STATE OF CALIFORNIA

FISH AND GAME COMMISSION

DATE: May 25, 2010

TO: John McCamman, Director

FROM: Jim Kellogg, President *James W Kellogg*

SUBJECT: Request for Confidential Pacific Fisher Status Review Document

I am writing to request that the Department provide to the Commission the Confidential peer review draft of the Pacific Fisher Status Review document. The peer review draft in question has been brought up in public comments at Commission meetings. While I understand that the question of whether to disclose this document has been the subject of some controversy, I believe that providing the draft to the Commission will help to put the matter to rest.

cc: Richard Rogers, Vice President
Michael Sutton, Commissioner
Daniel Richards, Commissioner
Donald Benninghoven, Commissioner
John Carlson, Executive Director

State of California -The Natural Resources Agency **_ARNOLD SCHWARZENEGGER_**, _Governor_
DEPARTMENT OF FISH AND GAME **_JOHN McCAMMAN,_** _Director_
1416 9th Street, 12th Floor
Sacramento, CA 95814
www.dfg.ca.gov

May 25, 2010

Mr. Jim Kellogg, President
California Fish and Game Commission
[address omitted]

Subject: Confidential Peer Review Draft of Pacific Fisher Status Review

Dear Mr. Kellogg,

Enclosed in response to your letter of May 25, 2010, is a copy of the January 2010 confidential draft of the now final Status Review for Pacific fisher (*Martes pennanti*) (February 2010). The Department of Fish and Game previously provided this confidential draft to a select group of individuals for peer review, pursuant to Title 14 of the California Code of Regulations, section 670.1(f)(2). The Department submitted its final Status Review to the Fish and Game Commission in Ontario, California, on March 3, 2010. The final Status Review is currently the subject of additional, public scientific review initiated by the Department on May 5, 2010. The Department is providing the Commission with a copy of the confidential peer review draft in the interest of best available science. At the same time, the Department will make this peer review draft available to the public by placing it on the Department's website. We do so, however, with the view that the peer review draft is confidential and not otherwise a public record subject to disclosure under the California Public Records Act. We release this confidential peer review draft with this reservation, as a result, reserving the same rights, privileges, and arguments in the future, specifically with regard to the Department's deliberative process privilege, all without waiver in this instance.

The Department will be happy to address the changes made to this draft, as reflected in the final Status Review, at the Commission's meeting in Folsom, California, on June 23-24, 2010.

Sincerely,

John McCamman
Director

Enclosures

cc: John Carlson, Executive Director
Fish and Game Commission

STATUS REVIEW OF FISHER IN CALIFORNIA
Report to the Fish and Game Commission
***** DRAFT January 23, 2010 *****

Introduction

Petition History

The Center for Biological Diversity (CBD) submitted a petition on January 23, 2008, seeking action by the Fish and Game Commission (Commission) to list the 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 § 2073 of the FGC, on January 31, 2008, the Commission transmitted the petition to the Department of Fish and Game (Department) for review.

The Department had a 90-day period to review the petition and make one of the two following findings:

• Based upon the information contained in the petition, there was sufficient evidence to indicate that the petitioned action may be warranted and the petition should be accepted and considered; or
• Based upon the information contained in the petition, there was not sufficient evidence to indicate that the petitioned action may be warranted, and the petition should not be accepted and considered.

The Department requested a 30-day extension to complete the evaluation and was granted that request. The Department found that the information in the petition was insufficient to indicate the petitioned action may be warranted, and recommended the Commission reject the petition (CDFG 2008). At the August 7, 2008 Commission meeting regarding the fisher petition, the Commission discussed the Department's evaluation report, recommendation, and public testimony, and voted to reject the petition.

On March 4, 2009, the Commission voided and set aside its August 7, 2008 decision rejecting the petition, and voted to accept the petition to list the fisher as an endangered or threatened species. A Notice of Findings was published in the California Regulatory Notice Register on April 24, 2009, designating the fisher a candidate species, thereby starting the candidacy period and the one year status review process. A candidate species is defined as a native species or subspecies of bird, mammal, fish, amphibian, reptile, or plant the Commission has formally noticed as being under review by the Department for addition to either the list of endangered species or the list of threatened species. The Commission also adopted a special order pursuant to FGC Section 2084 to provide for incidental take of fisher under specific circumstances during the candidacy period. The Department's status review of fisher in California is due to the Commission no later than April 23, 2010.

<u>Department Review</u>

This report, pursuant to FGC Section 2074.6, details the Department's review and recommendations to the Commission regarding the proposed listing of the fisher as a threatened or endangered species under CESA. The discussion and analysis set forth below is based on the best scientific information available. Further, this status review identifies habitat that may be essential to the continued existence of the species and suggests management activities and other recommendations for recovery of the species.

The Department contacted affected and interested parties, invited comment on the petition, and requested scientific information that may be available, as required under FGC Section 2074.4. The Department mailed a public notice and solicitation of information on June 26, 2009, to affected and interested parties (Appendix A). The Department also posted a 30-day notice on its website on September 2, 2009 to solicit information, and we produced a news release on September 3, 2009 to solicit information (Appendix B).

In an attempt to obtain and review all available information on fisher in California, Department staff contacted scientists, agency personnel, landowners, researchers and others for available information. Information provided to the Department by the scientific community and knowledgeable parties is vital to the completeness of this review. In addition, the Department provided a draft version of its status review to several qualified experts for peer review. The list of scientific experts and their peer review comments to the

Department regarding fisher are contained in Appendix C.

We considered all of the peer review comments received, and most of their comments have been incorporated into this report. In some cases, we were unable to incorporate the information or respond to particular questions, because we needed more information in order to properly address the issue at hand, or discussion with experts was needed before definitive conclusions could be drawn. Additionally, there are some areas where additional research is needed before definitive conclusions can be drawn.

Finally, the Commission and Department received 14 letters commenting on the listing petition and the status of the fisher as a candidate species under CESA (Appendix D). Twenty-one percent opposed listing, 36% supported listing, and 43% declined to state support or opposition.

Fisher as a Species of Special Concern and a Federal Candidate for Listing

In 1986, the fisher was designated as 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 fishers, especially where talus and rock crevices are unavailable”.

The fisher is still considered 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. The species on this list were used 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. The fisher is one of several species selected to illustrate conservation issues within the Sierra Nevada and Cascade bioregion. 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…", 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 U.S. Fish and Wildlife Service (Service) issued a 12-month finding on a petition for listing the fisher under the federal Endangered Species Act (ESA) (USDI 2004). The Service 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 fisher is currently designated a candidate species under ESA.

Life History

Species Description

The fisher is a member of the order Carnivora, family Mustelidae. The mustelid family includes martens, weasels, mink, and otters. Fishers have a slender weasel-like body with relatively short legs and a long well-furred tail (Douglas and Strickland 1999). Fishers appear uniformly black from a distance, but in fact are dark brown over most of their bodies with white or cream patches distributed on their undersurfaces (Powell 1993:3). The fur on the head and shoulder may be grizzled with gold or silver, especially in males (Douglas and Strickland 1999). The fisher's face is characterized by a sharp muzzle with small rounded ears (Grinnell et al. 1937), and forward facing eyes indicating well developed binocular vision (Powell 1993:3). Sexual dimorphism in body size is pronounced, with females weighing between 2.0-2.5 kg (4.4-5.5 lbs) and ranging in length from 70-95 cm, and males weighing between 3.5-5.5 kg (7.7-12.1 lbs) and ranging from 90-120 cm long (Powell 1993:3-4).

Fishers are commonly confused with the smaller American marten (*M. americana*), which is lighter in color (cinnamon to milk chocolate), has an irregular cream to bright amber throat patch, and has more pointed ears and a proportionately shorter tail (Lewis and Stinson 1998). Fishers have a single molt in late summer and early fall, and shedding starts in late spring (Powell 1993). The molting of hair on the tail can be extensive, giving the appearance of a “rat-tail” in some individuals.

Fishers are seldom seen, even where they are abundant. Although the arboreal ability of fishers is often emphasized, most hunting takes place on the ground (Coulter, and Powell *in* Douglas and Strickland 1999). Females, perhaps because of their smaller body size, are more arboreal than males (Powell, and Pittaway *in* Douglas and Strickland 1999).

Taxonomy

The fisher (*Martes pennanti*) is one of the larger members of the weasel family (Mustelidae), belonging to the subfamily Mustelinae, and genus *Martes*. The fisher is the only extant member of the subgenus *Pekania* and the largest member of the genus *Martes* (Anderson 1994). Goldman *in* Powell (1993:14) found evidence of three subspecies: *Martes pennanti pennanti* (eastern and central North America), *M. pennanti columbiana* (Rocky Mountains), and *M. pennanti pacifica* (West Coast of North America). However, Grinnell et al. (1937) found no evidence of subspecies differentiation after examining morphology and pelage characteristics of fisher from Maine, Quebec, Washington, and California. Hagmeier *in* Douglas and Strickland (1999) also concluded the subspecies could not be separated on the basis of pelage or skull characteristics. Thus, for the purposes of this report as part of the listing petition process, and until new scientific information is provided, we use *Martes pennanti* as the taxonomic designation for native fishers found in California historically, and at this time.

Genetics

Recent genetic studies and review papers have shown evidence of population subdivision in fishers, especially among populations in the western U.S. and Canada (Drew et al. 2003, Aubry and Lewis 2003, Wisely et al. 2004). In California, the northern fisher population differs strongly in haplotype frequencies from the southern Sierra population, and from fisher populations elsewhere (Drew et al. 2003, M. Schwartz, August 21, 2009 letter in Appendix E). Wisely et al. (2004) found evidence that genetic diversity followed a latitudinal gradient, decreasing from the northern extent of fisher range in British Columbia to the southern region of the Sierra Nevada Mountains in California. The pattern of decreasing genetic diversity with decreasing latitude holds true for measures of heterozygosity, allelic richness, number of unique alleles, and effective population size within the Pacific coast distributional peninsula from British Columbia to the southern Sierra Nevada (Wisely et al. 2004).

When compared to the continental core of fisher range (Kyle et al. 2001), genetic diversity measures are much lower in the Pacific coast region (Wisely et al. 2004). In fact, heterozygosity estimates in the Pacific coast periphery region were less than half of those within the continental core (Wisely et al. 2004).

Concurrently, levels of genetic structure within the Pacific coast region are very high (Aubry and Lewis 2003, Drew et al. 2003), among the highest reported for a mammalian carnivore (Wisely et al. 2004). This high degree of genetic structure coupled with low gene flow and population isolation is epitomized in the two southern Sierra Nevada populations. These populations are separated by the Kings River within <100 km of contiguous forest, yet exchange on average only 1 migrant every 50 generations (Wisely et al. 2004). However, a current study is investigating the connectivity of the populations separated by the Kings River, and preliminary analyses show higher genetic exchange rates than found by Wisely et al. (2004), based on a higher number of samples (J. Tucker, August 21, 2009 letter in Appendix E).

Recent genetic analyses indicate the 2 fisher populations in California (northern California and southern Sierra Nevada) have apparently been separated for thousands of years (M. Schwartz, August 21, 2009 letter in Appendix E). If these preliminary genetic findings hold true with further analyses, the driving ecological forces need thorough investigation, discussion, and rigorous review by fisher scientists. If fisher movements were constrained even under pre-European settlement conditions, it is likely that constraints are now multiplied given the anthropogenic changes that have occurred in the forested landscape over the last 200 years or more.

Additionally, recent genetic studies in the eastern Klamath province of northern California indicate that fishers in the study area are native to northern California and not similar to haplotypes found in introduced fisher in southern Oregon (S. Farber, August 14, 2009 letter in Appendix E). Thus, the translocated fishers (from Minnesota and British Columbia) in southern Oregon have not expanded their range beyond a relatively small area since the last translocation in 1981 (Aubry and Lewis 2003). The authors believe this suggests that suitable habitat in surrounding areas may be inadequate to support fishers.

Food Habits

Fishers are opportunistic, generalist predators with a diverse diet including mammalian and avian prey, ungulate carrion, vegetation, insects, and fungi (Grenfell and Fasenfest 1979, Powell 1993, Martin 1994). Throughout their continental range, reported prey items include: porcupines (*Erethizon dorsatum*), snowshoe hares (*Lepus americana*) squirrels (Sciuridae), mice and voles (Muridae), moles and shrews (Talpidae and Soricidae), carrion of deer and moose (Odocoileus sp. and *Alces alces*), other carnivores such as grey fox (*Urocyon cinereoargenteus*), skunks (Mephitinae) and raccoons (*Procyon lotor*), bats (*Myotis* sp), reptiles (Squamata and Anguidae), amphibians (Caudata), insects including beetles (Coleoptera), wasps (Vespula sp.) and ants (Formicidae), plant matter such as *Arctostaphylos* sp., and hypogenous fungi (Grenfell and Fasenfest 1979, Powell 1993, Martin 1994, Zielinski et al. 1999, Zielinski and Duncan 2004, Golightly 2006).

While California fishers share some general dietary similarities with fishers across the continental range (Golightly et al. 2006), fisher diet in California tends to be more diverse than described elsewhere in North America. Furthermore, it has been proposed that diet diversity is highest in coastal areas of Pacific states (Martin 1994, Zielinski et al. 1999, Zielinski and Duncan 2004, Golightly et al. 2006).

Both Powell (1993) and Martin (1994) comprehensively summarize studies on fisher diet across their range in North America. Unlike fishers elsewhere in their range, reptiles comprise a regular component of fisher diet in both the Klamath Bioregion population and the Southern Sierra Nevada population (Golightly et al. 2006). In addition, previous dietary studies across North America have found fishers to frequently specialize on porcupine and/or snowshoe hares (Powell 1993, Martin 1994, Weir et al. 2005). However, in California, both the Klamath Bioregion and the southern Sierra Nevada sites show extremely low occurrences of lagomorphs and porcupine in the diet (Golightly et al. 2006, Zielinski et al. 1999, Zielinski and Duncan 2004).

