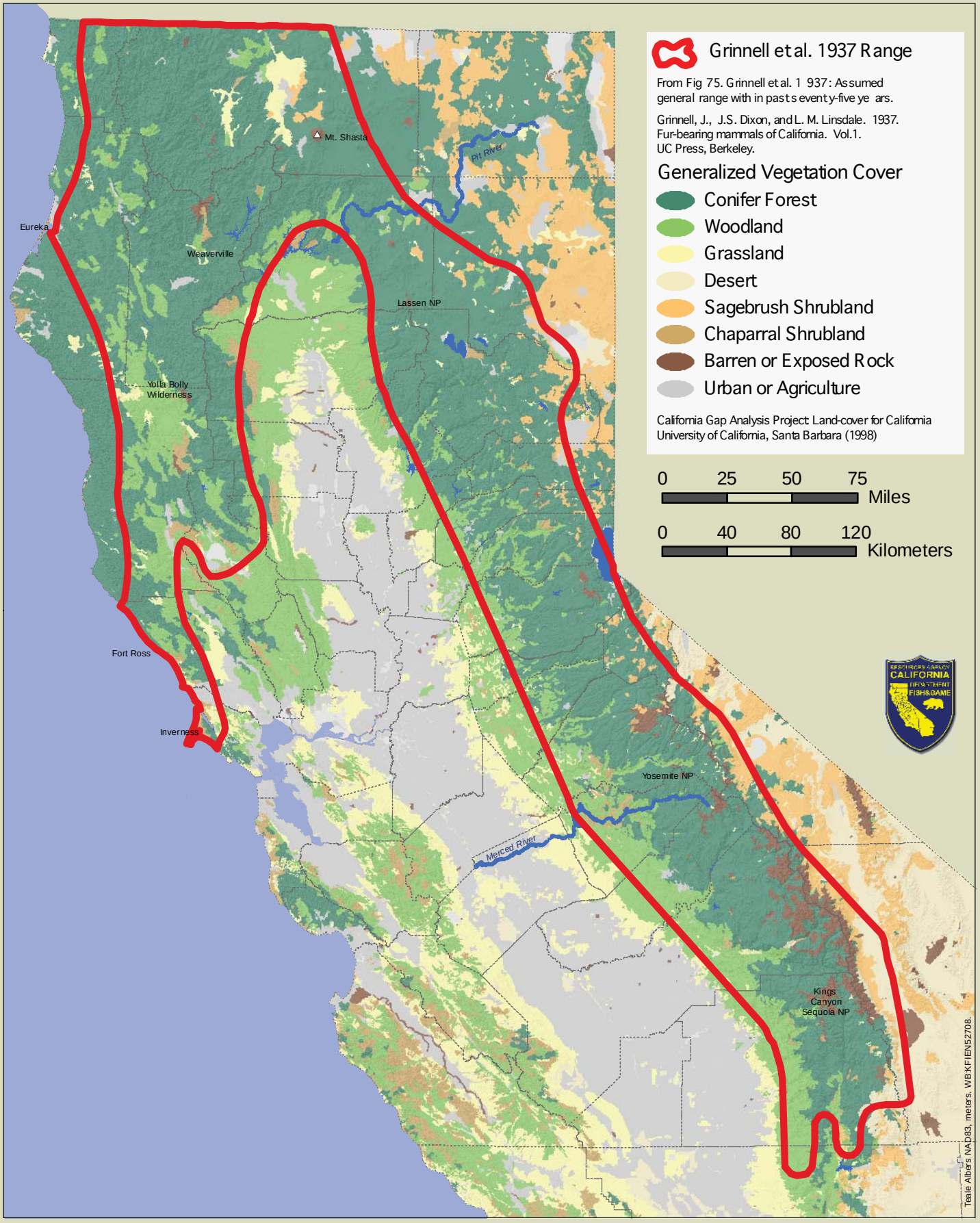

Figure 1. HISTORIC RANGE OF FISHER (*MARTES PENNANTI)* IN CALIFORNIA FROM 1862 - 1937, BASED ON GRINNELL ET AL. 1937

Figure 2. COMPARISON OF GRINNELL ET AL. 1937 FISHER RANGE MAP WITH CALIFORNIA WILDLIFE HABITAT RELATIONSHIPS RANGE

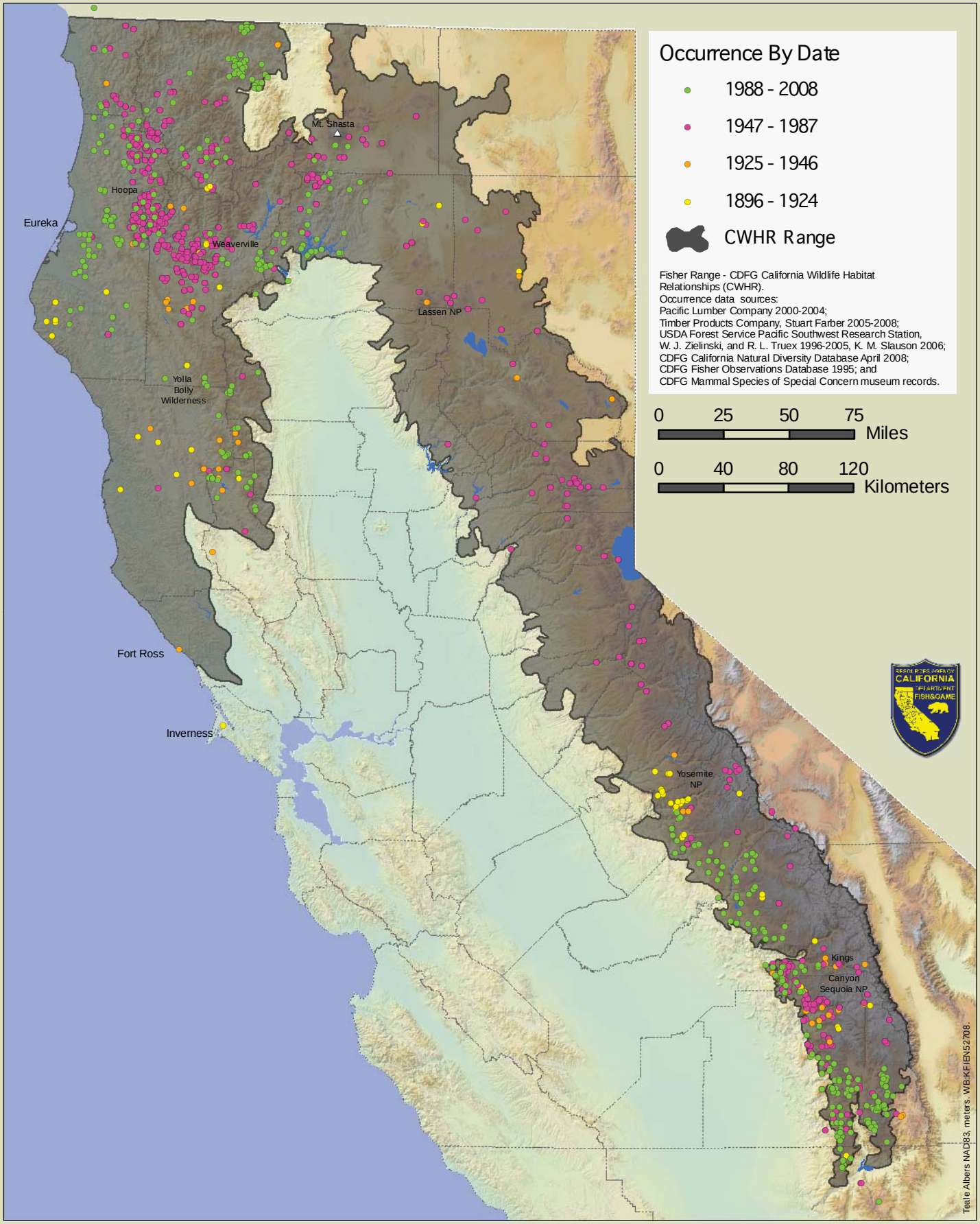

Figure 3. FISHER OCCURRENCES GROUPED BY DATE PERIODS

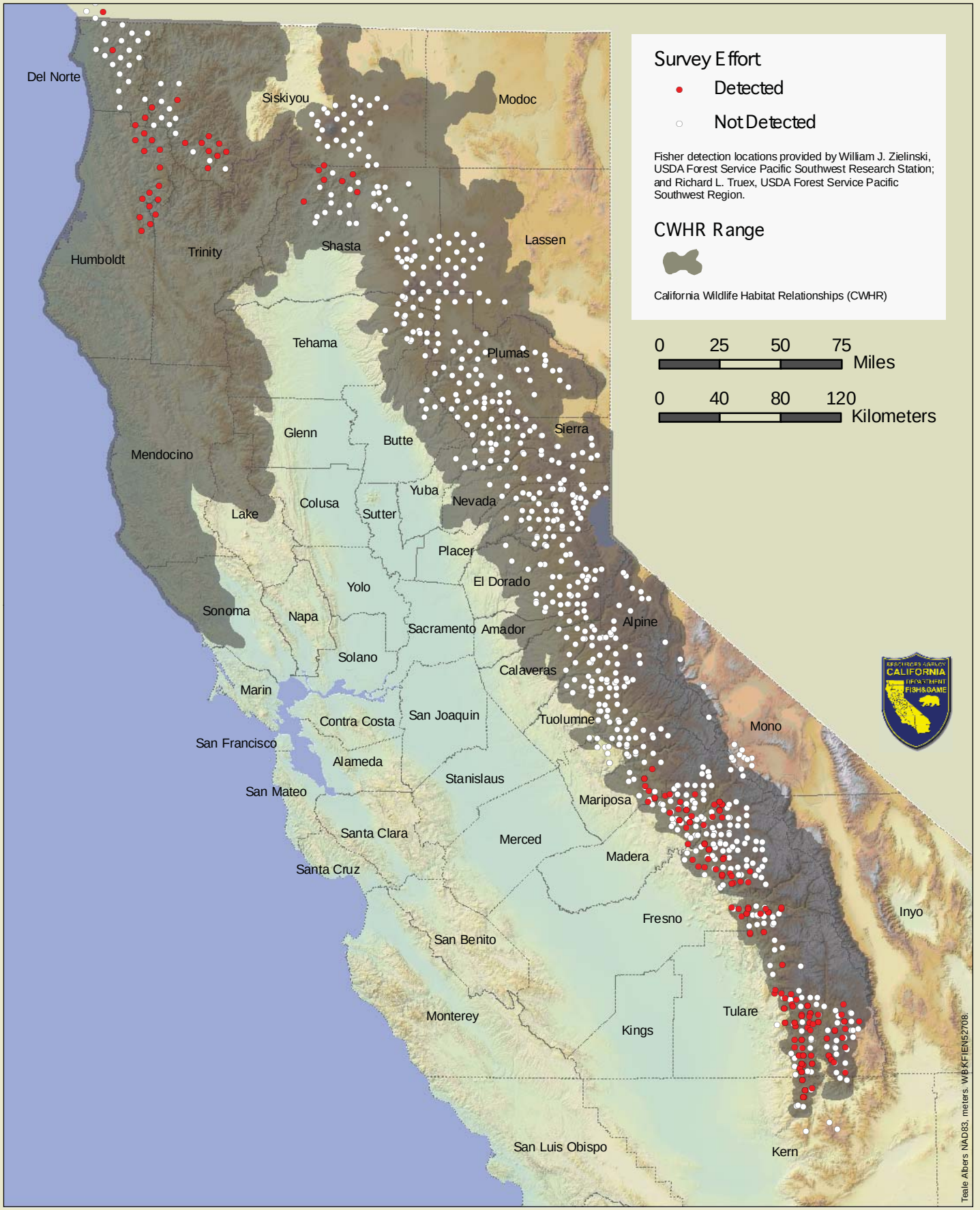

Figure 4. DISTRIBUTION OF FISHERS ON PUBLIC LAND IN CALIFORNIA, 1996-2005