Variation in diet with season or sex appears to be weak. In the southern Sierra Nevada, Zielinski et al. (1999) noted that consumption of deer carrion increased slightly during winter months and consumption of plant material increased with its availability in summer and autumn. Likewise, no significant sex difference in diet has been demonstrated throughout the fisher's range in the U.S. and Canada (Giuliano et al. 1989, Kuehn 1989, Powell 1993, Martin 1994). However, some variation did occur with proximity to the coast in northern California where sciurids were favored at interior sites and woodrats (*Neotomas sp.*) were favored at coastal sites. With this finding, Golightly et al. (2006) cautioned the characterization of the fisher diet as simply opportunistic, stating fishers were influenced by habitat and energetic issues as well. Some variation in diet with age has been documented in the eastern U.S. where juveniles eat more fruits than yearlings and adults, possibly because they have not yet become adequate hunters (Giuliano et al. 1989).

Reproduction

The fisher breeding season generally lasts from late February to late April (Wright and Coulter 1967, Leonard 1986, Powell 1993:53). Fisher reproductive biology is distinct in that the gestation period lasts for almost a year, but implantation of the blastocyst is delayed for approximately 10 months (Wright and Coulter 1967, Powell 1993:53). During this time of embryonic diapause, the blastocyst remains in a state of arrested development until implantation is induced by increasing photoperiod (Powell 1993:53). This system of embryonic diapause allows for breeding in late winter, when it is energetically efficient for adults and still gives kits enough time to develop before the following winter (Arthur and Krohn 1991, Powell 1993:57).

Active pregnancy follows implantation in late February for an average period of 30 to 36 days (Powell 1993:53, Frost et al. 1997). Parturition typically occurs in late March or April following active pregnancy after which females are receptive for breeding within 7-10 days (Powell 1993:53, Mead 1994, Frost et al. 1997). It is theorized that ovulation is induced by copulation, although little evidence exists for this (Powell 1993:47, Frost et al. 1997).

Average litter size is between 2-3 kits with a range from 1-4 (Powell 1993:50-53). Raised in a den entirely by the female, young are born altricial with eyes and ears closed, weighing between 40-50 g (Zielinski and Powell 1994). The kits' eyes open at 7-8 weeks old. They remain dependent on milk until 8-10 weeks old, and are capable of killing their own prey at around 4 months (Powell 1993:62-70, Zielinski and Powell 1994). Juvenile females and males become sexually mature and establish their own home ranges at 1 year (Wright and Coulter 1967, Arthur et al. 1993). Although, some have speculated that juvenile males may not be effective breeders at one year due to incomplete formation of the baculum (Powell and Zielinski 1994).

Fishers have a low annual reproductive capacity (Heinemeyer and Jones 1994, Lewis and Stinson 1998, Lamberson et al. 2000). Due to delayed implantation, females must reach the age of 2 before being capable of giving birth. According to Truex et al. (1998), only 50-60% of females in the southern Sierra Nevada were found to be lactating from 1994-1996. Concurrently, the same review paper recorded wide fluctuations in lactating females on the north coast of California: 73% (8 of 11) of females were lactating in 1995, but only 14% (1 of 7) of females were lactating in 1996, although sample sizes were small. Another recent study in the Hoopa Valley of California reported 62% (29 of 47) of denning opportunities were successful in weaning at least one kit from 2005-2008 (Higley and Mathews 2009).

Range and Distribution

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 fishers 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.

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 omits some forested areas that were likely occupied by fisher, at least prior to European settlement 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 (*Sequoia sempervirens*) 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 include the following items as evidence that fisher occurred historically in the coastal zone of California: "From reliable testimony we conclude that *formerly* [emphasis added] 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 fishers 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 fishers" (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* [emphasis added] 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 fishers 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).

The overall distribution of fisher in California was described by Grinnell et al. (1937:214-215) as occurring: "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 earlier than Grinnell's work, when Dixon (1925) concluded that the California fisher population was dangerously close to extinction and proposed that measures be taken to protect the species from trapping. However, it was not until 1946 that trapping for fisher was prohibited (Gould 1987).

Grinnell et al. (1937) cite trapping as one reason for the reduction of fisher in California, but they also cite habitat loss due to 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.

It is well documented that timber harvest 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 Europeans 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, habitat loss and changes were underway, coupled with trapping pressure. 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., mining effects, timber harvest, fire suppression, and sheep grazing) are summarized in Sudworth (1900), McKelvey and Johnston (1992), and Beesley (1996).

From the historic information described above, more recent information summarized below, and from forest vegetation distribution, the Department's "California Wildlife Habitat Relationships" (CWHR) program prepared a range map for fisher in California (Figure 2); in this figure, the CWHR range is depicted in comparison to the Grinnell et al. (1937) range. The CWHR range was also utilized recently in a paper describing fisher habitat models in California (Davis et al. 2007).

As part of analyzing the current range and distribution of the fisher in California, and in order to determine the percentage of range that has been lost, we compiled as much information as possible during the petition review and status review periods. We utilized records from the California Natural Diversity Database (CNDDB), maintained by the Department, and other databases on fisher maintained by the Department. Additionally, we digitized some occurrence points from reports that were provided during the petition and status review periods, and contacted researchers, and private and public sources for fisher occurrence information. The results of our compilation of historic and recent records are depicted in Figure 3. The records are broken down 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;

1925 -1946 covers the period after the Grinnell et al. (1937) map through the end of the trapping season for fisher;

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

1988 – 2009 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, or another mustelid, or some other forest carnivore. Aubry and Jagger (2006) note 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 by experienced/trained biologists, naturalists, foresters, and trappers. Although all 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, and correspond closely with the CWHR range. Records of fishers 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 _ (maps created by the Service 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 first map (Figure 1) in Appendix _: “*Points represent presence only and do not imply abundance or density*”. Comparing these maps (Figure 3; and Figures 1 and 2 in Appendix _) reveals two main areas of fisher occurrence in California today: northern California (including the Yolla Bolly Wilderness/Mendocino National Forest area) and the southern Sierra Nevada.

In the redwood zone of northern California, systematic efforts to better define the current range and distribution of fisher by verifiable and repeatable methods included work in Del Norte and Humboldt counties (Beyer and Golightly 1996), and in Mendocino county (Douglas 2008, Nelson and Valentine 2008). Neither of the latter two studies detected fisher. The most systematic and broadscale work in other parts of the state occurred from 1989-1994 (Zielinksi et al. 1995), from 1996-2002 (Zielinski et al. 2005), and from 2002-2009 (USDA 2006, USDA 2008, Truex et al. 2009). The results of the survey effort for the 1996-2005 period on federal lands is shown in Figure 4, and the previously mentioned 2 areas of fisher concentration in northern California and the southern Sierra Nevada are readily apparent. Fishers were not detected across an approximately 430 km region, from the southern Cascades (eastern Shasta County) to the southern Sierras (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 is of concern primarily because the gap is more than four times the known maximum dispersal distance for fisher (100 km; York 1996). The reduction in historic range in the Sierra Nevada is most likely due to a combination of loss of mature forest habitat (see Figure 3, page 24 in the petition), residential development (see Figure 5, page 40 in the petition), and the latent effects of commercial trapping (Zielinski et al. 2005). This gap in distribution stands in contrast to the range map and statement in Grinnell et al. (1937:215) that fisher occurred "…throughout the main Sierra Nevada". Given the natural distribution of forest vegetation in California, there is no reason to doubt this description of fisher range by Grinnell and colleagues. The Department acknowledges that a few fisher may yet exist in the Sierra Nevada, however, if they do, their numbers are so low as to make them undetectable via standard methods that are known to be effective at detecting fisher. Such an extremely low density would also be cause for concern.

Because recent surveys in Mendocino County have failed to detect fisher, and due to the paucity of sighting records for fisher 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 as well. The early timber harvest and trapping that occurred in this region of the State also led to the extirpation of a close relative of the fisher in Mendocino and Sonoma counties, the marten, specifically in California, the Humboldt marten (*M. a. humboldtensis*) (Zielinski et al. 2001). Thus, two native forest carnivores are now extirpated from the coastal redwood zone in Sonoma and Mendocino counties, indicating how much the landscape has changed since European influence. For fisher, the total extent of historic range lost in California is estimated at approximately 43% (Figure 5).

Land ownership patterns in fisher range

In order to better understand land management and land use factors that may be effecting fisher distribution and abundance, and to help analyze the severity of threats to fisher,

Figure 6 was created. The pie chart in the lower left-hand corner of this figure breaks down land ownership percentages within the CWHR range of fisher in California. The majority of fisher range is in various federal ownerships (approximately 62% overall), with USDA Forest Service (USFS) land at approximately 52%, and National Park Service (NPS) lands at approximately 7%. Private lands make up approximately 37% of the total fisher range, and tribal lands are included within the private land total, though tribal lands represent a small percentage. State lands make up only about 1% of fisher range. However, distribution of the various ownerships is complex, with a large amount of private land in the coastal zone of northern California from Sonoma county northward, and scattered private lands, sometimes in larger blocks, and other times in checkerboard pattern with USFS and NPS lands, from northcentral California to Tuolumne county (just north of Yosemite National Park). Much of the currently occupied fisher range is associated with large blocks of USFS ownership, e.g., Salmon Mountains, Marble Mountains, Trinity Alps, Yolla Bolly Wilderness, and Mendocino National Forest. The southern Sierra Nevada is unique with the large concentration of USFS and NPS lands where fisher still occur today, south of the Merced River. Because fisher do not recognize these administrative boundaries, populations should be managed regionally and cooperatively across such ownerships in order to maintain viable populations and to allow for natural recolonization of historic range, if feasible.

In order to have a better understanding of the available habitat and federal ownership patterns in the southern Sierra Nevada, Figure 7 was created. 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. More detailed maps of habitat suitability for this population can be found in Spencer et al. (2007). Because fisher have rarely been detected very far north of the Merced River in the last 20 years (L. Chow, pers. comm), and because surveys on the Stanislaus National Forest have failed to detect fisher (J. Buckley, pers. comm.) it is clear from Figure 7 that habitat is restricted for this population

Road Effects on Fisher Distribution

As another aspect of analyzing current distribution of fisher in California, Figure 8 was created and depicts various levels of roadways in fisher range, from Interstates to unpaved

USFS roads. Of management and conservation interest, this figure shows fewer roads in northwestern California, Mendocino National Forest/Yolla Bolly Wilderness, and the southern Sierra Nevada, all areas where fisher still exist today. On page 38 of the petition, it is noted that the northern Sierra Nevada, in particular, is heavily dissected by roads; that is readily apparent by reviewing Figure 8. Direct mortality of fisher from car strikes is one main threat from roads. Past and recent (ongoing) studies in the southern Sierra have documented road kill as a high mortality factor (Truex et al. 1998, R. Barrett, pers.comm).

Roads are an additional type of habitat fragmentation in addition to timber harvest effects, development, and catastrophic fire effects on habitat. Known and potential effects of roads on fisher are also discussed in the Threats section of this report.

Additional Information on Range Contraction

On page 15, the petitioners state 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 petitioners cite reports by Zielinski et al. (2005) and Weinberg and Paul (2000) (incorrectly cited in the petition as being prepared in 2007). They also cite surveys conducted on Jackson State Forest in coastal Mendocino county in 2006.

Zielinski et al. (2005) addressed historic and current carnivore distribution in the southern Cascades and Sierra Nevada; we found no reference in the paper to a range contraction for fisher in northwestern California. Zielinski et al. (2005) does provide evidence that the range of the fisher in *northeastern* California has contracted (*i.e*., south and east of a line roughly approximated by Highway 299 in eastern Shasta County).

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, fishers were detected in the Black Butte watershed but not in the Stony watershed. Thus, the lack of fisher detections in the Stony watershed is one piece of evidence cited in the petition for a northward range contraction of fisher distribution in northwestern California.

However, the petition did not include reference to more recent carnivore surveys conducted on the Mendocino National Forest (Slauson and Zielinski 2007). Those surveys detected fishers 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, fishers appear to be distributed throughout most of the historical range included in the geographic extent of our surveys." 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 there has been a reduction in the overall number of locations historically occupied by fishers.

It is possible that the range of fishers may have expanded westward in coastal northwestern California, though such a conclusion is contradicted by information cited earlier in this section from Grinnell et al. (1937). It may be more of a change in abundance at least temporally in some locales, due to timber harvest practices and the fast growth rate of coast redwoods. 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 fishers 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 fishers were increasing in Humboldt and Trinity counties (the Department believes this could be related to recovery from trapping) and the authors attributed it as possibly related to the increase in porcupines (*Erethizon dorsatum*) 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 1971). It may be that fisher responded to this change in prey type or abundance, but it is difficult to definitively draw that conclusion because there is only sighting data to rely on from Yocom (1971) and from Yocom and McCollum (1973); no rigorous quantitative studies were undertaken of fisher or porcupines.

As noted earlier, Appendix _ contains two fisher distribution maps that were contained in supporting documents written by the Service for the Sierra Pacific Industries Candidate Conservation Agreement with Assurances. The distribution of these recent (1995-2008) fisher observations mapped from several studies and surveys conducted throughout northwestern California (exclusive of the coastal zone in Mendocino, Sonoma, and Marin counties) is roughly similar to the distribution of 1919-1924 trapping locations mapped by Grinnell et al. (1937). However, it must be emphasized that neither the modern observations nor the historic trapping locations represent complete surveys of fisher distribution during each period. The historic records from the map in Grinnell et al. (1937), in particular, only represent the fishers reported to have been trapped during a five year period. However, these records and other records housed by the Department largely remain the best data available on the historic distribution of fishers in California, and comparisons of historic and current distributions can provide valuable information regarding the current status of a species (Zielinski et al. 2005). One area in California 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), it appears the forested region is naturally connected to occupied fisher habitat to the west. This gap in historic and current knowledge of fisher distribution is indicated by a map depicting results of some fisher survey efforts in the vicinity (see Davis et al. 2007, Figure 1).