Based on track-plate and camera surveys conducted on federal lands

Figure 5. AREAS IN CALIFORNIA WHERE FISHER ARE NOW RARE OR ABSENT, TOTALLING APPROXIMATELY 43% OF HISTORIC RANGE

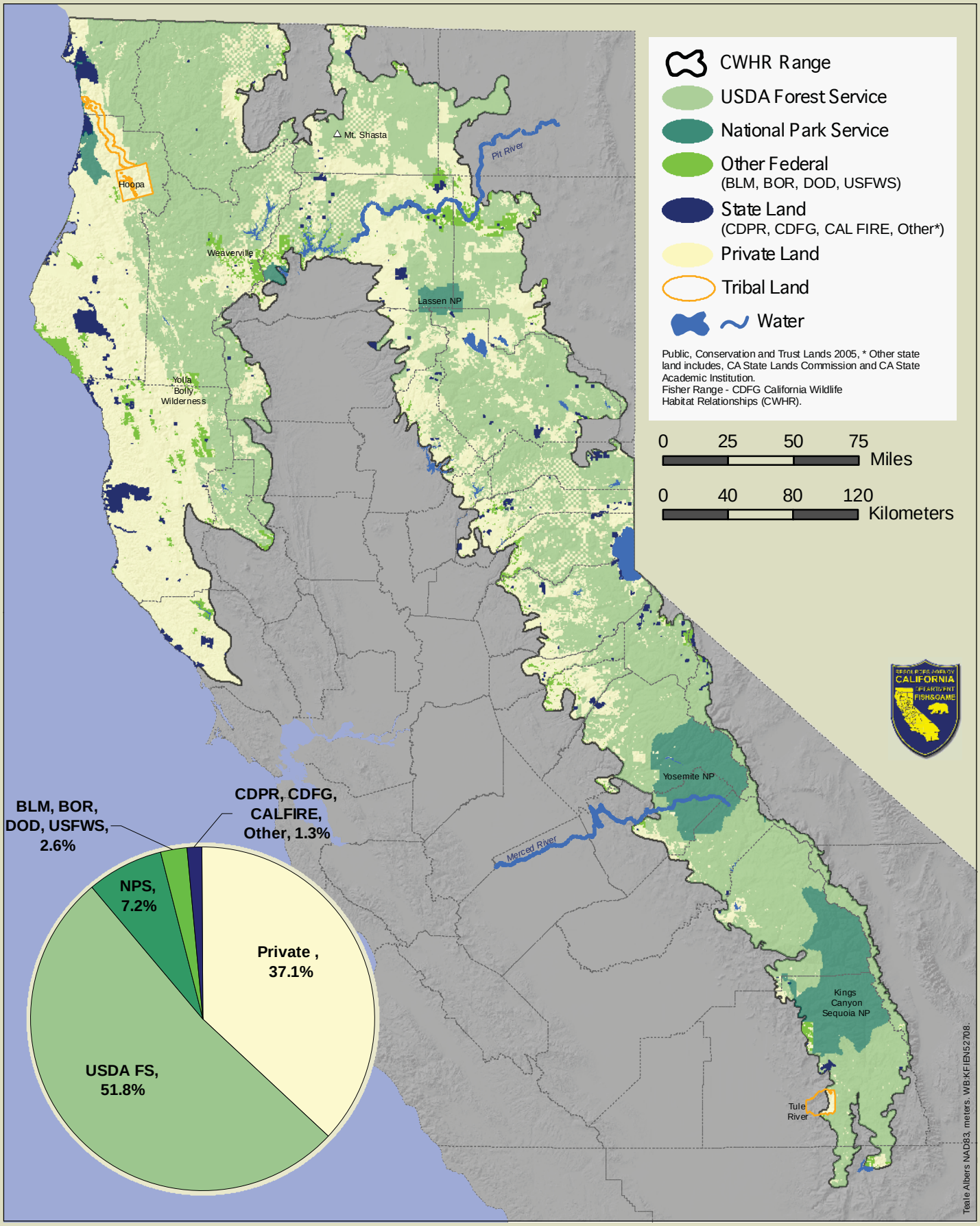

Figure 6. LAND OWNERSHIP WITHIN FISHER *(MARTES PENNANTI)* RANGE

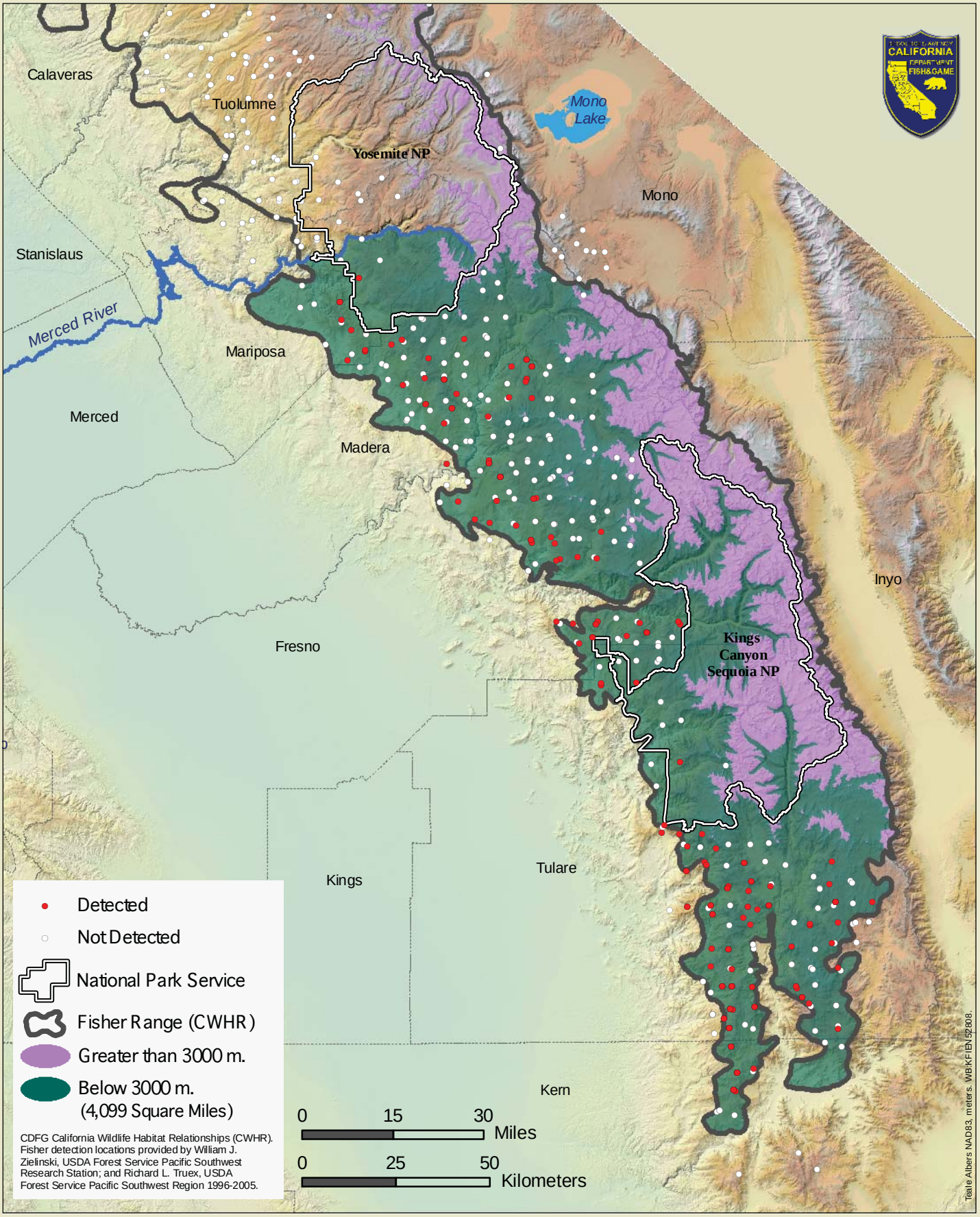

Figure 7. RANGE OF FISHER IN RELATION TO YOSEMITE AND KINGS CANYON SEQUOIA NATIONAL PARKS, 1996 - 2005, based on track-plate and camera surveys conducted on federal lands, (see also Figure 4).

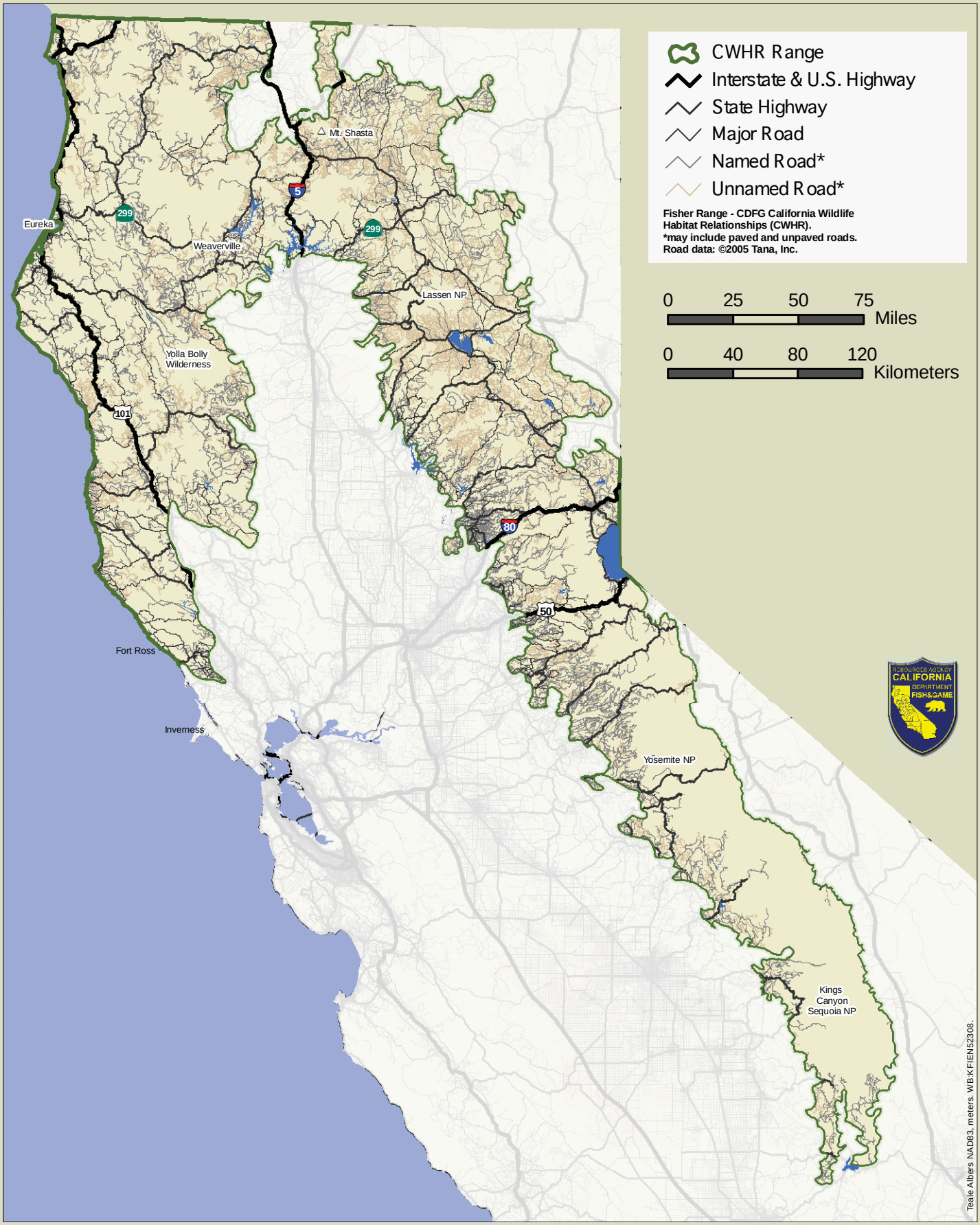

Figure 8. CALIFORNIA ROADWAYS IN FISHER RANGE
(includes U.S. Highways, Interstates, major and minor roads).

Figure 9. Radio-collared female fisher at a rest site on Hoopa Tribal land; the rest tree is a black oak (*Quercus kelloggii*). *Photo by: Rebecca Green*

Figure 10. Natal den site for fisher on Hoopa Tribal land; the den tree is a tan oak (*Lithocarpus densiflora*), and the diameter of the cavity measured 7.5 cm horizontal x 6.5 cm vertical.

Photos by: Mark Higley

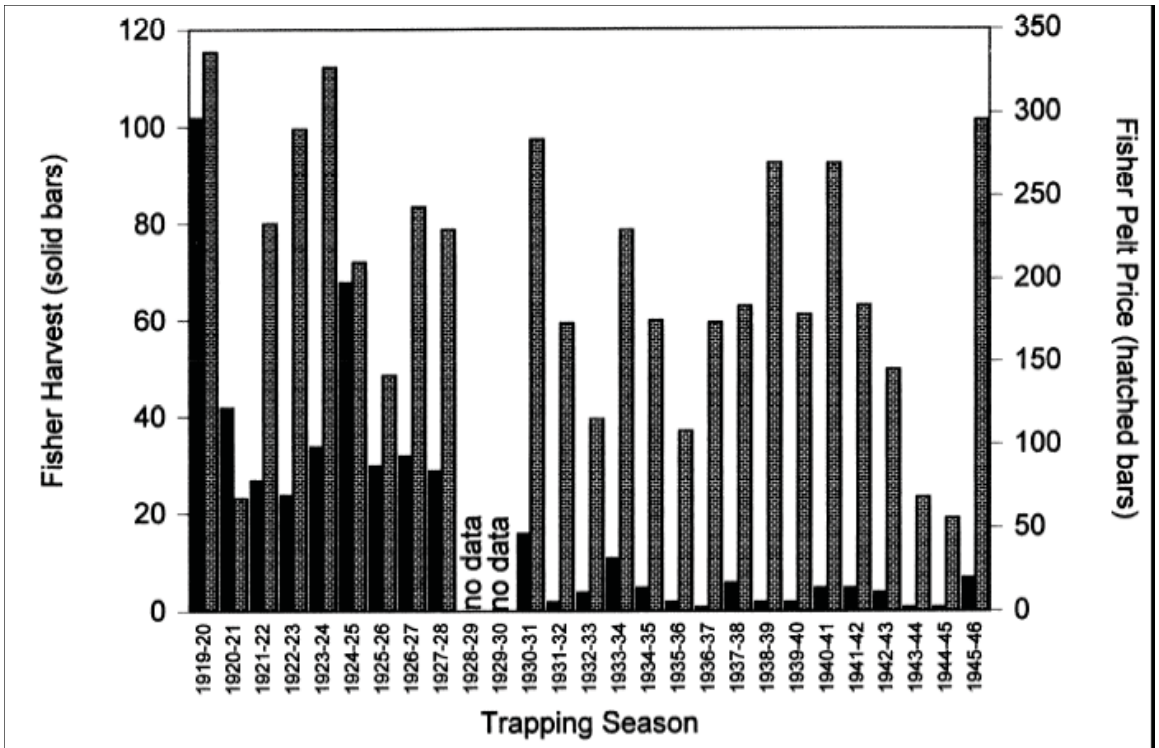

Figure 1. Number of fisher pelts harvested and the mean price paid (adjusted for inflation) for fisher pelts in California, 1919-1946.

Figure 10a. Known historic fisher trapping data, California (from Lewis and Zielinski (1996).