Summary

Fisher distribution in California today is limited to two populations, the northern California population and the southern Sierra population. These two populations are separated by approximately 430 km. Fisher have apparently been extirpated from Marin, Sonoma, and most of Mendocino county, and generally between the Pit River in the northern Sierras/Cascades to the Merced River in the southern Sierra. Thus, approximately 43% of historic range no longer has fisher present, or fisher are extremely rare. The range loss is best explained as the result of habitat loss due to timber harvest, along with overtrapping. On page 15 of the petition, loss of fisher in the northern Sierra Nevada is attributed to a combination of factors along with timber harvest and trapping. The other factors noted from various publications include: road building concurrent with logging, rapid population growth, and development. The Department concurs with this assessment, and these other factors are discussed in more detail in the Threats section of this report. As noted later in the Abundance, and Population Trend sections of this report, other considerations in assessing status of a species are population size and population trend.

Kind of Habitat Necessary for Survival

Primary habitat 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). In general, based on a number of studies in eastern North America and in California, 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 also appears to be an important habitat component even for foraging habitat. Presumably, fisher are usually foraging when detected with track plate devices or cameras. Two track-plate studies occurred in and near the coast redwood ecosystem, and canopy cover was uniformly high at sites where fisher were detected, and where they were not detected, apparently due to the fast growth rate of redwood and timber harvest practices in that region (Beyer and Golightly 1996, Klug 1997). In another track plate study in the southern Sierra, canopy cover ≥40% was associated with fisher detections (Green 2007).

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 populations fluctuate with populations of prey, and fisher population densities vary with habitat and prey (Powell and Zielinski 1994). In essence, fishers have to balance their need to obtain prey resources year-round and to avoid predation on themselves or their young, 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 utilized 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 fishers 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 chryosphylla*), Douglas-fir (*Pseudotsuga menziesii*), Big-leaf maple (*Acer macrophyllum*), Incense Cedar (*Calocedrus decumens*), 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. 2008, Reno et al. 2008).

Den and Rest Site Attributes

Appendix _ contains a compilation of den and rest site attributes from select studies in California and elsewhere. A summary table description of natal and maternal dens and surrounding habitat from 3 study areas in California is also 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 noted above 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. 2008; den sites on Hoopa Tribal Forestry land, in Appendix B), and with ongoing studies in the southern Sierra. Large sample sizes of natal and maternal den sites are available from Hoopa now that over 3 years of field work have occurred.

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 30-44in., 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 Service for SPIs CCAA 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 Sierras, fishers 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). In another study in the southern Sierras, Mazzoni (2002) also noted that infrequent re-use of rest trees suggested a need for numerous quality rest sites within the home range of an individual fisher. Her findings also suggested large trees (related to occurrence of large snags and logs), along with dense and multi-layered canopies contributed to quality resting habitat for fishers. Older, large trees have structural attributes suitable for fisher resting such as cavities, large branches and mistletoe brooms, along with dense canopies that younger trees may lack. In her particular study area, there was a high incidence of dwarf mistletoe broom in rest trees. 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.

The following discussion of rest sites is taken from Zielinski et al. (2004a): “Because large trees had such a prominent influence on resting-site selection in each of the top models, managers can have direct effects on the resting habitat of fishers by favoring the retention and recruitment of trees that achieve the largest sizes possible. These are the trees that host most resting structures, and also characterize the vegetation near the structure. We discovered infrequent reuse of the same resting structure, which indicates that fishers use-and may require many large trees, snags, and logs distributed within home ranges. The resting trees, and in many cases, the trees in their immediate vicinity were among the largest standing live and dead trees within fisher home ranges. The objective of recruiting and retaining large trees should not overshadow, however, the goal of encouraging structural diversity; standard deviation of dbh was included in the Sierra model. This observation suggests that developing stands that include variation in the size of trees may be beneficial. We agree with Weir and Harestad (2003) that the maintenance of large structural elements at small scales may mitigate for the negative effects of large-scale alterations of habitat. However, we cannot at this time recommend standards for the optimal distribution of resting-structure types across a landscape".

For managers and biologists, the challenge for the future is to design or attempt to design larger managed landscapes across multiple ownerships for fisher population viability. It is clear that fisher need late seral elements for rest and den sites, and that such elements need to be recruited for future use. It is also clear that high canopy cover and complex forest structure should be maintained, but in landscapes managed for timber production, it is not known exactly how to manage the forest landscape to allow high timber production while simultaneously protecting and enhancing fisher populations. This is complicated by the fact that large live trees are among the most slowly renewing elements of the forest and are dominant elements in forest communities. Conifers and hardwoods may take hundreds of years to develop the size and the decadence necessary to be used by fishers for resting (Zielinski et al. 2004a).

Comments on Fisher Habitat Received During Petition Review Period

Two literature reviews of fisher habitat associations were submitted as comments on the petition by the California Forestry Association (Mader 2008, Gorham and Mader 2008). The Mader (2008) report in particular characterizes the petition's statements about the fisher's reliance on "late successional forest" as incorrect and misleading. Both review papers appear to conclude that fishers are typically associated with dense canopy forests and rely upon relatively large and decadent trees for resting and denning, while pointing out that some studies have also observed fishers in more open habitats. The Department does not believe the petition is materially misleading in its characterization of the habitat associations of fishers. 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 Department believes the fisher’s association with late successional forest attributes is a key factor in the management of the species.

Several comment letters (e.g., Carr 2008, Tomascheski 2008, Ewald 2008) disagreed with the petition’s characterization of fishers as associated with forests with late seral characteristics, such as dense canopy and abundant large snags, decadent trees, and logs. Most of the studies cited in the petition to support this premise are peer-reviewed publications or Master’s theses and do, in fact, suggest that fishers select areas with these older forest characteristics. And, in balance, the petition also cites Klug’s (1997) thesis project on Green Diamond Resource Company (formerly Simpson Timber Company) lands which did not find a stand age-effect on fisher detections at track plate stations.

The aforementioned comment letters cite several unpublished reports submitted during the evaluation period (Self et al. 2008, Diller et al. 2008) as demonstrating fishers lack a strong association with late seral forests. Most of these studies (see Self et al. 2008) simply indicate fishers occur on industrial timberlands without a quantitative discussion of habitat conditions at the site, stand, or landscape scale. An exception is the Green Diamond occupancy model prepared for fisher foraging habitat, which indicated increasing use by fishers 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 fishers in this study. Other variables such as stand age, slope position, tree height, and stand interior area, among several others, did not affect the probability of detecting fishers. The results related to amount of 21-40 year old stands do not contradict the characterization of fishers 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.

Likewise, the unpublished study of fisher den sites in the Sacramento Canyon and Hayfork Summit study areas submitted by SPI (Reno et al. 2008) does not contradict the notion that fishers 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 well 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 fishers and areas within the extirpated range in the Sierra Nevada. However, it is unclear how the areas identified as “occupied” were determined to be occupied, or in fact whether these plots simply fall within the portion of the historic range considered still occupied. If the latter, then habitat associations with these plot data would have limited value.

Snags

In general, Private Industrial and Private Non-Industrial timber lands have 40 percent fewer snags of all size and decay classes than are found on National Forest reserve lands (3.7 per acre versus 6.2 per acre). The relative abundance of large snags across ownerships and management emphasis is also noteworthy. Private Industrial and Private Non-Industrial ownerships possess 70 (0.3 snags per acre) and 80 (0.2 snags per acre) percent fewer snags of greater than 30 in dbh, respectively, than do National Forest reserve lands (Calif. Dept. of Foresty and Fire Protection 2003).

This lack of one essential habitat element that is affected by timber harvest practices, coupled with other threats described later in this report, probably contributes to fisher population persistence in only 2 distinct geographic areas in California at present, with no indication that dispersal is occurring at the edges of these populations.

Forest Fire

Another essential habitat element for fisher in California is fire. 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 catastrophic fires that have the potential to destroy and heavily modify fisher habitat (see the Threats section of this report for further discussion of catastrophic fire). For the Sierra Nevada, Campbell et al. (2000) noted the following: "Logic dictates that fisher must be adapted to the natural frequent fire pattern historically common in lower- to mid-elevations due to long-term persistence in these habitats. However, the present situation is unique in all of the fisher's evolutionary history: individuals and their habitat are, and have been, impacted by many human-caused changes within a very short period of time (just over a century), with which they have not evolved. These changes have been made by activities including timber harvest, livestock grazing, roads, predator and pest control, recreation, mining, and urban development in a State with 32 million human inhabitants. Each of these factors acts in a yet-to-be quantified manner upon individual fisher, populations, and habitat, and may combine in a negatively synergistic fashion. Added to those stressors, potential effects of rapid-rate, large-scale reintroduction of fire into the ecosystem are unknown".

Abundance

Fishers are generally not considered to be an abundant species given their place near the top of the food web as a carnivore. Grinnell et al. (1937:227) noted that "Fishers are nowhere abundant in California. Even in good fisher country it is unusual to find more than one or two to the township". This may have been somewhat of an overstatement in the context of an unharvested population, but given that trapping was occurring and had been occurring, along with habitat loss, there is probably some validity to it, at least in locales that trappers worked heavily. However, there are no rigorous studies on historic fisher density in California that we can rely on at this time. What is generally understood, is that fisher have seldom been considered to be common anywhere, and that fisher population densities are low relative to other mammals, and can undergo fluctuations that are related to their prey (Powell 1993:78, Powell and Zielinski 1994).

Northern California

In a petition to list the fisher pursuant to the federal Endangered Species Act (Greenwald et al. 2000), CBD cited a preliminary estimate by Dr. Carlos Carroll of 1,000-2,000 fishers in northern California. According to the petition, the estimate was based primarily on a probability model of likelihood of fisher detection (Carroll et al. 1999) and density estimates derived primarily from the Hoopa Valley Indian Reservation. To develop the estimate, Carroll assumed fishers have 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.

In April 2008, Dr. Carroll indicated that his analysis of fisher data sets from both the Hoopa Reservation and the Six Rivers National Forest in northwestern California suggest a regional (northern California and a small portion of adjacent Oregon) fisher population of 1,000-3,000 animals (C. Carroll, pers. comm.). This estimate represents the rounded outermost bounds of the 95% confidence intervals from the analysis. Carroll acknowledges a substantial lack of certainty regarding the population size, as evidenced by the broad range of the estimate. However, he believes that this estimate is useful for general planning and risk assessment.

As additional information to be considered during the Department's evaluation of the petition, Self et al. (2008x) derived two separate "preliminary" estimates of the California fisher population. The authors compiled or developed fisher density estimates for specific locations based on previous field studies. Using these density estimates, the authors used a "deterministic expert method" and an "analytic model based approach" to estimate regional population values. The "deterministic expert" approach involved extrapolating the density estimate values from the specific studies to larger geographic areas in the vicinity of the study areas, 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 5000 feet in the north to 8000 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. (2008x) generated several hypotheses about environmental conditions that might affect fisher density. For each hypothesis they described independent variables which could be used to explain and test each hypothesis, and developed a regression model to determine which combination of independent variables best explained the 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 fishers within each township in the occupied range.

The deterministic expert method provided an estimate of 3,079 fishers in northern California, and the model-based regression method estimate was 3,199 (95% confidence interval [CI]: 1,848 - 4,550) fishers. Estimates for the southern Sierra population were 598 and 548 (95% CI: 247 – 849) fishers, respectively. While cautioning that their estimates are preliminary, the authors emphasized the similarities between the separate estimates.

The results should also be interpreted cautiously because it is unclear if the all of the density estimates from the underlying studies are sufficiently robust for inclusion in the meta-analysis, and if all available density estimates were included in the development of the model. Estimating fisher density was an explicit goal of only a few of the studies utilized 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. 2004b) for the purposes of providing readers a general idea of comparative densities at different sites (W. Zielinksi, pers. comm.). Another potential source of error in the deterministic expert method involves extrapolating the density values from specific study areas (perhaps chosen due to a prior knowledge of fisher abundance in those 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, USDA 2008, USDI Fish and Wildlife Service, unpublished data).

The estimates described above are preliminary and have not been peer-reviewed or published. The Department is supportive of efforts to refine the size of the northern California population, but we recognize that basic distribution work may be needed first, or concurrently, along with habitat mapping, to more fully understand the extent of occupied range and to calculate population size.

Southern Sierra Population

For the southern Sierra fisher population, a detailed modeling exercise, an analysis of fisher habitat suitability, and fisher population estimates were recently completed (Spencer et al. 2007). There were many caveats associated with the output from this modeling exercise, and the authors weighed the various uncertainties in all their assumptions and concluded with a small population estimate of only 160-360 total individuals (not including juveniles). The number of adult females was estimated at 57-147 individuals, but the effective population size is unknown and additional studies are needed. The authors concluded that because the population does not experience immigration from other regions, it is at risk of extirpation by a variety of stochastic influences.

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 relatively consistent 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.

While there is reason to be cautious about the absolute validity of these estimates, this is the best available scientific information available at this time, and they all point to a population small enough to be significantly impacted by stochastic events.

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".

Population Trend

Northern California

There are no historic population estimates of fishers, and no large-scale population trend monitoring is being conducted in northern California at this time. The most intensive field study on fisher population trend and demography is currently being conducted on Hoopa Tribal lands and is discussed below.

To help determine population change on their ownership in coastal northwestern California, Green Diamond Resource Company repeated fisher surveys using track plates in 1994, 1995, 2004, and 2006 (Diller et al. 2008). The first three surveys involved the same 40 "segments" (linear routes along which six track plate stations were spaced one km apart), while the 2006 survey consisted of 18 segments randomly selected from the 40 previously surveyed segments. Information on changes in habitat conditions over the study period was not provided. Detection rates at segments increased slightly from 1994 to 2006. At individual stations, detection rates were higher in 1995, lower in 2004, and higher in 2006. There was insufficient statistical power to detect a trend in these detection ratios (L. Diller, pers. comm.).