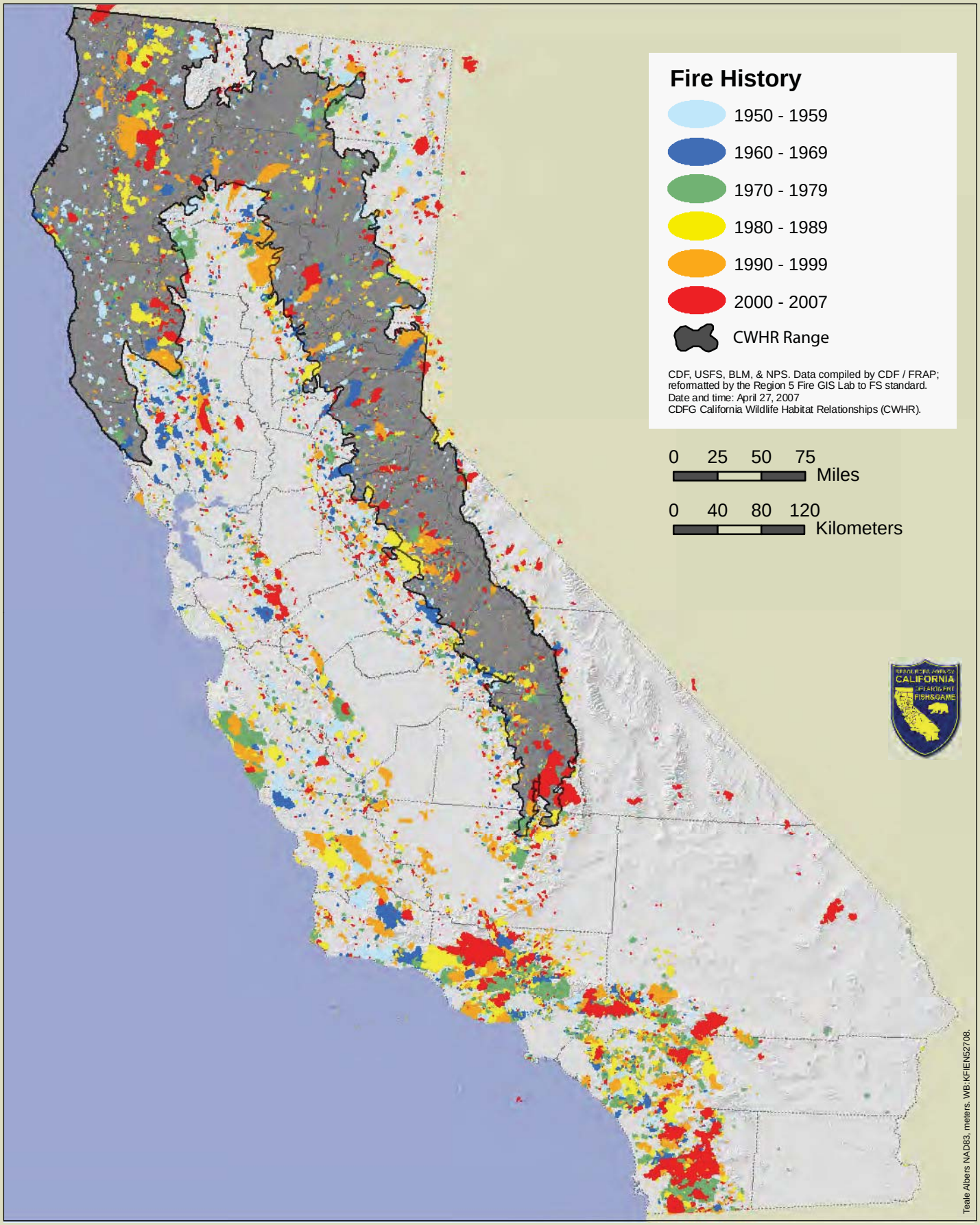

Figure 11. Perimeters of wildfires from the period of 1950 to 2006 sourced from USDA Forest Service data (perimeters ≥10 acres) and CAL FIRE data (perimeters ≥300 acres).

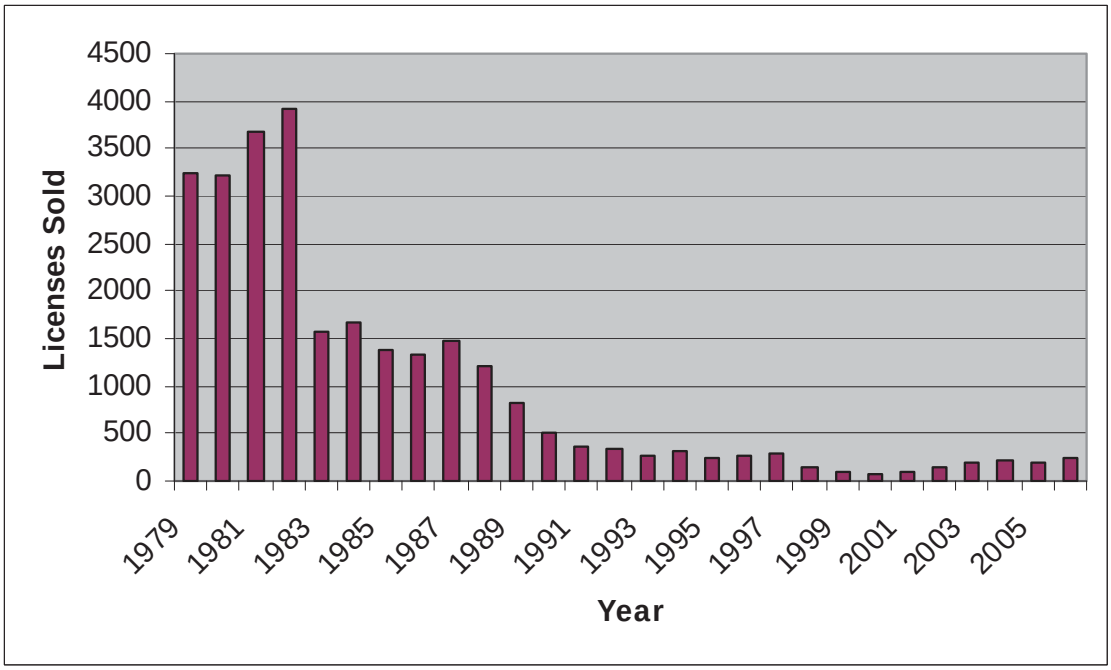

Figure 12. Number of trapping licenses reported sold in California, 1979- 2006.

Appendix A

Fisher Distribution Maps from Sierra Pacific Industries' Candidate Conservation Agreement with Assurances and associated Conference Opinion issued by U.S. Fish and Wildlife Service (signed May 15, 2008)

1. **Figure 1.** Historical and contemporary fisher locations in northwestern California, page 17 of "Conference Opinion and Findings and Recommendations on Issuance of an Enhancement of Survival Permit for the Fisher (*Martes pennanti*) to Sierra Pacific Industries, Inc."
   Permit Number TE166855-0
   Note the corrected figure reference to Grinnell et al. 1937 map is Figure 75.
   Literature cited in the map legend is also attached.

2. **Figure 2.** Opinion-based distribution of fisher in California and southwestern Oregon, page 4 of Candidate Conservation Agreement with Assurances for Fisher for the Stirling Management Area, between Sierra Pacific Industries and U.S. Fish and Wildlife Service.

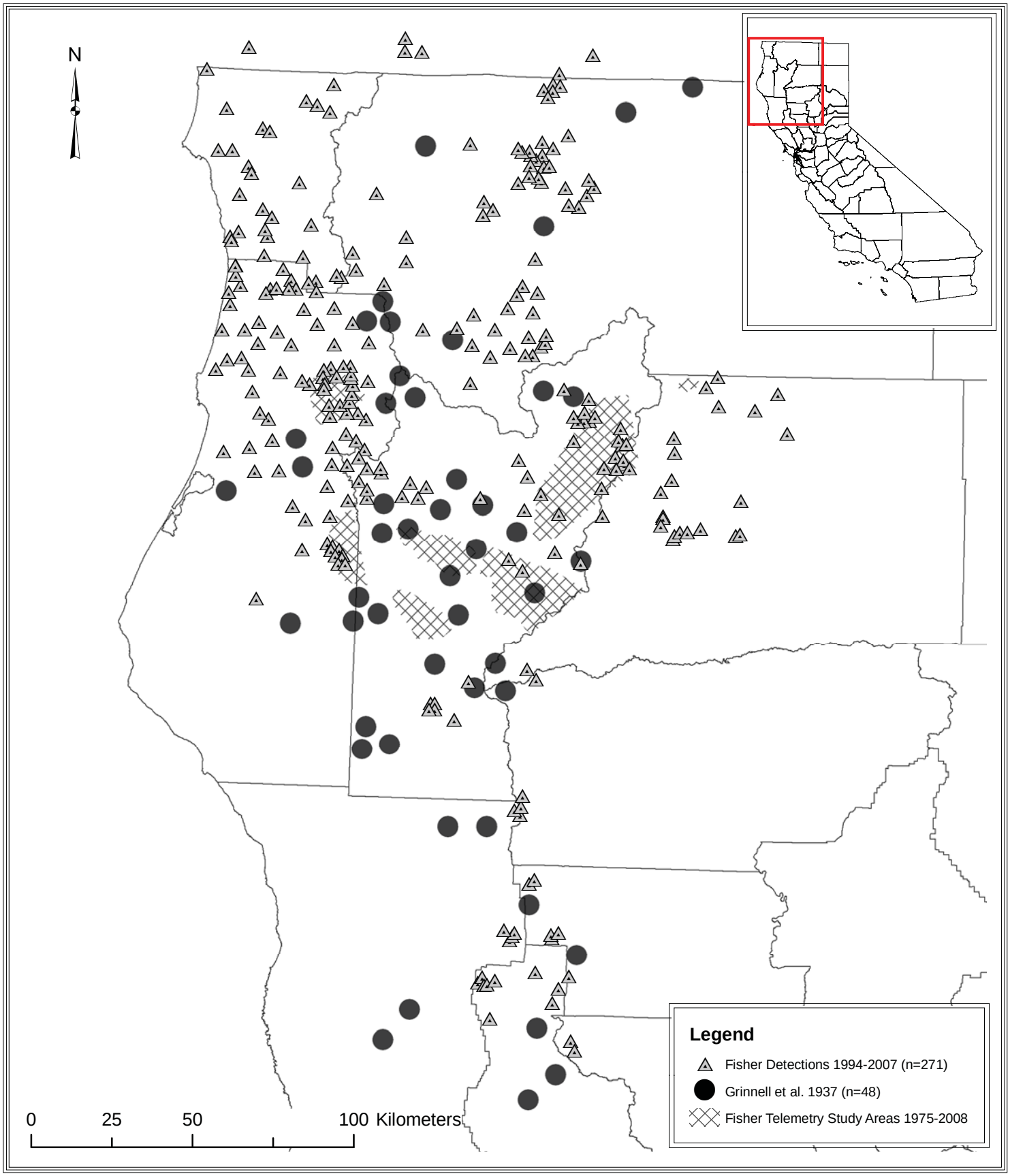

Figure 1. Historical and contemporary fisher locations in northwestern California. Historical locations adapted from Grinnell et al. 1937 figure 75. Contemporary locations (triangles) from miscellaneous surveys (Beyer and Golightly 1996, Dark 1997, Carroll et al. 1999, Zielinski et al. 2000, Slauson and Zielinski 2001, Slauson et al. 2001, Hamm et al. 2003, Slauson et al. 2003, Slauson and Zielinski 2004, Lindstrand 2006, Slauson and Zielinski 2007, Farber et al. 2008, USFWS unpublished data). Cross-hatching represents fisher telemetry study areas (Buck et al. 1994, Self and Kerns 2001, Zielinski et al. 2004, Yaeger 2005). Points represent presence only and do not imply abundance or density.

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Zielinski, W. J., R. L. Truex, G. A. Schmidt, F. V. Schlexer, K. N. Schmidt, and R. H. Barrett. 2004. Home range characteristics of fishers in California. Journal of Mammalogy 85:649-657.

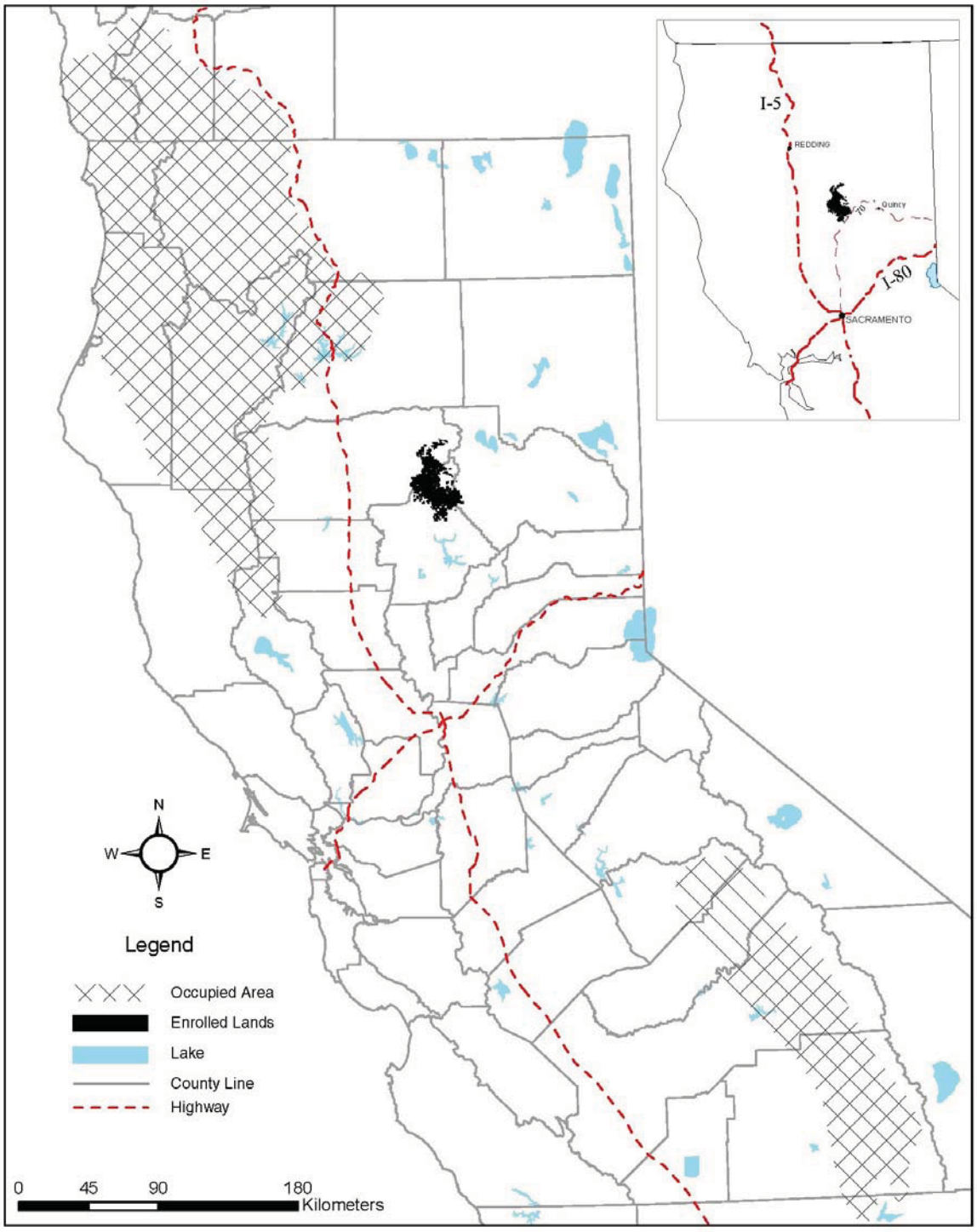

Figure 2. Opinion based distribution of fisher in California and southwestern Oregon. Distribution representations based on current understanding of extent of occurrence for fisher from contemporary survey and research data (USFWS 2008). Enrolled lands shown for reference.

Appendix B

1. Habitat characteristics around fisher den and rest sites, Tables 4, 6, and 7 from Truex et al. (1998).

2. Habitat values associated with den and rest locations of radio-marked fishers in California, southern Oregon, and British Columbia, Tables 1 and 2 (pages 9 and 10) from Candidate Conservation Agreement with Assurances for Fisher for the Stirling Management Area, between Sierra Pacific Industries and U.S. Fish and Wildlife Service.

Table 4. Descriptions of natal and maternal dens and the surrounding habitat for female fishers in the Eastern Klamath, North Coast, and Southern Sierra regions of California. Natal dens refer to the site where parturition is assumed to have occurred while maternal dens refer to sites where an adult female was observed resting with one or more kit(s).

Study Area	Indiv.	Den Type	Tree Species	Tree Condo	DBH	BA	Canopy Closure
Eastern Klamath	1	Maternal'	PIPO	snag	78	59.4	70
	2	Maternal	QUKE	live	88	18.3	98
	3	Maternal	QUCH	live	52	59.4	75
	3	Maternal	QueH	live	40	27.4	77
	3	flJaternal	PSME	live			
North Coast	1	Maternal	CADE	live	105	101. 6	97
	2	Maternal	PSME	live	138	78.5	98
	2	Maternal	QUKE	live	53	73.9	100
	3	Maternal	ABCO	log		120.0	72
	3	Maternal	PSME	live	99	50.8	99
	4	Maternal	ABeo	snag	125	166.3	96
Southern Sierra	1	Natal	ABCO	snag	148	32.1	94.
	1	Natal	UNK	snag	112	64.3	96
	2	Natal	ABeo	live	82	64.3	96
	3	Natal	QUKE	live	99	59.7	93
	3	Natal	QUKE	live	76	114.8	97
	3	Maternal	QUKE	live	40	23.1	89
	3	Maternal	ABeo	live	146	27.7	93
	4	Maternal	QUKE	live	52	60.1	96

From Truex et al. 1998: pages 83-84.

Table 6. Diameter at breast height (1.37 m) in centimeters for conifer and hardwood rest sites used by fisher on three study areas in California, 1992-1996.

Tree Type	Study Area	*n*	$\bar{x}$	SD	Range	Median
Conifer	Eastern Klamath	215	77.2	46.7	8-196	63.8
	North Coast	136	105.8	42.4	12-205	111.5
	Southern Sierra	176	111.7	49.7	28-433	106.0
Hardwood	Eastern Klamath	38	49.3	27.7	12-132	44.6
	North Coast	35	87.1	28.3	42-149	77.0
	Southern Sierra	141	65.0	21.6	30-145	63.0

Table 7. Habitat characteristics surrounding fisher rest sites located on three study areas in California from 1992-1996.

Variable	Study Area	*n*	$\bar{x}$	SD	Range	Median
Basal Area (m/ha^2)	Eastern Klamath	289	59.8	30.9	9.2-169.0	54.8
	North Coast	127	75.6	27.6	9.2-161.7	73.9
	Southern Sierra	285	62.6	26.1	9.2-129.3	64.7
Mean Tree DBH (cm)[a]	Eastern Klamath	293	46.2	28.2	6.8-236.4	39.5
	North Coast	127	118.3	35.6	40.2-198.7	119.2
	Southern Sierra	285	89.6	29.5	24.0-176.2	87.2
Canopy Closure (%)	Eastern Klamath	298	88.2	12.8	3.0-100.0	95.4
	North Coast	127	93.9	7.5	65.2-100.0	96.7
	Southern Sierra	291	92.5	9.1	39.7- 99.9	95.4

[a] Mean tree diameter at breast height (DBH, 1.37 m) calculated for the four largest trees at rest sites; the rest site tree was included if it was among the four largest.

From Truex et al. 1998: page 89.