Fecundity

Fisher fecundity rates in northern California are low and highly variable based on a study that compared reproductive rates in 2 successive years on the Six Rivers National Forest (Truex et al. 1998). In 1995, 73% (n=11) of captured females were lactating, while only

14% (n=7) of captured females were lactating in 1996. Denning rates in 2 successive years were also substantially different in interior northwest California (Reno et al. 2008; K. Rulon, pers. comm.). Twenty-two percent (n=9) of monitored females denned in 2006, while 80% (n=10) denned in 2007. In contrast, fisher fecundity on the Hoopa Reservation varied little during a two year study period (Higley and Matthews 2006). Eighty-one to 88% percent of adult female fisher denned during 2005-2006.

Other studies also suggest interannual variability in fecundity is not uncommon. 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: a) Eastern Klamath in the vicinity of Trinity Lake; b) North Coast near Mad River; and c) 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 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 California. 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). Recent studies indicated the ratio of female to male fishers at the Hoopa reservation had declined (Higley and Matthews 2006). Trapping data collected in 2004 and 2006 indicated a change in the fisher sex ratio (from 1M:2.6F, to 1M:1F) since the mid- and late 1990s. Higley and Matthews (2006) speculated that females may be preyed upon disproportionately due to their smaller size. More recent work on Hoopa estimated female annual survival at 75.4% from 2004-2009, although survival did vary across years, ranging from 58.9-94.4% (Higley and Matthews 2006, Higley and Matthews 2009). Lambda was estimated for adults as 1.03 from 2004-2009 indicating a barely stable population within the Hoopa Valley (Higley and Matthews 2009).

Density

Research on the Hoopa Reservation documented substantial declines in trapping success and estimates of fisher density during one period. Capture success declined from 12% in 1996-1998 (1,324 trap nights yielding 50 individual fishers on 161 capture occasions) to 5.5% from 2004-2006 (1,673 trap nights yielding 20 individual fishers on 92 capture occasions) (Higley and Matthews 2006). In 2005, estimated population density was 0.16 fishers/km^2 (95% CI: 0.16-0.17), while similar estimates were 0.45 (95% CI: 0.35-0.58), 0.37 (95% CI: 0.29-0.46), and 0.29 (0.21-0.38) fishers/km^2 for the years 1997-1999, respectively (Matthews et al. 2006). Researchers at Hoopa have speculated that the apparent fisher population declines on the reservation may have resulted from local increases in predation, disease, or the effects of timber management (Higley and Matthews 2006). A large fire (Megram fire) on the east side of the tribal lands may have also been a factor, perhaps displacing predators (*e.g*., bobcats) onto tribal lands and/or increasing bobcat numbers (M. Higley, pers.comm.).

Summary

Due to the lack of historic and current population estimates for the northern population as a whole, it is not possible to ascertain population trend. Because the data collected on Hoopa land has not been published or subjected to rigorous scientific review, the Department views the latest results with caution, given annual variability in fisher reproduction, and the potential for habitat change, *e.g.*, another large fire, and concurrent timber harvest, to further affect the population in the near future. We believe the work warrants further study. To that end, we are currently supporting continued work through contract, and it has been suggested (W. Zielinkski, pers.comm.) that a scientific group work with Hoopa and Wildlife Conservation Society biologists to analyze the data more fully and determine significance of the results. However, there would still remain the problem of applicability of results from Hoopa lands to the northern California population as a whole.

Localized changes in wildlife populations are not necessarily indicative of corresponding changes at the regional level, and fisher populations are known to exhibit marked fluctuations in size (Bulmer *in* 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.

Southern Sierra

This population has been fairly well-studied, but trend monitoring only recently began as a result of the Sierra Nevada Framework. Beginning in 2002, USFS implemented a population monitoring program for fisher in the southern Sierra Nevada. The monitoring program relies on establishing and annually or bi-annually resampling 250 – 300 primary sample units (PSUs in conjunction with Forest Inventory and Analysis (FIA) points in the southern Sierra Nevada. Each PSU is comprised of 6 track-plate stations modified with hair snares (barbed wire) and sampled for 10 consecutive days.

Since 2006, track-plate stations have been modified with barbed wire hair snares at the entrance of each track plate station to permit collecting genetic material from fishers and other carnivores without physically detaining the animals. Individual fishers will be identified when possible. Inclusion of genetic sampling in the monitoring program will allow exploring population genetics of fishers in the southern Sierra, and will help calibrate the relationship between the index of abundance and absolute abundance. This genetic work is ongoing (J.Tucker, pers.comm.).

The primary objective of the large scale monitoring effort is to use presence/absence sampling to detect a 20% decline in relative abundance with 80% statistical power. Occupancy modeling techniques are being used to assess the effect of various survey and ecological characteristics on detection probabilities and occupancy rates. Fisher have been detected at 23-27% of the sites annually , with the majority of detections occurring in mid-elevation forest habitat. Preliminary analysis of survey data through 20088 suggests no decline in the index of abundance across the population during the monitoring period, though occupancy rates appear to vary among geographic regions within the population, and the trend has varied considerably. The USFS is currently evaluating whether to continue the monitoring effort, or to modify it in some way to decrease costs. Because ongoing studies have documented high predation rates on fisher (Switzer and Barrett 2009), and because fisher have not been detected colonizing habitat north of the Merced River, it is unclear if the population is stable or if methods used are unreliable at detecting trend. Populations normally expand when suitable habitat is present and unoccupied.

Though a trend has not emerged from the USFS monitoring effort, the small population size of fisher in the southern Sierra is cause for concern, especially when coupled with the threat to fisher habitat by catastrophic and severe wildfire (Spencer et al. 2008). The high fisher mortality from road kill will likely not be resolved in the vicinity of Yosemite National Park due to the popularity of the park and because Highway 41 runs through fisher habitat. Thus, a constraint on population growth for fisher will remain.

Factors Affecting the Ability of Fisher to Survive and Reproduce

Threats to the fisher have been divided into major and minor categories to help identify their degree and immediacy. The threats have also been tentatively ranked by the Department within the categories.

Major Threats

I. Timber Harvest

In California, the reduction in old growth forest habitat due to timber harvest is fairly well documented. The description of the degree to which late-seral forests have been impacted is based on published literature and is not disputed. In one study of National Forests in California, old growth had declined from an estimated 4 million acres in 1900 to 2 million acres by 1985 (Laudenslayer 1985). The loss of this habitat type led to the creation of the Northwest Forest Plan, the Sierra Nevada Framework, and other recent landscape planning efforts (*e.g.*, King's River Study Area in the southern Sierra) to help conserve late-seral dependent wildlife species, including the fisher.

In the Sierra Nevada, total old growth in 1945 was estimated at 4.28 million acres, representing 45% of the total Sierra Nevada timber cropland (Wieslander and Jensen 1946). Then, in 1993, a comparative study was conducted using similar old growth classifications, and only 11% of the timber cropland in the Sierra Nevada was documented as old growth, most of which occurred in high elevation forests (Beardsley et al. 1999). Little old growth remains in mid-elevation mixed conifer forests (optimal habitat for fisher) due to extensive logging which began in the 19^{th} century in association with mining and railroad building (Beesley 1996). Additional evidence for loss of old growth forest habitat, and projected impacts to fisher was discussed in the Range and Distribution Section of this report.

<u>Potential impacts of timber harvest</u>

The Department considers both the harvest of high canopy cover stands and the harvest of late seral habitat elements (large diameter conifers and hardwoods with cavities and large limbs suitable for denning and resting) to be threats to fishers. Relatively few stands on private timberlands meet the definition of "late succession forest" under the California Forest Practice Rules (see the section entitled "Existing Management Efforts" below). However, some young stands with high canopy cover may provide suitable foraging and dispersal habitat, while stands with sufficient late seral habitat elements may be suitable resting and denning habitat. Threats from timber harvest involve the opening of forest canopy, removal of understory vegetation and coarse woody debris, and the removal of important structural components (large trees and snags with cavities for den and rest sites).

These impacts 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 (*e.g.*, large diameter downed logs) 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 until relatively dense overhead cover is re-established. Site preparation and plantation management may remove and/or simplify understories, also decreasing foraging and cover value for fishers. However, the potential significance of these impacts is dependent on their size and landscape context. At the landscape scale, the abundance and distribution of fishers 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.

The petition cites two studies of fisher ecology in northern California as indicating that habitat modification resulting from timber harvesting resulted in the reduction of fisher density and survival (Buck et al. 1994, Truex et al. 1998). Cause-and-effect studies of land use changes upon the fitness of wide-ranging animals are very difficult to conduct, but these two studies represent the best scientific information available in California at this time relative to potential effects from timber harvest and how different landscape conditions may affect fisher populations. Additional information of timber harvest effects on fishers will be forthcoming in the future as the USFS carries out forest thinning and burning projects in the southern Sierra Nevada (Spencer et al. 2008).

As noted earlier, due to over 100 years of timber harvest, most forest land in California where fisher are found is in a “managed” condition. This is the case on both public and private land to varying degrees depending on the location. The difficult part for biologists and foresters in trying to conserve fisher while also allowing timber harvest, is in defining the desired condition from each individual timber harvest plan (THP), over a long time scale to allow for regrowth, and over a broad planning area, *in the context of best landscape condition for viable fisher populations*, while also allowing for commercial use and rotation plans needed by the land owner for revenue generation. Any particular THP could leave various essential habitat elements for fisher behind if such elements currently exist on site (*e.g.*, one snag that may or may not have a visible cavity, one or more large live conifers or hardwoods in the dbh range of fisher den trees, or large diameter downed logs), but the number and distribution of such elements, and the suitability of the changing landscape over the proper geographic planning area and time scale to assure fisher *population* *persistence or growth* is the key missing element. The proper landscape formula is further hampered by trying to accommodate or plan for effects of natural and anthropogenic disturbances, *e.g.*, fire, whether lightning-caused or catastrophic, or a series of controlled burns or thinning. Though the science of fisher habitat management has not yet reached a stage where a simple prescription can be easily given on each THP, it appears the current system is not working favorably for fisher given 43% range loss and apparent lack of natural recolonization of formerly occupied habitat. Most fisher biologists agree that fisher range loss and population isolation is not caused just by historic or existing timber harvest practices, but those impacts are now acting in combination with a series of other threats that are described below. Timber harvest effects have a strong influence on fisher population persistence and viability though, given the long time frame needed for trees to reach the decadence stage necessary for den and rest sites (100 years or more).

The Department acknowledges many fisher studies in the last 18 years or more on both private and public managed forest lands, and the persistence and reproduction of fisher on those lands. The continued existence of fishers in the variable ecosystem types suggests that suitable habitat features are present at levels that allow fishers to continue to use some of these lands. However, if the presence of those features is not maintained and recruited over time, those lands may become less suitable or even unsuitable for fishers. Therefore, a science-based quantitative assessment of the status of California's 2 fisher populations is needed. A cost effective method for assessing and monitoring habitat suitability is also desirable.

<u>Potential reasons for the gap in fisher distribution in the Sierras</u>

The percentage of the land base that is private industrial timberland increases substantially transitioning north from the Merced River which is generally considered the line separating occupied habitat from the area not currently occupied. And, the size of timber harvest plans in the Sierra compared to North Coast plans, is substantial. North coast plans on industrial timberlands typically average less than 100 acres compared to Sierra plans that are often more than ten times larger, and can be as much as 2,500 acres or more. These larger Sierra plans have the potential to impact more streams, disturb more ground, and affect more wildlife species over much larger areas, cumulatively resulting in long term impacts to species and resulting in greater fragmentation and less connectivity between adjacent habitat types.

The petition quotes Bias and Gutierrez (1992) and Beardsley (1999) in making the point that late-seral forests are generally lacking in the central Sierra and that less than 9-percent of the private timberlands possess a mean dbh greater than 21 inches. Similar concerns were raised in the petition regarding the condition of late-seral forests on the National Forests in the central Sierra. During THP review, the Department recommends retention of “wildlife trees” that includes snags, deformed trees, large trees with thick lateral branching, and cavities for use by fisher and other wildlife species. Our recommendation to retain a specified level of wildlife trees is based on the pre-harvest condition. It has become problematic to know the pre-harvest condition when this information is not included in the plan nor provided upon request.

Greenwald et al. (2000) found, that for his study area, the percentage of acres planned for harvest under an approved timber harvest plan (4 percent) was dwarfed by the percentage of acres harvested under exemptions (94%); see Table 14 in the Petition.

Another area of concern pertaining to the regulatory process for timber harvest plan review is the required analysis of cumulative effects. Cumulative impacts are those impacts that when considered individually may not be significant but when considered with many other similar projects, the resulting incremental impact may be or become significant. The Department has on several occasions requested CALFIRE to consider the potential for significant impacts associated with plans under review. On such occasions, we have not received support to acknowledge the effects and identify appropriate mitigation measures to reduce or offset the effect. Additional aspects of THP review and the Forest Practice Rules relative to fisher conservation are discussed in the “Existing Management Efforts” section of this report.

II. Catastrophic Forest Fire

Wildfires are a natural part of California’s forests and happen under natural conditions as a result of lighting strikes. Low intensity forest fires have a beneficial effect on fisher habitat and their prey through the maintenance of normal ecological processes. Fire is a major force in ecosystem dynamics of California’s forests, and fisher evolved with changing forest conditions. However, there is a distinction between catastrophic fires and the low intensity wildfires that were a natural part of the landscape prior to European settlement. Catastrophic, or *stand-replacing* wildfires burn at high intensity over large areas killing trees and destroying existing forest stands. Because fisher are dependent on late seral forest conditions for resting and denning, the loss of late seral elements has a profound effect on habitat quality, especially since the developmental sequence of forests containing large-diameter trees is long, generally 200 or more years of growth before they reach an old-forest condition (Van Pelt *in* Lutz et al. 2009). The human-caused change in California forest fire patterns is discussed below, with an emphasis on the Sierra Nevada.