Table 1. Values associated with resting locations of radio-collared fisher at various study areas in California and southern Oregon

Study Area	Source	n Indiv Fisher	Rest Tree Type	n Structure	Average dbh of Rest Tree (in)	StDevof Rest Structure (in)	Average QMDaof Rest Site (in)	StDev of Rest Site QMD (in)
Southern Oregon Cascades	Aubry and Raley 2006	19	Live Tree	259[b]	25.1 males 34.6 females			
			Snag	54[c]	47.6 males 44.9 females			
North Coast (Six Rivers)	Zielinski et al. 2004a	22	Hardwood	32	34.5	11.9		
			Conifer	64	49.1	14.9		
			Snag	50[d]	46.8	12.9		
			Log	10	37.4	17.4		
Coastal Klamath Province (Hoopa)	Yaeger 2005	19	Hardwood	86	29.6	10.2	14.4	5.5
			Conifer	52	43.1	15.9		
			Hardwood snag	5	28.7	9.0		
			Conifer snag	7	45.1	19.3		
			Conifer Log	5	36.6	2.6		
Interior Klamath Province (Trinity Lake)	Yaeger 2005	19	Hardwood	26	28.3	10.7		
			Conifer	154	38.8	16.1		
			Hardwood snag	4	26.6	6.6		
			Conifer snag	18	39.5	11.9		
			Conifer Log	9	92.3	19.8		
Interior Klamath Province (Weaverville)	Se1fpers comm.	9	Hardwood	11	29.8	15.0	11.0	1.7
			Conifer	10	29.8	11.8		
			Conifer Snag	4	43.8	3.3		
Interior Klamath Province (Castle Creek)	Self and Kerns 2001	3	Conifer	23	29.9	12.5	13.3	3.0
			Hardwood	4	21.0	2.6		
			Snag	5	41.0	14.0		
			Log	2	38	-		
Southern Sierra Nevada[e]	Zielinski et al. 2004a	23	Hardwood	146	25.6	8.4		
			Conifer	70	43.4	14.9		
			Snag	93[c]	47.4	20.0		
			Log	33	51.8	36.1		
Southern Sien'a Nevada	(Mazzoni 2002)	9	Live Tree	53	37.5	11.0		
			Snag	9	40	17.5		

a _ QMD calculatlOns do not mclude rest structure
b -less than 2% hardwood
c _ n = 3 hardwoods
d _ conifer only
e _ giant sequoias removed from calculations of dbh

dbh-dtameter breast htgh (4.5ft above ground)
StDev-Standard Deviation
in-inches
QMD-Quadratic Mean Diameter

From page 9 [10] of Candidate Conservation Agreement with Assurances for Fisher for the Stirling Management Area, between Sierra Pacific Industries and U.S. Fish and Wildlife Service, signed May 15, 2008, 33 pages.

Table 2. Values associated with reproductive den (natal and maternal combined) locations of radio-collared fisher at various study areas in California, southern Oregon, and British Columbia

Study Area	Source	n Indiv Fisher	Den Tree Type	n Structure	Average dbhof Den Tree (in)	StDevof Den Structure (in)	Average QMD"of Den Site (in)	StDev of Den Site QMD (in)
British Columbia	Weir 2003		Hardwood	19	41.5			
British Columbia	Weir 2007	4	Hardwood	9	19.8	3.5		
Southern Oregon Cascades (natal dens)	Aubry and Raley 2006	6	Live tree	7	36.2			
			Snag	6	35.0			
Southern Oregon Cascades (maternal dens)	Aubry and Raley 2006	6	Live tree	8	38.2			
			Snag	5	51.9			
			Log	5	41.3			
North Coast (Six Rivers)	Truex et al. 1998	4	Hardwood	1	20.9			
			Conifer	4	46.0			
Coastal Klamath Province (Hoopa)	Yaeger 2005	5	Hardwood snag	1	24			
			Hardwood	8	25.1	5.6	13.0	5.1
			Conifer snag	1	37.9			
Coastal Klamath Province (Hoopa)	Higley and Matthews 2006	16	Live tree	37	40.9			
			Snags	10				
Interior Klamath Province (Trinity Lake)	Yaeger 2005		Hardwood	5	28.2	13.8		
			Conifer snag	1	30.7			
Interior Klamath Province (Weaverville)	Self 2008	9	Hardwood	37	24.8	11.6		
			Conifer	5	43.4	20.7	10.7	1.5
			Snag	20	33.7	14.3		
Southern Sierra Nevada	Truex et al. 1998	4	Hardwood	4	26.3			
			Conifer	3	49.3			

" - QMD calculatIOns do not mclude den structure.
dbh-Diameter Breast High (405ft above ground)
StDev-Standard Deviation
in-inches
QMD-Quadratic Mean Diameter

From page 10 [11] of Candidate Conservation Agreement with Assurances for Fisher for the Stirling Management Area, between Sierra Pacific Industries and U.S. Fish and Wildlife Service, signed May 15, 2008, 33 pages.

Appendix C

List of Materials Received by the Department on the Petition to list fisher in California

Sierra Pacific Industries (SPI)

1. Cover Letter dated May 1, 2008 (1 page), to Mr. John Carlson, Jr., California Fish and Game Commission, along with a CD from Steven Self, Wildlife Biologist, SPI, with 6 enclosures:

    - Letter dated April 25, 2008 (4 pages), to Dr. Eric Loft from S. Self, discussing the petition's statements regarding the draft Candidate Conservation Agreement with Assurances (CCAA) for the fisher in California (also received via Email on April 25, 2008 from S. Self, SPI).

    - Progress report to the Department of Fish and Game on fisher reproduction study: Reno, M.A., K.R. Rulon, and C.E. James. 2008. Fisher monitoring within two industrially managed forests of Northern California. Progress report to California Department of Fish and Game. April 25, 2008. Research and Monitoring Department, Sierra Pacific Industries, Anderson, CA. 24 pages (also received via Email on April 25, 2008 from S. Self, SPI).

    - White paper ("Factors Affecting the Fisher, Past, Present and Future in California") discussing the historic, current and future threats facing the fisher and its habitat in California, undated report, 16 pages (also received via Email on May 1, 2008 from S. Self, SPI).

    - White paper ("Existing Regulatory Mechanisms and Fisher") discussing the existing regulatory mechanisms on all ownerships, public and private, within the range of the fisher in California, 16 pages, with 1 page undated cover letter (also received via Email on April 30, 2008 from S. Self, SPI).

    - White paper predicting the number of fisher in California's two populations using the best scientific data and methods available: Self, S., E. Murphy, and S. Farber. 2008. Preliminary estimate of fisher populations in California and southern Oregon. Unpublished report, April 18, 2008. 15 pages (also received via Email on April 25, 2008 from S. Self, SPI).

    - White paper presenting data on overhead canopy cover re-growth after forest harvesting on private lands in California as it relates to fisher foraging and travel habitat, by Ed Murphy, SPI, dated April 30, 2008, 6 pages (also received via Email on April 30, 2008 from S. Self, SPI).

2. Letter dated May 7, 2008 (1 page): Comments to Department of Fish and Game and Fish and Game Commission regarding the petition to list the fisher under the State of California Endangered Species Act (Steven Self, Wildlife Biologist, SPI); received via Email on May 7, 2008.

3. CCAA package submittal on May 16, 2008 via email:

   - Comment letter from SPI (4 pages dated May 16, 2008).

   - Signed Candidate Conservation Agreement with Assurances concerning the fisher.

   Additionally, 2 federal documents that accompany the signed CCAA:

   - "Conference Opinion and Findings and Recommendations on Issuance of an Enhancement of Survival Permit for the Fisher to Sierra Pacific Industries, Inc."

   - "Final Environmental Action Statement Screening Form for Candidate Conservation Agreement with Assurances"

Green Diamond

1. Letter dated March 14, 2008 (1 page), with Letter dated November 7, 2003 attached (22 pages); 2003 letter is to Mr. Steve Thompson, U.S. Fish and Wildlife Service, regarding "Comments on the status review of the Pacific fisher (*Martes pennanti pacifica*)", signed by Neal Ewald.

2. Letter dated April 8, 2008, "Green Diamond Information Relevant to Listing Petition"; 2 pages with map attached (Figure 1. Distribution of fishers on Green Diamond Resource Company lands…").

3. Cover letter dated May 1, 2008 (1 page), Executive Summary (4 pages), and Report: Summary of Fisher (*Martes pennanti*) Studies on Green Diamond Resource Company Timberlands, North Coastal California, May 1, 2008. 49 pages. Compiled by: Lowell Diller, Keith Hamm and David Lamphear, Green Diamond Resource Company, Korbel, CA; and Joel Thompson, Glen Elder, KS.

4. Email received May 12, 2008 with 2 attachments: a) Letter dated May 9, 2008 (7 pages), "Supplemental Information Submittal on CESA Petition to List the Fisher"; and b) Terrestrial Dead Wood Management Plan, Green Diamond Resource Company, dated April 13, 2005, 15 pages.

5. Email from L. Diller on May 16, 2008 regarding analysis in trend data; "…no statistical evidence for a trend in fisher numbers".

6. Letter dated May 28, 2008 (5 pages), signed by Neal Ewald; "Green Diamond Supplemental Information Submittal on CESA Petition to List the Fisher"; responds to some of the comments submitted by petitioner, Center for Biological Diversity (CBD) in CBD letter dated May 23, 2008. Attached reference, May 2008:

Thompson, J. L. 2008. Density of Fisher on Managed Timberlands in North Coastal California. M.S. thesis, Humboldt State University, Arcata, CA. 40 pages.

Timber Products Company

1. See attached letter dated March 19, 2008 (2 pages) from Stu Farber itemizing 5 reports submitted.

2. Copy of Power Point Presentation by Stu Farber at May 7, 2008 Stakeholder's Meeting in Sacramento, California, 12 pages total:

   - Evaluation of fisher distribution in the eastern Klamath Province of interior Northern California; Stuart Farber, Tom Franklin and Celeste McKnight.

   - Cooperative Mesocarnivore Genetic Surveys to Estimate the Number of Individuals and Preliminary Population Structure in northern Siskiyou County, California; Stuart Farber, Rich Callas, Steve Burton, Laura Finley, Scott Yaeger, and Michael Schwartz.

W.M. Beaty & Associates

Bob Carey (W.M. Beaty & Assoc.) submitted files on CD on April 25, 2008: Cover Letter, Introduction, and 5 case studies detailing management considerations and practices that conserve and protect fishers and their habitats on over 2.3 million acres of private forest lands in California.

Cover Letter (2 pages) regarding petition to list Pacific fishers.

Introduction (3 pages): Management Considerations and Habitat Protection Provided for Pacific Fishers on Private Forestlands in California – Steve Self, Stuart Farber, Robert Carey, Sal Chinnici, Rich Klug.