Along with the reduction of old growth/late seral forests by timber harvest came the implementation of fire suppression in California. By the early 20th century, fire exclusion in the Sierra Nevada had become a general policy among government agencies (Husari and McKelvey 1996), and had changed forest species composition and structure. One effect of fire suppression is an increase in mean stem density, with a decrease in mean diameter of trees, as documented by North et al. (2004) in the southern Sierra Nevada. This increase in stem density has been shown to cause a shift in tree species composition towards fir species and away from pine species (Strong 1984 *in* Beesley 1996, Beardsley et al. 1999, North et al. 2004). Forests with a high stem density favor shade tolerant species such as white fir (*Abies concolor*) and incense cedar (*Calocedrus decurrens*) over shade intolerants such as ponderosa pine (*Pinus ponderosa*) due to competition for light (North et al. 2005). North et al. (2007, 2009) has even suggested retaining intermediate-sized pines and hardwoods during thinning operations in mixed conifer Sierra Nevada forests due to their relative scarcity.

Historic fire suppression further changed forest structure in the Sierra Nevada by causing an increase in fire return interval. Sierran mixed conifer fire regimes prior to the 1860s were characterized by frequent, low intensity fires with a median fire return interval (FRI) of consistently less than 25 years (Skinner and Chang 1996). Some estimates of historic Sierran mixed conifer FRI are considerably lower, ranging from 12-17 years (McKelvey et al. 1996, North et al. 2005). However, current FRIs differ from historic FRIs by 1-2 orders of magnitude. Recent estimates of current Sierra mixed conifer FRIs are between 185-644 years (Skinner and Chang 1996, McKelvey and Busse 1996, McKelvey et al. 1996).

Along with increased fire return interval, fires in the Sierra Nevada increased in severity, intensity, and spatial extent by the late 20th century (Skinner and Chang 1996, Lutz et al. 2009). These more intense fires are capable of causing the most dramatic habitat change in productive forests where low intensity fires were frequent in the past (Weatherspoon et al. 1992), such as mixed conifer forest of the Sierra Nevada. Crown fires, characteristic of high intensity fires, are capable of destroying forest canopy and forest legacy elements such as snags. Crown fires have become frequent in the Sierra Nevada compared to the pre-fire suppression era (McKelvey et al. 1996) in which early surveyors reported fires typically of surface nature with crown fires apparently uncommon (Sudworth 1900: pp 557-558).

Green et al. (2008) state: "Arguably, the greatest threat to fishers in the Sierra Nevada is loss of habitat due to uncharacteristically severe wildfire." They go on to 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.

Catastrophic fires are increasingly common in California due to the unnatural accumulation of forest fuels resulting from decades of fire suppression (Weatherspoon et al. 1992). Low intensity fires which burn primarily in the understory and do not spread to large size with crown-destroying properties are not believed to significantly impact fishers or their habitat. Fire suppression activities still occur in California due to the unnatural accumulation of forest fuels; if left unchecked, some fires can cause catastrophic fires and destroy homes and other infrastructure. Natural fires, controlled burns (some of which escape control), and unintended human-caused fires remain a significant factor affecting the forest landscape, and fishers are then subject to habitat change already exacerbated by timber harvest and subsequent forest fragmentation. Figure 11 displays the extent of fires in California since 1950 (CAL FIRE 2003/USDA). The figure is a conservative display of recent fire extent because many fires were not reported.

Catastrophic wildfire can negatively impact fisher populations through a variety of pathways, including: direct mortality to fishers, destruction of habitat, direct mortality to and short-term population depression of prey species, and isolation and fragmentation of suitable fisher habitat (Greene et al. 2008). The destruction and isolation of fisher habitat from wildfire is expected to synergistically interact with the problems of low population size and low genetic variability to significantly increase the risk of fisher extinction in the southern Sierra Nevada (Spencer et al. 2007).

Green et al. (2008) in their conservation assessment for fishers in the Sierra Nevada made the following key points regarding the effects of catastrophic fire on fisher:

- The largest events affecting fishers in the southern Sierra and their potential to sustain a viable population appear to be large, stand-replacing wildfires.
- Past large wildfires in the Stanislaus National Forest have created large patches of unsuitable habitat that are functioning as a barrier to northward expansion of southern Sierra fisher populations.
- There is an increasing trend in the annual amount of area burned by wildfires in the last 30 years and the trend is likely to continue into the future in the absence of vegetation and fuels management activities (USDA 2004).
- Fire suppression efforts can impact fishers through fire break construction, back-fires, and the influx of firefighters and equipment into remote habitats.

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 northwestern California with the possible exception of the near-coastal redwood zone. For example, Courtney et al. (2004) in discussing threats to the northern spotted owl state that catastrophic wildfire is currently the primary source of habitat loss to that species and note that the Klamath province is particularly vulnerable to catastrophic wildfire. Although there is some 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 has 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 fishers in the northern California population from catastrophic wildfire.

In summary, the Department believes catastrophic wildfire is among the most significant threats to the persistence of fisher in California. Similarly, the Conservation Biology Institute found in early results from Sierra Nevada fisher habitat modeling that in the absence of fuel reduction projects, catastrophic wildfire is almost certain to result in the extirpation of fisher from the southern Sierra (Conservation Biology Institute, pers. comm., 2008; Spencer et al. 2008).

III. Population Size and Isolation

The northern California fisher population is currently isolated from the southern Sierra population and from fishers in British Columbia and other parts of North America (Zielinksi et al. 1995, Aubry and Lewis 2002). This isolation precludes genetic interchange, increasing the vulnerability of the northern California population. Aubry and Lewis (2002) stated: "…the inability of extant fisher populations to support one another demographically, including those that are isolated by relatively small distances…or to colonize currently unoccupied areas within their historical range, are significant conservation concerns".

Drew et al. (2003) concluded that California fisher populations have become isolated from fishers in British Columbia and the Rocky Mountains due to extirpation of fishers in Oregon and Washington, and that one haplotype detected in historic California specimens appears to have been lost from current populations. The authors speculated 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 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 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.

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.

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 fishers in the northern populations related to size and isolation are likely not as acute as those faced by the southern Sierra population (S. Wisely, pers. comm.; C.Carroll, pers.comm.). Additional studies are needed to determine the size, distribution, and trend of the northern California population. Because genetic diversity is lower than that found within British Columbia populations, continued study and monitoring of the northern California population 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 fishers in northwestern 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 fishers per year (five fishers 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 utilized 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 fishers. 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". This caveat is important, because to the best of our knowledge, there are no published studies on the effects of timber harvest, and its rate, on fisher vital rates. Additionally, the analysis was conducted without considering information that suggested that fisher, particularly females, may be declining on Hoopa Tribal lands. Powell and Zielinski (2005) noted the model would have to be revised, by varying the adult sex ratio to account for such a potential scenario.

As noted earlier in the Abundance section of this report, the population size of fishers in the southern Sierra is estimated to be very low. Because the population is isolated, it is more at risk of extirpation by a variety of stochastic influences (Spencer et al. 2007). Examples of stochastic events include successive years of drought that deplete prey populations for fisher, and/or one or more catastrophic fires in a short time frame.

There is also the potential for the accumulation of deleterious mutations to negatively affect population growth, and mutation accumulation and extinction time are highly sensitive to habitat fragmentation. There is a critical level of habitat connectivity that must be maintained for efficient selection against deleterious mutations. Because the interaction between mutation accumulation and metapopulation demography is synergistic, an assessment of metapopulation viability based only on demographic forces is especially likely to underestimate the risk of extinction (Higgins and Lynch 2001).

IV. Roads

Vehicular collision is a recognized source of fisher mortality (Heinemeyer 1993), and is probably second to trapping as a source of non-natural death in the North American range of fishers. Approximately 3.4 percent of 147 radio-collared fishers studied in Massachusetts (York 1996) and Maine (Krohn et al. 1994) were killed by vehicles. Presumably the risk of collision mortality increases with the density of highways and freeways where vehicle speeds are highest and the ability of driver or fishers to avoid a collision is lessened. This may be an especially important factor in the Sierra Nevada where a dozen highways and Interstate-80 intersect current and former fisher habitat, with an average of only about 50 km separating each. Subsequently, dispersing fishers might not be able to avoid crossing highways and encountering the associated hazards therein. Interstate-80, with its jersey barriers, steep fills, and other impediments to fisher crossing may be particularly hazardous to dispersing fishers. In general, the importance of roads to Sierra Nevada fishers is currently difficult to quantify, but highways in particular have the potential of being a very important risk factor.

The fragmented governing structure of current land use and transportation planning systems hinders conservation efforts for animals like fisher that can be killed and limited in dispersal by roads. Despite the logical connection between land use and transportation, decision making about these related processes often occurs in isolation. Transportation planning occurs primarily at the state or regional level with significant funding coming from the federal government. In contrast, land use planning is governed mostly at the local level without significant external funding sources (Moore and Thorsnes 1994). Planning is further fragmented among the numerous counties, cities, and metropolitan jurisdictions that each conduct separate land use planning processes. In order to maintain ecological function, conservation planners must coordinate their efforts at a variey of scales ranging from landscapes to ecosystems. Also, highway funds are often earmarked for design, construction, and operation only, leaving little or no funds for assessment and monitoring (White et al. 2007).

V. Predation

Predation appears to be a current threat to fisher in California, especially when coupled with human-caused effects such as fisher mortality on roads, and disease exposure from domestic animals. In the southern Sierras, the Sierra Nevada Adaptive Management

Project (SNAMP) study identified predation as the most significant source of mortality. From January 2008 - October 2009, 46% (10/22) of fisher mortalities were a result of predation. Though these are preliminary results, bobcats and mountain lions (*Puma concolor*) were identified as key predators (SNAMP U.C. Science Team Annual Report, 2009). Also in the southern Sierra Nevada, the Kings River fisher project identified predation as the most common source of mortality. From 2007-2009, 81% (13/16) of fisher deaths were the result of predation. Predators definitively identified to date include mountain lion (2), bobcat (1), and coyote (*Canis latrans*) (1) (Purcell et al. 2009).

Predation is also an important source of mortality on the Hoopa Valley Reservation in northern California. From 2004-2009, 73% (16/22) of mortalities occurred as a result of predation. Bobcats, mountain lions, and unknown canids (possibly coyotes) were identified as predators (Higley and Matthews 2009). During a 1996-1998 study in Hoopa, 4 out of 5 fisher skulls recovered were found with puncture wounds suggestive of bobcat predation (Higley et al. 1998).

All 3 of the studies cited above are ongoing and as the collective sample size increases, a more definitive assessment of the role of predation as a constraint to fisher population growth will likely emerge. The Department is currently providing some funding for continued work (to G. Wengert, U.C. Davis) to help determine predators of fisher in California, and to understand bobcat home range patterns where they co-occur with fisher.

Previous studies on fisher in California also documented what appear to be high predation rates (Buck et al. 1994, Truex et al. 1998). The fisher, especially females, due to their smaller body size and smaller home ranges, may be more susceptible to predation in areas with fragmented forest stands, and sub-optimal forest cover; thus, certain timber harvest practices (*e.g*., clearcuts) and patterns may expose them to additional predation risk (Buck et al. 1994:373-374). In California, bobcats and coyotes occupy more than one habitat type and have a broader statewide distribution than fisher. Bobcats and coyotes are considered habitat generalists whereas the fisher is a forest specialist (Buskirk and Zielinski 2003). Bobcats and coyotes are larger than fishers and may kill them for food, or simply to exclude them from their own home ranges in order to reduce competition for food. Scheffer (1995) noted: In Washington state, the Makah natives say that the fisher is occasionally attacked by the bobcat (Gunther *in* Scheffer 1995:90-91). Grinnell et al.

(1937:227) noted the mountain lion as the only predator on fisher known to them, described by J.C. Howe via a trapper on the Upper Kern River.

In California, wolverines (*Gulo gulo*) are exceptionally rare and thought to be extirpated, and Sierra Nevada red foxes (*Vulpes vulpes necator*), also known as mountain foxes, are also very rare, and now apparently mostly confined to the Lassen National Park area. Both the wolverine and mountain red fox are state-listed as threatened in California. Though these 2 carnivores did not occupy the same exact niche as fisher in California, there are areas of their former range in the state where some overlap may have occurred, *e.g.*, during the winter months when heavy snow or prey scarcity may have forced seasonal movement, or during the summer when fisher at the higher elevations were in closer contact. The extirpation of dominant predators has been described as causing “mesopredator release” (Soule et al. 1988), wherein the loss of a large predator from the animal community causes the newly top predator to exert unnaturally high levels of predation on even smaller predators. Loss of mountain red foxes and wolverines, coupled with human-caused major changes in the forest landscape may have contributed to what appear today to be high predation rates on fishers. Though explicit scientific proof does not exist for such a scenario, it may be operative, and more studies on bobcats, coyotes, and mountain lions in forest environments occupied by fisher are needed. Comparison of the density of these 3 predators in managed vs. unmanaged forests would be particularly helpful.

VI. Urban Development

The petitioners’ discussion of urban development threats is found on pages 38-40 of the petition. The discussion 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 petitioner’s note that 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, aligns well with the area of greatest human influence. The petitioners conclude 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. Reports of road-killed fishers in the *central* Sierra are so rare that the conclusion that roads and infrastructure pose significant threats to fisher is not well-supported, however, the Department acknowledges that if dispersing individual fisher attempt to set up territories in the central Sierra, there is the possibility that mortality could occur from a vehicle strike. The more important threat from roads is their effect as barriers or strong filters to movements by fisher. This would be the case with major highways such as Interstate 80, and highways 4, 49, 50, and 88 (see previous section on road effects).

The Department finds the citations and conclusions in the petition to be generally correct. CAL FIRE projects that between 2000 and 2040, 343,000 acres of undeveloped California conifer forests will be impacted by residential development (or 6% of the year 2000 undeveloped California conifer forests) along with an additional 17,000 acres (4%) of conifer woodland (California Department of Forestry and Fire Protection 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 in the range of fisher is noted to be intense 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 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, residential development along two National Forests boundaries, the Tahoe and Stanislaus, has been identified as being the source of future increased risk of wildfire and invasive species; impacts to water quality; overuse from recreationalists; increased trash and traffic; disruption of natural processes and disturbance to wildlife (Stein et al. 2007).