Management Considerations and Habitat Protection Provided for Pacific Fishers on Private Forestlands in California Historic, Current, and Future Fisher Habitat on Sierra Pacific Industries Lands – (CaseStudy1_SPI.pdf)

Suitable habitat trends for fishers on Timber Products Company on forestlands in interior Northern California – (CaseStudy2_TP.pdf)

W.M. Beaty & Associates, Inc. Forest Management Activities Benefiting Pacific Fishers (*Martes pennanti*) within Shasta, Siskiyou, Lassen, Modoc, and Plumas Counties, California. – (CaseStudy3_WBA.pdf)

The Pacific Lumber Company (PALCO) Habitat Conservation Plan (HCP)
Pacific Fisher Conservation Strategy – (CaseStudy4_PALCO.pdf)

Summary of Management Practices Affecting Pacific Fishers and their Habitat on Roseburg Resources Company Lands – (CaseStudy5_RRC.pdf)

Case Study 6: Existing Conservation Measures and Habitat Assessment for Fisher on Green Diamond Resource Company's California Ownership; 5 pg's dated April 30, 2008. Received via U.S. mail, April 30, 2008.

Roseburg

1. Report, 3 pages, undated, but received via email on April 25, 2008 from Rich Klug: Trends in Occupancy of Pacific Fisher Across Northern California: A Case Study.

2. Letter dated April 28, 2008 from Richard Klug (2 pages) with 3 Figures attached.

California Forestry Association

1. May 6, 2008 letter to Dr. Eric R. Loft, 11 pages total, signed by Christopher J. Carr (Morrison/Foerster LLP), 2 documents attached:

    - Literature Review by CH2M Hill, Inc., Gorham and Mader April 2008, 85 pages.

    - Review of Habitat Claims in the Petition to List the Pacific Fisher as an Endangered or Threatened Species under the California Endangered Species Act, by S.F. Mader, CH2M Hill Inc., April 30, 2008, 22 pages.

2. May 20, 2008 letter to Dr. Eric R. Loft, 2 pages total, signed by Christopher J. Carr (Morrison/Foerster LLP), 3 documents attached:

    - Candidate Conservation Agreement with Assurances for Fisher for the Stirling Management Area, between Sierra Pacific Industries and U.S. Fish and Wildlife Service, signed May 15, 2008, 32 pages.

    - Conference Opinion and Findings and Recommendations on Issuance of an Enhancement of Survival Permit for the Fisher (*Martes pennanti*) to Sierra Pacific Industries, Inc., signed May 15, 2008, 21 pages.

    - Final Environmental Action Statement Screening Form for Candidate Conservation Agreement with Assurances (CCAA), signed May 15, 2008, 15 pages.

Central Sierra Environmental Resource Center

April 13, 2008 Email from John Buckley regarding surveys for carnivores over the past decade on Stanislaus National Forest and nearby locales; no detections of fisher.

U.S. Forest Service

Thompson, C. and K. Purcell. 2008. Links between landscape condition and survival and reproduction of fishers in the Kings River Project in the Sierra National Forest. Progress Report for Calif. Dept. of Fish and Game. April 21, 2008. 5 pages. Received April 21, 2008 via Email.

Spencer, W.D., H.L. Rustigian, R.M. Scheller, A. Syphard, J. Strittholt, and B. Ward. 2008. Baseline evaluation of fisher habitat and population status, and effects of fires and fuels management on fishers in the southern Sierra Nevada: Unpublished report prepared for USDA Forest Service, Pacific Southwest Region. June 2008. 133 pp + appendices. Received hard copies June 10, 2008 from USFS.

Mendocino Redwood Company

Douglas, R. B 2008. Mesocarnivore distribution on commercial timberlands in Mendocino County. Draft unpublished report submitted to the California Department of Fish and Game, April 29, 2008. 6 pages. Draft report received via Email on April 29, 2008.

Southern California Edison

April 30, 2008 Email from Stephen Byrd, Wildlife Biologist, 2 documents attached:

- "Comments in response to the petition for listing the Pacific fisher", by Stephen Byrd, 2 pages.

- "Comments on: A Petition to list the Pacific fisher", by Patrick Emmert, Forester, RPF#1839, 2 pages.

Center for Biological Diversity

See attached list of items received on May 23, 2008. Cover letter dated May 23, 2008 (29 pages) and 11 attachments.

U.S. Fish and Wildlife Service (USFWS)

Received via Email on May 16, 2008 from Scott Yaeger (USFWS):
Integral Ecology Research Center. 2008. Pathogens associated with fishers (*Martes pennanti*) and sympatric mesocarnivores in California. Final report submitted to the USFWS, Yreka, CA, USA.

Integral Ecology Research Center

Received via Email on May 23, 2008 from Mourad Gabriel:

- Summary of Fisher Predation in Two Fisher Ecology Projects in California Personal Communication: Greta Wengert, 2008, Integral Ecology Research Center, Humboldt State University, and U.C. Davis

- The proportion of fishers (*Martes pennanti*) exposed to pathogens within the USFS Kings River Study Project within the Sierra Nevada Mountains, CA. Personal Communication: Mourad Gabriel, 2008, Integral Ecology Research Center, Humboldt State University, and U.C. Davis.

Timber Products Company
THE TREMENDOUS RESOURCE

Yreka Veneer Division
And Timberlands
P. O. 80x766
Yreka, CA 96097

Phone (530) 842·2310
Fax (530) 842·3825

3/19/08

Dr. Eric Loft
Wildlife Branch, Department ofFish and Game
1812 Ninth Street
Sacramento CA 95814

Dear Dr. Loft;

Enclosed are copies of several studies of fisher *(Martes pennanti)* in Siskiyou County, California. The studies have been conducted primarily on Timber Products Company forestlands and adjacent USFS forestlands. We are providing these studies to you during your review of a petition to list fisher as a threatened or endangered species tmder the California Endangered Species Act.

Farber, S.L. and T. Franklin, C. **McKnight** 2008 Evaluation **of** fisher *(Martes pennanti)* distribution in **the eastern Klamath province of interior Northern** California. Timber **Products Company,** 130 **Phillipe Lane, Yreka,** CA. **16 p.** This evaluation compared fisher presence found in previous Company reports with predicted fisher presence from the Carroll et al. 1999 habitat based probability model. At the 0.17 probability level the Carroll et aL 1999 model had an overall correct classification rate of 51% with an omission rate of 67%. At the 0.33 probability level the Carroll et aL 1999 model had an overall correct classification rate 01'51% with an omission rate of 81%. Since models may be used to describe habitat distribution, fragmentation or absence, validation of these models in a wide variety of habitat and landscapes is needed. Fisher presence and preliminary genetic results in our study areas suggest that fisher populations are well distributed and genetically related, contrary to claims made by others that fisher populations are fragmented and genetically isolated in the Klamath province.

Farber, S.L. and T. Franldin 2005 Presence-absence surveys for Pacific fisher *(Martes pennanti)* in the eastern **Klamath province of** interior Northern California. **Timber** Prodncts Company, 130 PhiHipe Lane, Yreka, CA. 35 p. This study detected fisher in 15 of 18 (83%) four-square mile sampling units covering 43,928 acres. We found fisher detections were seasonally influenced. We found the Carroll et aL 1999 probability model failed to predict fisher in 8 of 15 sampling units or an omission rate of 53%. This study area contained a high density oflow use roads, 4.2 miles/square mile, which did not appear to limit detection of fisher. This study area contained little old-growth or late-sera1 habitats, 4% of habitats greater than 24"qmd, however detection of fisher occurred throughout the study area. Fisher were detected in 58% of sampling units during a previous 1995 study and detected in 92% ofthe original sampling lmits in 2005, demonstrating that fisher are persisting in our highly fragmented and heavily disturbed landscape.

Farber, S.L. and S. Criss 2006 Cooperative mesocarnivore snrveys for the npper and west fork of Beaver Creek watersheds in interior Northern California. Prepared to complete FWS Agreement No. 813335J030, U.S. Fish and Wildlife Service, Yreka, CA, Timber Products Company, 130 Phillipe Lane, Yreka, CA., Criss and Co. Consultants, 5705 Porcupine Court, Weed CA, 26 p. This study detected fisher in 6 of21 (29%) four-square mile sampling units covering 51,408 acres. This study also reverified detections of fisher made in the early 1990's and indicates fisher continue to persist within the study area containing a high density of low use roads, ranging from 2.4 miles/square mile to 5.5 miles/square mile. Fisher were detected on a variety of aspects and on slopes between 15% and 50%. Portions of the study area were located above 5,000 feet in a snow dominated zone that may have limited fisher detection, although fisher detection ranged from 3,400 feet to 6,160 feet.

McKnight, C. 2008 Research Note: Pacific fisher *(Martes pennanti)* in the Deadwood study area. Timber Products Company, 130 Phillipe Lane, Yreka, CA. 11 p. This study detected fisher in 6 of 8 (75%) four-square mile sampling units covering 20,956 acres in eastern Klamath province. All detections in the study area were locations not previously known to support fisher. The study area has been subject to historic trapping, numerous wildland fires, historic and current timber harvesting, extensive road building, and is near an urban interface of Fort Jones and Yreka, California.

Farber, S.L. and L.Finley, S.Yaeger, S.Bnrton, R.Callas 2008 Preliminary resnlts from on going cooperative genetic mesocarnivore surveys. This presentation was made at a recent TWS conference and provided preliminary results of an on going genetic survey study of fisher. In 2006, from a total of 173 hair snagging samples, 44 samples were identified as fisher and 22 unique individual fisher were identified. Haplotype analysis indicates fisher within the study area are native to northern California and not similar to haplotypes found in introduced fisher in southern Oregon. Population assignment tests indicate that fisher from the two study areas are genetically similar, suggesting that a broad expanse of oak-woodland, state Highway 96 and the Klamath river, which are located between the two study areas, are not preventing fisher distribution in the eastern Klamath province.