In northern California, the Department is aware of the following projects and development activities within fisher range:

- Dyer Mountain Resort: All-season community and ski area near Lake Almanor.

- McCloud Springs Ranch and Abbot Ranch (Siskiyou County): both are large residential developments with 50+ lots each.

- Sierra Pacific Industries (SPI) TPZ conversions: near Shingletown and Viola, and also between McCloud and Mt. Shasta; lot sizes and number unknown. TPZ conversions tend to set the stage for development or other land uses (e.g., rural residential or vineyards).

- TPZ conversions planned in Humboldt County by Green Diamond Resource Company (30 projects) and contemplated by The Pacific Lumber Company; the Department has not fully quantified all TPZ conversion projects in fisher range at this time.

- Tehama General Plan update: includes recreational developments at the headwaters of Deer Creek on Highway 36.

- McCoy development, near Salyer (Trinity County): Relatively small project (45 lots).

- Also a number of semi-rural lot splits in the Weaverville area.

- In Sonoma, Mendocino, and Lake counties, TPZ conversions are usually from timber production to vineyards. There has been an acceleration of conversions of oak woodlands to vineyards on lands zoned for agricultural, which are largely exempt from environmental review and permitting.

Duane (1996) identified at least five ways development is known to negatively impact wildlife:

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 vehicle strikes (USDI 2004).

8. Disruption of normal wildlife behavior from human presence, noise, and lighting; 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. Decrease in available water and aquatic and riparian habitats due to water diversion for human uses (California Department of Fish and Game (2007).

10. Blockage of, or interference with migration and seasonal dispersal routes (California

Department of Fish and Game (2007).

11. Habitat loss / modification due to fuel reduction treatment both at the individual structure scale and the community scale.

12. Increased frequency of wildfires and associated impacts (see separate discussion of wildfire threat) (Syphard et al. 2007, Syphard et al. 2007a)

Thus, the effects of residential development on fisher extend far beyond the physical footprint of the structures. Urban development should be considered a significant threat to the fisher. In their 12-month finding on the petition for federal-listing of the fisher, the Service found that development effects and associated habitat fragmentation resulting from roads has likely played a significant role in the loss of fishers from the central and northern Sierra Nevada and in the species' failure to recolonize those areas (USDI 2004). Additionally, many of the effects of urban development (*e.g.* fragmentation, disease exposure, fire threat, habitat loss) compound the threats to the species related to low population size and isolation thereby contributing to the tenuous status of the fisher.

Minor Threats

I. 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. Our concerns focused on recreational activities in winter and other times of the year, when denning, hibernating and other essential behaviors of bears and mesocarnivores would be disrupted; during the nesting season when birds would be in the mists of courtship, nesting, and rearing of young; and fall and spring periods when deer are migrating between their summer and winter ranges. Impacts can also result from winter recreation in the vicinity of the winter range and fawning areas. Recreational activities of greatest concerned are motorized activities including snowmobiles in the winter, various ORV's, dirt bikes, ATVs during the remainder of the year, and noise from all of the above. Potentially, direct impacts to species may occur from killing animals or destroying or disturbing nests and eggs. 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.

The Department's concerns apply to the fisher in the central Sierra on public lands. Recreational activities on private lands in considered minimal. As previously stated, the central Sierra is not currently occupied by fisher but the area contains portions of suitable habitat potentially available for dispersing fisher.

The lack of habitat attributes such as snags, large trees, high canopy cover, and downed logs, together with the prevalence of clearcut silviculture, urban development, roads, and recreation, may together represent an insurmountable barrier to fisher recolonization in much of the central Sierra.

II. Poaching and Incidental Capture

Fishers 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 fishers 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 fishers, and Grinnell et al. (1937) suggested "much needed, prolonged closed season". In 1946, fisher trapping in California became illegal (Lewis and Zielinski 1996).

Fishers are known to be incidentally captured in traps set for other furbearers (Lewis and Zielinski 1996). Between 1946 and 1998, fishers 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). Licensed individuals trapping for purposes of commercial fur or recreation in California are now limited to the use of live-traps. Fishers captured in live traps (cage traps) are apparently infrequently injured (Department of Fish and Game, unpublished data on file at Redding office), and owners of traps or their designee are required by regulation to visit all traps at least once a day.

However, fishers do scratch at the bottom of live traps, and grip the cage bars/wires with their teeth; such behavior has been observed in captive and wild-caught fishers and could potentially result in broken canines or other teeth, or injured feet (R. Golightly, pers. comm.). If such injuries lead to infection or reduced ability to capture prey or escape predators, fisher survival in the wild could be compromised.

Researchers live-trapping fishers for scientific studies are required by the Department to install a wooden “cubby” box onto the cage trap to provide thermal and visual cover for trapped animals (Wilbert 1992, cited in Fowler and Golightly 1994). Fisher incidentally trapped by a commercial or recreational trapper in a cage trap without the cubby box modification would have a higher probability of injury, or death due to hypothermia, but the level of risk to fishers from this threat has not been studied and is unknown.

The Department does not require that incidental captures be reported by licensed commercial or recreational trappers, but some trappers occasionally provide such information and we have information on incidental fisher catch and release from Trinity and Shasta counties.

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 and north coastal California, including the Mendocino National Forest area, outside of the range of Sierra Nevada red 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.

The sale of trapping licenses in California has declined substantially since the 1970s and

1980s (Figure 12), indicating a decline in the number of traps in the field during the trapping season for other furbearers. However, the number of trapping licenses sold has recently increased, very likely due to the high pelt price for bobcats (*Lynx rufus*), based upon data from the 2002-03 through 2008-09 license years (pers. comm. J. Garcia). Data from 2009-10 are not yet available.

Some fisher poaching is likely to occur (Lewis and Zielinski 1996, Truex et al. 1998). Additionally, hunters using hounds for legal game may occasionally tree fishers, but the fate of such fishers is not known. However, the Department is not aware of any data that suggests poaching is a widespread practice or a substantial threat to fisher populations.

III. Disease

Green et al. (2008) summarized the following: Fishers, like all mesocarnivores, are susceptible to a number of diseases and parasites. Diseases include rabies, plague, canine and feline distemper, toxoplasmosis, leptospirosis, trichinosis, and Aleutian disease (Strickland et al. 1982, Wild and Roessler 2004). Banci (1989) noted fisher susceptibility to sarcoptic mange. Common endoparasites include nematodes, cestodes, and trematodes, and ectoparasites fleas, ticks, and mites (see Powell [1993] for an extensive list of known parasites). However, none of these diseases or parasites had been thought to constitute a significant source of mortality (Lewis and Hayes 2004), possibly because of a weak transmission pathway due to the solitary nature of fishers (Coulter 1966, Powell 1977), and tendency to avoid proximity to other individuals (Powell 1977, Arthur et al. 1989a).

Results of recent studies in California reveal that disease is a mortality factor to fishers. In northern California on the Hoopa Valley Indian Reservation from 2004-2007, 76% (60/79) had been exposed to *Anaplasma phagocytophilum,* 58% (45/77) had been exposed to *Toxoplasma gondii,* 31% (28/90) of fishers had been exposed to canine parvovirus (CPV), 24% (24/102) had been exposed to *Borrelia burgdorferi* sensu lato (bacteria that causes lyme disease), and 5% (5/98) had been exposed to canine distemper virus (CDV) (Brown et al. 2008).

In the southern Sierras, a Sierra Nevada Adaptive Management Project (SNAMP) study identified 58% (15/26) of fishers exposed to *Toxoplasma gondii*, 4 % (1/24) exposed to

CPV, and a low occurrence of CDV (Sweitzer and Barrett 2009). Also in the southern Sierra Nevada, the Kings River Project identified 6% (2/31) of fishers exposed to CDV, 44% (8/18) exposed to CPV and 11% (2/18) exposed to *Toxoplasma gondii.* In addition, one active infection was documented of CPV (Purcell et al. 2009).

Brown et al. (2008) cautions that although little is known about diseases in fishers, many of the pathogens evaluated are know to cause morbidity or mortality in susceptible carnivores, specifically through immunosuppression and synergistic effects of pathogen exposures. The Department would expect disease transmission and outbreaks to occur as urban development occurs in or near fisher habitat.

IV. <u>Climate Change</u>

The petition did not address the threat to fisher posed by global climate change. Experts predict global climate change will have profound effects on species and habitats resulting in altered precipitation patterns leading to vegetation change. For fishers, vegetation changes may lead to changes in type and availability of prey, availability of den and rest sites, reduced 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 decreasing 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.

Existing threats to fisher may be exacerbated by climate change, e.g., wildfire may increase in size, intensity, duration and frequency. These are effects we have already seen in some parts of the state within the historic fisher range. The number of acres damaged by wildlife has been increasing annually. 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 catastrophic wildfires.

In forested ecosystems, disturbance such as wildfires, 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) will 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 fisher 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 fishers are unclear. 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 fishers to occupy sites that would otherwise be inaccessible. Fishers may benefit from the increased abundance of hardwoods in montane forests as they often provide important denning and resting structures. However, if wildfires become 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 fishers. 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 effected 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 tree species composition and tree density are also actions that would, from an economic perspective, hedge against sustaining losses due to climate change. These actions may have profound effects on fishers, potentially eliminating recolonization of nascent habitat.

Existing Management Efforts

This section provides brief summaries of some existing management efforts regarding fishers or forest management on federal, private, and tribal lands.

U.S. Forest Service

The fisher is designated as a sensitive species by the USFS, and therefore receives special management emphasis to ensure their viability and to preclude trends toward endangerment that would result in federal listing. USFS management direction is to use the best available science, and recent fisher conservation and research efforts in the southern Sierra Nevada are indicative of that.

Management Indicator Species

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 stated reason for this action was the desire to bring efficiency to the monitoring responsibilities of the USFS across all Sierra Nevada forests. The fisher was dropped from the list of MIS because of "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 Department met with the USFS to express our concerns regarding the proposed amendment to the Management Indicator Species list. Specifically we requested clarification about which species were currently being monitored, and how the proposed amendment would affect them. In response, the USFS stated in the FEIS that a complete list of what was being monitored, and why, was being developed but was not yet completed for the entire Region. However, the USFS assured us that monitoring programs for both California spotted owl and the fisher were in place, and those monitoring programs would continue, regardless of the fisher's status on the MIS list.

Another concern raised by the Department was that the MIS Amendment did not have specific thresholds identified that would trigger adaptive management based on the monitoring trends if those trends signaled a problem. In recent conversations with the USFS, we were told assured that it was the responsibility of individual forest plans to incorporate thresholds. How population trend is determined from monitoring studies could vary from forest to forest, and include anything from presence-absence surveys to full scale demographic studies.

The Department understands the fisher is a 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 fishers, 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 Service adds incentive for the USFS to continue monitoring for fisher at its current level.

<u>Habitat Management Areas</u>

According to the USFS, 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.

<u>Sierra Nevada Forest Plan Amendment (SNFPA)</u>

The desired goal of the Old Forests and Associated Species section of SNFPA is to increase the density of large trees, increase structural diversity of vegetation, and improve the continuity and distribution of old forests across national forest landscapes. The monitoring plan for old forests was developed to address community and ecosystem management goals. The monitoring plan addresses issues of the amount and condition of old forest, and the vegetative structures characteristic of old forest function and habitat suitability for associated species. Remote sensing will be used to monitor changes in forest conditions at a broad spatial scale. Relative to fisher, the primary concern is the "area treatments" to reduce wildfire risk. The conservation strategy for fisher focuses on limited operating periods near natal dens, retention of large snags and logs, minimizing the effects of treatments on large trees, snags, and logs, and the maintenance of large oaks in conifer stands, among other things. The strategy also recognizes roadkill as a threat to fisher. A Southern Sierra Fisher Conservation Area was delineated where fisher conservation is the goal. The combination of population and habitat monitoring will help determine if the conservation strategy is effective in increasing the fisher population and in increasing the amount, quality and distribution of fisher habitat.

The King's River management area in the southern Sierra was excluded from the SNFPA, and is an area where fisher are currently being studied as part of understanding how controlled fires and thinning may affect fisher.

On December 10, 2009, the Forest Service issued a Notice of Intent to Prepare a Supplemental Environmental Impact Statement (SEIS) to the 2004 Sierra Nevada Forest Plan Amendment (Framework) Final SEIS. The new SEIS is being prepared in response to an order issued in November 2009 by Judge Morrison C. England of the Eastern District Court regarding the two lawsuits against the 2004 Sierra Nevada Forest Plan Amendment decision. A USFS interdisciplinary team has been assembled to prepare a narrowly-focused SEIS that responds to the Judge's direction. A Draft SEIS is anticipated to be released on February 12, 2010.

Giant Sequoia National Monument Management Plan

The 327,769 acre Giant Sequoia National Monument is important to the southern Sierra fisher population. Twenty-four percent of the positive fisher detections in Sierra-wide surveys conducted from 1989-1994, came from the Monument area (Zielinski et al. 1997). Land altering management activities and pre-monument designation timber sale contracts were initially to be allowed within the Monument under the 2004 Giant Sequoia National Monument Management Plan. The 2004 Management Plan has been invalidated, and in June 2007, USFS 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 USFS overemphasized timber harvest (Lockyer v. USFS et al.). Additionally, the new plan will be 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 Pacific fisher as an important scientific object in the Monument. Therefore, the new Management Plan may allow for less active management of fuels and improvements than occurs on Sierran National Forests. Until the new plan is finalized, the Department cannot determine the benefits to the fisher. Scoping for public comments is currently underway.

Northwest Forest Plan (NWFP)

The Department notes 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.

We understand 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) used spatially-explicit, empirically derived habitat suitability models for the northern spotted owl and fisher to examine the conservation value of the LSRs set up under the NWFP. The authors found low correlation in the landscape habitat suitability values for the two species (Spearman rank correlation coefficients of 0.111 or 0.162, depending on scale). The authors found the LSR system does not appear to provide the highest conservation value on the national forests in northwestern California for spotted owls or fishers. 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. Fishers were considered to be among the mammals with the lowest likelihood of remaining well distributed throughout the system (Zielinski et al. 2006).