We hope that you find the information contained in these reports interesting and infonnative. If you have any questions regarding these reports, please contact me at stuf(@sor.timberproducts.com or at (530)842-2310.

Sincerely,

Stuart Farber
Wildlife and Fisheries
Timber Products Company

cc. Esther Burkett, DFG Sacramento
Gary Stacey, DFG Region 1
Mark Stopher, DFG Region I
Rich Callas, DFG Region 1
Jim Ostrowski

CENTER *for* BIOLOGICAL DIVERSITY

May 23, 2008

Documents submitted by CBD on May 23, 2008

Letter to Dr. Loft and DFG

Endangered and Threatened Wildlife and Plants; 12-month Finding for a Petition to List the West Coast Distinct Population Segment of the Fisher *(Martes pennanti*), 69 Fed. Reg. 18770 (April 8, 2004)

Foley, Patrick. 1994. Predicting Extinction Times from Environmental Stochasticity and Carrying Capacity, Conservation Biology, Vol. 8, No. 1, pp. 124-137.

Jordan, Mark J, J. Mark Higley, Sean M. Matthews, Olin E. Rhodes, Michael K. Schwartz, Reginald H. Barrett, and Per J. Palsbøll. 2007. Development of 22 new microsatellite loci for fishers (*Martes pennanti*) with variability results from across their range, Molecular Ecology Notes, 1-5.

Jordan, M.J. 2007. Fisher ecology in the Sierra National Forest, California. Ph.D. Dissertation. University of California, Berkeley. 122pp

Matthews, Sean M., J. Mark Higley, and Peter C. Carlson. 2008. Northern Spotted Owl Demographic Analysis and Fisher Habitat Use, Population Monitoring, and Dispersal Feasibility on the Hoopa Valley Indian Reservation, CA, Final Report

Shaffer, Mark L. 1981. Minimum Population Sizes for Species Conservation. BioScience, Vol. 31, No. 2, pp. 131-134

Trailla, Lochran W., Corey J.A. Bradshaw, and Barry W. Brook. 2007. Minimum viable population size: A meta-analysis of 30 years of published estimates, Biological Conservation 139: 159–166

Zielinski, W. J., R. L. Truex, G. A. Schmidt, F. V. Schlexer, K. N. Schmidt, and R. H. Barrett. 2004. Resting habitat selection by fishers in California. Journal of Wildlife Management 68(3), 475-492

DFG Species of Special Concern

CBD 2000 Fisher Petition, pgs. 20-21

CBD Fisher CCAA Comments

Tucson • Phoenix • San Francisco • San Diego • Los Angeles • Joshua Tree • Pinos Altos • Portland • Washington, DC

Justin Augustine, Staff Attorney • 1095 Market St., Suite 511 • San Francisco, CA 94103
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State of California Department of Fish and Game

Memorandum

Date **June 24, 2008**

To **Don Koch, Director**
Department of Fish and Game

From **Ann S. Malcolm, General Counsel**
Department of Fish and Game - Office of the General Counsel

Subject : **Legal Standard for Candidacy Determination**

Introduction

The Fish and Game Commission (Commission) received a petition to list Pacific fisher as threatened or endangered under the California Endangered Species Act (CESA). This memorandum outlines the applicable legal standard for the Commission to use when determining whether the petitioned listing of a species as threatened or endangered "may be warranted" pursuant to Section 2074.2 of the Fish and Game Code (FGC), which triggers protection for the species as a candidate for listing under CESA. The Center for Biological Diversity and timber industry representatives have also provided their interpretation to the Department of Fish and Game (Department) on what they believe the standard to be.[1]

The Department has completed its required evaluation of the petition to list Pacific fisher and, along with this memorandum, is forwarding its evaluation report to the Commission. The evaluation report contains a recommendation from the Department that the Commission reject the petition as it does not contain sufficient information to indicate the petitioned action may be warranted.

Applicable Legal Standard

At this stage in the listing process, FGC section 2074.2(a) provides that the Commission is required to consider the petition, the Department's evaluation report and other comments received to determine whether the petition does or does not provide "sufficient information to indicate that the petitioned action may be warranted..." FGC section 2072.3 describes the required information as *scientific* information. The standard that applies to the Commission's decision on candidacy is the same standard the Department is required to apply as it evaluates the petition and prepares its recommendation to the Commission. In accordance with FGC section 2073.5(a), the Department is required to evaluate whether there is or is not "sufficient information to indicate that the petitioned action may be warranted" based on its evaluation of "the petition on its face and in relation to other relevant information the department possesses or receives..." FGC section 2072.3 and associated regulation, 14 CCR section 670.1(d), also specify categories of information that must be included in the petition: "population trend, range, distribution, abundance and life history of a species, the factors affecting the ability of the population to survive and reproduce, the degree of immediacy of the threat, the impact of

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1 Letter from Center for Biological Diversity to Eric Loft, Ph.D dated May 23, 2008; Letter from Green Diamond Resource Company to Dr. Eric Loft dated May 28, 2008.

existing management efforts, suggestions for future management, ...the availability and sources informationL]... information regarding the kind of habitat necessary for species survival, a detailed distribution map, and any other factors that the petitioner deems relevant."

The candidacy standard of "sufficient information to indicate that the petitioned action may be warranted" is higher than the "fair argument" or "substantial evidence" standard found in the California Environmental Quality Act, but lower than the "reasonable probability" standard required for a preliminary injunction, the Third District Court of Appeal ruled in *Natural Resources Defense Council v. Fish and Game Commission* (1994) 28 Cal.AppA[1h] 1104, 1125 *(NRDC).* The court articulated the "sufficient information" standard as follows: the Commission should conclude the petitioned action may be warranted for candidacy purposes when it finds "that amount of information, when considered in light of the Department's written report and the comments received, that would lead a reasonable person to conclude there is a substantial possibility the requested listing could OCCUr.,,2

The *NRDC* ruling specifically rejects the view that a species can become a candidate for listing under CESA only if the Commission concludes the species is more likely than not to be listed at the end of the process. On the other hand, the court opinion recognizes there may be petitions that show a real prospect for listing that is so remote that a reasonable person would not consider it a substantial possibility. In such a case, the "may be warranted" standard would require the Commission to reject the petition.

The candidacy standard is properly viewed as a standard that is less rigorous than the "is warranted" standard that must be employed by the Commission in making its final decision to list a species. The *NRDC* ruling notes that the "may be warranted" standard "stands in sharp contrast" to the Commission's decision whether to actually list the species as threatened or endangered, and thus give the species long-term protection under CESA.[3]

The Third District Court of Appeal acknowledged that the decision necessarily requires the Commission to weigh evidence and exercise its judgment. The process, according to the court, involves taking evidence for and against listing in a quasi-adjudicatory setting, weighing that evidence, and determining, in the Commission's discretion, what is essentially a question of fact.[4]

Importantly, the candidacy standard under CESA as discussed in *NRDC* is also different than the standard governing candidacy determinations under the federal Endangered Species Act (ESA). Similar to CESA, the ESA casts federal candidacy determinations in terms of whether the petition presents substantial information indicating the petitioned action "may be warranted."s Yet, in contrast to the *NRDC* decision under CESA, federal courts have interpreted the federal candidacy standard under ESA as simply turning on whether the petition presents "information that would lead a reasonable person to believe" the petitioned action may be warranted.[6] Indeed, a recent federal trial court decision in California held that ESA's "may

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2 *NRDC, supra,* 28 Cal.App.4[th] at 1125.

3 1d. at 1122.

4 1d. at 1126.

5 16 U.S.C. § 1533(b)(3)(A); see also 50 C.F.R. § 424.14(b)(1).

6 See, e.g., *Moden v. U.S. Fish &Wildlife Service* (D.Or. 2003) 281 F.Supp.2d 1193, *1203-1204; Center for Biological Diversity v. Morgenwick(D.Colo.* 2004) 351 1137 1141.

be warranted" candidacy standard "seems to require that, in cases of ll contradictory evidence, the Service must defer to information that supports [the] petition's position."? The state standard under CESA, in contrast, as interpreted by *NRDC,* sets the candidacy bar higher with a "substantial possibility" requirement. The state standard may be higher, in part, because unlike the federal standard, the "take" prohibition under CESA extends to candidate species.[8]

The Commission will need to refer to the legal standards for listing under CESA to determine whether there is sufficient information to lead it to conclude that there is a substantial possibility of listing. Those standards are found in the definitions of "endangered species" and "threatened species" at FGC sections 2062 and 2067, respectively.

Finally, as you may know, the governing statutes require the Commission to base a candidacy determination on scientific information in the petition or from other sources, not on non-biological factors such as economic consequences of the petition's acceptance. Significantly, the information that FGC section 2072.3 requires to be included in the petition does not include any economic or other non-biological factors. In the *NRDC* opinion, the court stated that candidacy determinations under both CESA and the federal Endangered Species Act were "to be based on science, not economics."g

Conclusion

While various groups providing comments seem to disagree in some part about the appropriate legal standard for the Department's review of the petition and the Commission's decision on whether to make fisher a candidate species, they appear to agree with the Department that the controlling law on this matter is contained in the *NRDC* case. This memorandum attempts to articulate those standards in an objective manner to help guide the Commission as it moves forward in the CESA process.

Thank you for your consideration of these issues. **If** you or the Commission have any questions, please let me know.

cc: California Fish and Game Commission
John Carlson, Jr.
Executive Director

Office of the Attorney General
Deborah L. Barnes
Deputy Attorney General

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7 *Center for Biological Diversity v. Kempthome* (N.D.Cal. January 19, 2007, No. C 06-04186 WHA) 2007 WL 163244.

8 Fish & G. Code, §§ 2080, 2085.

9 *NRDC, supra,* 28 Cal.Appth at 1118, footnote 11.