Other Public Lands

Bureau of Land Management (BLM)

BLM lands are subject to the Northwest Forest Plan (NWFP) provisions, though consultation with the Service is not required on projects that may affect fisher habitat, though the fisher is a candidate species. However, the fisher is also classified as a species of concern under BLM management and thereby receives special attention.

BLM conducted surveys for fisher in the Lack's Creek Late Successional Reserve and in the King Range in 2008. These surveys are voluntary and not required under the NWFP. BLM conducted fisher surveys in the Headwaters Forest in 1999, but no fisher detections were made. There are no plans for additional surveys in Headwaters, at this time. BLM biologists are participants in the west coast fisher conservation assessment and strategy process being led by the USFS and the Service.

National Park Service - Yosemite National Park

At this time, there is not a management program specifically aimed at fishers, but there are guidelines associated with programs that affect forest habitat, such as prescribed fire, mechanical fuels reduction, and hazard tree management. There is not a strict "let it burn" policy in effect. The guidelines provide life history traits of the fisher and identify habitat components that are important and should be preserved, if possible, in vegetation management programs. Retention of snags and oaks is encouraged, and fuel treatments that result in heterogenous forest structure are encouraged (*e.g.*, fire may make some habitat unsuitable for fishers, but suitable habitat would remain interspersed). A snag retention protocol for the fire program exists and is currently being utilized (pers. comm., S. Thompson).

Yosemite National Park (YNP) hosted a fisher workshop in May 2009 to better understand fisher biology, hear results of ongoing studies, and to identify research and management needs, and opportunities for collaboration on fisher research. YNP staff recently received grant funding to work collaboratively with U.C. Berkeley and the Department to better understand fisher distribution in the park, and to explore factors that may be constraining fisher dispersal north of the Merced River.

<u>National Park Service - Sequoia King's Canyon National Park</u>

Like other national parks, Sequoia-King's Canyon National Park (SKCNP) manages natural ecosystems, and therefore does not have specific management documents or policy for fisher. Additionally, the NPS does not itself have a classification of sensitive species, but they consider species so designated by other agencies, including species of special concern and listed species. Candidate species under ESA are managed closely, as though listed, and are addressed in planning documents.

Most existing park developments in SKCNP straddle the most suitable habitat for fisher. SKCNP is in the process of attempting to get funding for research that will address how fisher may be affected by park developments and park roads. They are also interested in research on the relationship between their fire management program and fisher (H. Werner, pers. comm.).

<u>State Lands</u>

State lands compose only about 1% of fisher range in California. State agencies are subject to CEQA, thus, the fisher should receive special management attention as a species of special concern, and more notably as a candidate species under ESA and CESA. Recreation is one potential threat to fisher on some state park land, and timber harvest on state forest lands could contribute to decline in fisher habitat quality and quantity if not adequately mitigated.

Private Lands Management

California Forest Practice Rules

The petition highlights the importance of private land management for maintenance and recovery of fisher populations due to the substantial portion of the fisher's historic geographic range on private lands. The Department estimates approximately 38% of the historic and 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 FPR) are the primary set of regulations for timber management projects on private and State lands in California. The Department is a member of the interagency Review Team established under 14 CCR 1037.5 to assist the Director of the Department of Forestry and Fire Protection (CAL FIRE) in evaluating the potential environmental impacts of timber operations.

The petition describes the FPR sections most relevant to fisher management and concludes the FPR "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 FPR 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 FPR 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.

Department's Determination

The Department, based on its experience as a member of the interagency review team for the timber harvest review process, believes the petition's conclusions about the lack of specific protections for the fisher in the FPR are correct. While the Department disagrees with some of the petition statements about the FPR and their implementation, the overall conclusion that regulation of private timberlands is not adequate to ensure the persistence of fishers and their habitat on private timberlands appears sound. The Department also recognizes that fishers do occur on some private timberland ownerships and that voluntary policies of some timber companies may ameliorate the potential for timber management to degrade the quality or diminish the quantity of fisher habitat on these lands. The following summarizes the petition's major points and the Department's view regarding them.

Mechanisms of Take and Other Adverse Impacts

Timber management can affect fishers both directly and indirectly through habitat modification. Human activities, such as felling and yarding trees, or hauling logs, can also directly impact individual fishers by killing them or by disrupting essential behaviors such as breeding, foraging, or resting. Timber harvests can alter habitat and make it unsuitable or less suitable for fishers, either by reducing the area of dense canopy forest within a fisher's home range or by removing the critical habitat elements (trees with cavities or other den sites) necessary for fishers to survive and reproduce. In general, the petition is correct to suggest the FPR 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 with suitable for denning fishers. As described in the petition and as summarized in literature reviews, such as Powell and Zielinski (1994) and Powell et al. (2003) a forest managed in such a condition would not provide the habitat requisites of fishers.

Timber management can also affect fishers by establishing and increasing road density. Fishers may be subject to direct mortality on forest roads. In addition, roads may increase their vulnerability to predation, incidental trapping, and disturbance related to other land use allowed on private lands.

Sensitive Species Designation

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, which also requires the Board to consider, and when possible adopt, feasible mitigation measures for the protection of sensitive species. 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 Board's consideration of feasible mitigation measures for a sensitive species might, but would not necessarily, result in adequate protection for the fisher.

In a petition comment letter submitted to the Department, Self (2008b) discusses several of the aforementioned 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, late succession forest stands, and WLPZ tree retention do not provide adequate assurance that fishers or their habitat will be conserved in the timber harvest review process. Mr. Self suggests the FPR intent language under 14 CCR 897(b)(1)(B) provides an over-arching protection mechanism for all wildlife, including fishers. 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." While meeting this intent would provide for the viability of fishers, at least where they exist, the FPRs do not provide specific direction on how to manage timberlands for fishers. In practice, and contrary to Mr. Self's comments regarding 14 CCR 897(b)(1)(B), the analysis of, and mitigation for, potentially significant impacts to fishers in the timber harvest review process has relied largely on standard ("boilerplate") language developed by foresters for inclusion in proposed plans. The Department is not aware of any plan that has identified potentially significant impacts to the fisher nor any specific mitigation measures to reduce such impacts prior to plan approval.

Protection of Fisher Den Trees

The availability of den sites is an important factor affecting habitat suitability for fishers (Powell and Zielinski 1994). The FPR do not offer specific protection of fisher den sites, although some aspects of the FPR may contribute to fisher den tree retention. The FPRs also contain Watercourse and Lake Protection Zones (WPLZ), these are zones of selection harvest along streams intended to protect instream habitat quality for fish. Depending on the type of stream (fish-bearing or not), the steepness of the slopes above the stream, and whether the stream is in a watershed with listed salmonids, the WLPZ may encompass 50 and 150 feet on each side of a watercourse (100 to 300 feet total width). In regions with high stream density like the north coast, WLPZ may encompass approximately 15% of the landscape (Department of Fish and Game, unpublished 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 networks should promote fisher dispersal, but the ability of narrow habitat in a matrix of lower-suitability habitat to sustain fisher populations is unknown. Moreover, these lands are still recovering from previous practices in which no provision for streamside buffers was made. In areas where stream corridors were clearcut in the 1950s or 1960s, it will likely be several more decades before fisher populations can rely on WLPZs for denning structures. In addition, the FPR WLPZ rules are subject to change. For example, the rules for WLPZ related to listed salmonids are currently being evaluated for possible modifications.

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 FPR 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. Reentry cycles for typical silvicultural systems may eliminate any real value of these retained trees for fishers because trees retained in an earlier entry can be harvested and replaced by two others that meet the minimum requirements.

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.

Snags

Snags (standing dead trees) are commonly used by fishers for denning and resting (Zielinski et al. 2004a and Reno et al. 2008, and many others). There are FPRs related to snag retention (14 CCR 919.1, 939.1, 959.1). Although the FPR requires "all snags shall be retained to provide wildlife habitat" within harvest areas, the FPR 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 fishers. Regardless of the merchantability standard, the FPR 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. As such, there is no assurance of adequate supplies of snags for fishers in the future.

Silvicultural Practices

In addition to large old trees for den sites, fishers prefer extensive stands of mature, closed canopy forest for movement and foraging and avoid open areas without cover (Buskirk and Powell 1994). 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. If several such harvests occur in close proximity on the landscape, the risk of predation or energetic cost of traveling between remaining suitable habitat patches might be too great to allow fishers to use the area. Evenaged regeneration methods also can be expected to remove habitat elements essential for denning, such as large old trees and snags, and downed logs, which would lower habitat suitability of the stand for an even longer period (many decades to centuries). The intermediate treatment of commercial thinning is considered a step leading toward evenaged harvest and under most circumstances would ultimately result in the same impacts as, for example, clearcutting.

Relative to evenaged methods, unevenaged regeneration methods, such as selection, tend to provide a more stable habitat condition in terms of canopy cover, although the canopy cover after harvest may be less suitable for fishers for a period of some years. But as discussed in the petition, unvenaged methods would likely result in a reduction in the number of suitable den trees, either through harvest of existing den trees, inadvertent felling of unmerchantable den trees during logging operations, or by managing forest stands so trees are harvested before they develop suitable den structures.

Under either silvicultural category, the emphasis on economic return and maximum sustained production promotes the harvest of trees before they reach the age, size, and condition conducive to fisher denning needs.

Sanitation-salvage harvests target dead, diseased, and dying trees, which are often the trees most likely to have suitable fisher den structures. As discussed in the petition, this silvicultural prescription 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 decadent old trees with a relatively high likelihood of providing suitable den sites for fishers. Likewise, emergency harvests exempted from preparation of a timber harvesting plan under FPR 1052 may not include measures needed to retain fisher habitat elements.

Generally, the Department believes current silvicultural practices can degrade fisher habitat quality across the species’ current and historic range in California. Although difficult to quantify, it is very likely management of private timberlands in California has resulted in reduced habitat suitability for fishers by reducing forest structural complexity and by creating a mosaic of forest openings. The Department believes timber management consistent with maintaining or improving fisher habitat quality is possible but would require modification of current silvicultural practices.

Mitigation Measures for Non-listed Species

The Department believes the petition’s discussion of mitigation measures for non-listed species to be correct. The petition discusses the role of the FPR (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 FPR. In the

Department's experience, neither of these processes has resulted in the development of significant mitigation measures for the fisher, in part because of the lead agency's narrow interpretation of FPR 1037.5(f)(1). This rule section states, in part, "the Director (of CAL FIRE) may only require incorporation in the plan of mitigation measures that are based on rules of the Board." In other words, where the plan submitter does not agree, for example, to retain specific trees that could be used by fishers for denning, because there is no specific rule section requiring retention of such trees, CAL FIRE sometimes finds that such mitigation cannot be made part of the timber harvesting plan.

Late Succession Forest Stands

Late succession forest stands are addressed in the FPRs (14 CCR 919.16, 939.16, and 959.16). 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. However, the Department has found this rule section does not provide appreciable protection for older forest stands 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 depending on the landscape context. 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 significant degradation to these stands may result.

Cumulative Impacts Assessment

There are requirements in the FPR under Technical Rule Addendum No. 2 to assess potential cumulative impacts to resources. In the biological resources section, harvest plans must address factors such as snags, den trees, rest trees, downed large woody debris, multistory 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, if addressed adequately, would result in disclosure of potential cumulative impacts to the fisher, in practice most harvesting plans provide conclusory statements that no significant cumulative impacts will occur. The Department believes that without additional regulations, policy, or guidance, especially in the development of thresholds, Technical Rule Addendum No. 2 does not provide adequate protection for fisher habitat.

Protections for Other Species

The petition discusses the inadequacy of the FPR protections for the northern spotted owl and marbled murrelet to protect the fisher. Although stands identified as 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 only encompasses a few thousand acres out of a total private land base in the range of the fisher of more than nine million acres. The area of marbled murrelet nest stands does not contribute significantly to fisher conservation and is concentrated in the north coastal zone where fishers appear to be relatively well distributed.

Likewise, protections in the FPR 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 Cascades mountains. Northern spotted owls rely less on snags and cavities as critical habitat elements than do fishers. If, as occasionally happens, northern spotted owls move their nest site or center of activity, the previously-occupied stand may become available for harvest. In such cases, any protection to fishers derived from that owl stand can be diminished or eliminated.

Within the range of the northern spotted owl, the habitat retention requirements of the FPR alone, as summarized by the petition, probably are not sufficient to maintain fisher populations, although the general practice of retaining a core patch of nesting and roosting habitat around northern spotted owl nest sites contributes to the amount of habitat available to fishers in the area. Moreover, the efficacy of conserving two or more predators with substantial diet overlap in the same patches of habitat (such as WLPZ or NSO nest cores) is unknown. Application of spatially-explicit habitat models for the fisher and northern spotted owl on national forests in northwestern California revealed relatively low correlation between habitat suitability values for the two species across the landscape (Zielinski et al. 2006).

The California spotted owl (*Strix occidentalis occidentalis*) in the Sierra Nevada is not listed as threatened or endangered and there is no habitat retention requirement for this species in the FPR. Overall, the Department believes the FPR provisions for marbled murrelet and spotted owl do not provide appreciable protection for the fisher, especially throughout its geographic range in the state.

Summary

In summary, the Department believes the FPR do not provide adequate protection to ensure the persistence of fishers on private and State timberlands in California. The protections offered fisher and other non-listed wildlife species in the FPR are minimal. Some improvements to timber harvesting plans have been achieved when the Department has had adequate time to review proposed plans and to provide recommendations for fishers. Also, the FPR do provide latitude to willing landowners to manage for fisher habitat, but the FPR do not explicitly require such management. Particular weaknesses in the current FPR with regard to fisher include a lack of a significance threshold for cumulative impacts to fisher habitat and habitat elements, no provision for recruitment of snags and live conifers suitable for fisher denning, and no provision for retention or recruitment of hardwoods suitable for denning.

Summary of Comments Received regarding the FPR and Existing Management Practices

Several comment letters submitted by representatives of northern California industrial timberland owners documented the occurrence of fishers on portions of their lands (e.g., Klug 2008, Diller et al. 2008, Farber 2008), while other landowners within the historic range of the fisher in northern California documented the apparent absence on all or most of their managed lands (e.g., Self 2008a, Carey 2008, Douglas 2008). Although fishers have been detected on some private timberlands in California, given the short duration of most of these studies it is unclear whether these populations are stable throughout their range. It is also unclear why, if current forestry practices on private lands are sufficient to maintain fishers (as purported in the comment letters from timber companies), the species has not expanded back into the private and public lands where it is currently extirpated.

In 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. The Department acknowledges that, on their face, many of these policies should result in better conservation of fisher habitat elements than are afforded by the FPR. However, whether such policies are adequate to ensure persistence of fishers on these lands is unclear. Moreover, 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. Moreover, non-industrial landowners, which comprise a significant fraction of the fisher's geographic range in California, generally do not have comprehensive policies for wildlife habitat, so the minimal protections offered by the FPR would apply to most of these timberlands.

Comment letters (Self et al. 2008, Carr 2008) also 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 CAL FIRE. In the Department's experience, these plans are not sufficient to ensure the habitat needs of species like the fisher, which relies on older hardwoods and conifers not typically modeled in growth and yield projections, are met.

Existing Habitat Conservation Plans

There are 2 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 Department believes the PL HCP, if fully and correctly implemented, could have provided adequate habitat to ensure fishers remain on PL lands. 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 PL HCP, which covers about 200,000 acres of mostly second-growth forest in Humboldt County, provides incidental take authorization 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. Due to disagreement over interpretation of the term “live cull”, this aspect of the HCP was not implemented during the first several years of the HCP and as a consequence many of the trees of highest wildlife value were harvested. Therefore, the Department believes that, while the various measures in the PL HCP may contribute to fisher conservation, the adequacy of the HCP to ensure the long-term existence of fisher on the ownership is unclear.

The Department received comment letters (Self et al. 2008, Carr 2008) highlighting coverage of the fisher under the PL HCP. Neither comment letter mentioned the lack of retention of “live culls” as required by the HCP. During the first eight years of HCP implementation, significant numbers of old, decadent redwoods were harvested that should have been retained as live culls. Because similar trees may take more than a century to regenerate, substantial resting and denning habitat for fishers has been lost for the foreseeable future.

The GD HCPs cover mostly second and third-growth forest on about 440,000 acres in

Humboldt and Del Norte counties. 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 modestly 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, but the Department has not yet fully evaluated the value of these HCPs for fisher conservation. 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, also contributes 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 by Green Diamond or the Department has been conducted to ensure these measures are adequate for the long-term viability of fishers.

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 fishers is presently unknown. Fishers have not been detected during recent mesocarnivore survey efforts in the coastal redwood/Douglas-fir forests in proximity to the proposed plan area (Douglas 2008). 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, current versions of the plan include 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).

Sierra Pacific Industry Candidate Conservation Agreement with Assurances

The Sierra Pacific Industry "Candidate Conservation Agreement with Assurances" (SPI CCAA) for fisher is between SPI and the Service and was approved on May 15, 2008. CCAAs are intended to enhance the survival of a covered species and would provide incidental take authorization from the Service 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 – it is apparently not currently occupied by fishers.

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 evenaged 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). Based on the information in the CCAA, it appears only one potential den tree is needed for an entire stand, regardless of its area, and there need be no direct evidence of use or suitability for use of the tree by fishers. The petition points out 22 inches dbh is about half the average diameter for fisher den trees in conifers, which is generally consistent with the values reported in scientific literature. However, more than one study of fisher den sites has indicated hardwoods as small as 22 inches may be used for denning. It is also not clear from the CCAA whether the 22-inch or greater trees may be included in WLPZ. If so, then this retention standard may not provide any real benefit in terms of habitat retention above the FPR standard.

The Department believes stands meeting the Lifeform 4 criteria might be suitable fisher habitat, but whether a landscape containing 20% to 33% such habitat could sustain a fisher population is unclear 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. If conifers comprise a significant portion of the retained trees, then it is likely a much larger dbh standard would be needed for the conifers because of the typically much larger size of conifers used as den sites (for example, see Reno et al. 2008). Moreover, the Department notes Powell and Zielinski (1994) calculated the minimum area in California needed to support a fisher population to be about 150,000 acres. If only about 32,000 to 53,000 acres of the Stirling Management Area is comprised of suitable fisher habitat, then it would not appear to be capable of sustaining a fisher population without a substantial area of suitable habitat on other nearby lands. Also, as modeled by Davis et al. (2007), the Stirling Management Area appears to provide low habitat suitability for fisher.

The Department believes the SPI CCAA has limited benefit to the fisher over current management practices. The SPI CCAA was mentioned in three comment letters (Self 2008a, Tomascheski 2008, Carr 2008) received by the Department. The Self (2008a) letter is a summary of the CCAA provisions and points out some inaccuracies in the petition regarding the CCAA development process and intent. The Tomascheski (2008) letter was submitted after the SPI CCAA was signed by the Service and provided the final signed version of the CCAA and two related federal documents. The Carr (2008) letter also mentions the CCAA and its provision to increase denning habitat from 22% to 33% of the Stirling Management Area. Although the Self letter, in particular, correctly indicates the CCAA does not alone permit translocation of fishers to the Stirling area, the Tomascheski and Carr letters state the CCAA would permit SPI to work with the Department to translocate fishers. These authors state there is consensus translocation is necessary to address the primary threats to fisher. They also state listing the fisher would frustrate or actually prevent implementation of a translocation project. Although the Department considers translocation an important management tool for fishers, there is not yet consensus among the scientific community that translocation is the highest priority action for fisher conservation in California. Neither does the Department believe that listing the fisher would prevent translocation of fishers onto private lands. For example, a fisher translocation project is being implemented in the State of Washington, where the fisher is listed as endangered.

Translocation Update

Translocation is a management technique that has been used successfully to reestablish fisher in North America and is being used by the Department to reestablish fisher to its historic range in California. A primary conservation concern for fisher has been the reduction of its overall distribution in the state, leading to relatively small, isolated populations. Establishing another population in a formerly occupied area is an important step towards strengthening the statewide population in California.

The Department assessed the feasibility of translocating fishers to properties owned by Sierra Pacific Industries (SPI) within the unoccupied portion of the fisher's historic range in the northern Sierra Nevada (Callas and Figura 2008). Five areas were offered for consideration by SPI. They represent most of the large, relatively contiguous tracts of its land within the southern Cascades and northern Sierra Nevada.

A variety of factors were used to assess the feasibility of reintroducing fishers to these areas including habitat suitability within candidate release sites, prey availability, genetics, effects on other species with special status, disease, predation, and effects of removing animals on donor populations. Three GIS models were used to evaluate potential fisher habitat at candidate release sites and elsewhere within the fisher's unoccupied range in the southern Cascades and northern Sierra Nevada. The model, based on the California Wildlife Habitat Relationships System, predicted substantial habitat to be present within these areas. However, models based on the characteristics of locations of fishers in currently occupied areas predicted comparatively little habitat of moderate or high suitability within the unoccupied areas assessed.

Data collected by SPI at thousands of inventory plots within each of the candidate release sites provided a detailed picture of the density of habitat elements such as large hardwoods, snags, and large trees considered important to fishers. The density of many of these elements within some candidate release sites was similar to, and in some cases exceeded, the density of those elements on other portions of its property currently occupied by fishers. Of the candidate release sites evaluated, all three GIS-based models indicate that SPI's Stirling Management Area contained the most suitable habitat.

Between November 24, 2009 and January 2X, 2010, 19 fishers were captured using live traps in Siskiyou, Shasta, and Trinity counties (Figure 13). Most fishers (58%) were trapped on commercial timberlands owned by SPI or Timber Products Company. Eight fishers were captured on land administered by the Bureau of Land Management or the USDA Forest Service.

All fishers captured that met initial target criteria (age and sex) upon examination while in the trap were transported to a captive holding facility. Potential candidates for translocation were chemically immobilized, given a physical examination, vaccinated for distemper and rabies, treated for parasites, and blood/fecal/nasal samples were collected for disease testing.

Female fisher meeting health and body weight criteria were surgically implanted by a Department wildlife veterinarian with a VHF radio transmitter. Male fisher meeting initial health and weight criteria were fitted with a GPS collar. Biological samples collected while fishers were immobilized were shipped to U.C. Davis for canine distemper and canine parvovirus testing. No animals with evidence of previous exposure to canine distemper or that were actively shedding parvovirus were translocated.

Of the fishers captured for translocation, 13 (7 female and 6 male) met health and other screening criteria and were released within SPI's Stirling Management Area (Figure 13) during December 2009 and January 2010. These animals are being intensively monitored as part of a research project under the direction of Dr. Roger Powell in collaboration with the Department, Service, and SPI. A graduate student and field technicians are working on the project under Dr. Powell's direction.

California Environmental Quality Act (CEQA)

The petition briefly describes the role of CEQA in ensuring the environmental impacts of proposed projects are assessed and disclosed. As noted previously, most projects on State and private lands with fisher habitat are regulated under the CEQA-equivalent timber harvest review process. However, 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 processed under CEQA. The petition's statements regarding CEQA are mostly correct and the overall conclusion that impacts to fishers are allowed under CEQA is sound. However, mitigation measures for the protection of declining species can be and often are developed under CEQA before such species reach the "brink of extinction" as stated in the petition. Also, contrary to the petition's statement, protection of fisher habitat could be required by a lead agency even where fishers have not been detected.

CEQA requires a lead agency (normally a county or city government or a State agency such as Cal Trans) to analyze potential project impacts and mitigate those impacts to a less than significant level when feasible. However, a lead agency may make a statement of overriding considerations when it finds that specific economic, legal, social, technological, or other project benefits outweigh unavoidable adverse environmental impacts (California Code of Regulations, Title 14, section 15093). Additionally, many categories of projects have been exempted from CEQA review by the legislature, including some with potential to impact fisher such as installation and maintenance of pipelines, changes in water diversions and places of use, and emergency actions (CCR 14 section 15260 et seq.).

As noted previously, the California Forest Practice Rules do not consider an "exemption" a project under CEQA and therefore do not require any environmental review prior to allowing exemption harvesting. This process does not provide a mechanism for the Department to comment as a trustee agency, and to recommend any mitigation measures for fisher conservation.

Exemption harvesting is potentially a significant source of impacts to fishers and their habitat. The unregulated aspect of exemptions makes this harvesting option an attractive alternative to participation in the often rigorous timber harvest review process. Important late-seral habitat elements are often the specific targets of exemption harvesting making recovery of the habitat and by extension, recovery of the species more difficult. Exemption harvesting is discussed in the petition under the California Practice Rules section (beginning on page 61), that properly describes the potential impact to fishers resulting from the high number of acres harvested through this method. Here the absence of adequate regulatory oversight by CAL FIRE in not considering the potential impacts to non-listed species, nor the potential take of listed species, and not applying the mandatory finding of significance provided in CEQA Guidelines Section 15065, is inadequate regulatory oversight.

Another area of concern pertaining to the regulatory process for timber harvest plan review is the required analysis of cumulative effects and alternative analysis. Cumulative impacts are those impacts that when considered individually may not be significant but when considered with many other similar projects, the resulting incremental impact, may be or become significant when considered together. The Department has on several occasions requested CAL FIRE to consider the potential for significant impacts associated with our review of individual timber harvest plans. On those occasions, CAL FIRE has concluded that without specific significant impacts on an individual THP, the likelihood of cumulative impacts was unlikely (see official response for THPs 2-01-128 BUT, 2-01-197 YUB, 4-02-12 CAL).

Alternative analysis requires a description of a range of reasonable alternatives to the project, or to the location of the project, which would feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project. Alternative analyses in THPs do not meet this guideline on a regular basis. Feasible alternatives in an area with fisher or fisher habitat would be to retain more hardwoods, snags, large trees and downed logs, or to modify the time of entry to avoid critical denning seasons. These are alternatives that would benefit fishers and be supported by the Department.

Hoopa Tribal Forestry

Hoopa Tribal Forestry has been active in fisher research for almost 2 decades. The tribe lands are in a unique location near the northwestern edge of the Klamath Province, with the coast redwood ecosystem edge approximately 5-10 miles to the west. The fisher is culturally significant to the Hupa people, and forest management activities are conducted with sensitivity to potential impacts to fisher. A new management plan is under development, and the Department cannot comment on its conservation value to fisher until we have reviewed it. We are currently providing some funding for ongoing work on fishers to better understand den site characteristics, juvenile dispersal, and fisher demography.

Tule River Tribe

The Tule River Tribe is located in southeastern Tulare county in the southern Sierra. The tribe manages approximately 54,000 acres, of which 15,000 acres are conifer forest , and an additional 20,000 acres are potential lower elevation fisher habitat - blue oak woodland, black oak woodland, oak-chaparral mix. The tribe cooperated with USFS fisher studies in the 1990s and has documented fisher presence on tribal lands, including a sighting of a pair of fisher in blue oak woodland. The conifer zone is managed for timber production using nearly exclusively single tree selection harvest although 25-30% of the conifer zone is unmanaged because it is too steep or otherwise inaccessible. Timber harvest is regulated by the U.S. Bureau of Indian Affairs and is very similar to timber harvest on private lands regulated by the California Forest Practice Rules (B. Rueger, pers.comm.).

Suggestions for Future Management

The petition presented 9 suggestions for future management of fisher under the Recommended Management and Recovery Actions section on page 71. The Department generally agrees with these suggested management actions, with the following caveats:

Items 2 and 6 recommend retention of medium and large conifer and hardwood trees and snags ≥15 inches. The Department believes emphasis should *also* be on retention of larger trees covering the size classes that fisher have been documented to use. Additionally, maintaining trees of various sizes (and species) in perpetuity, to provide replacement habitat in the long term should be a goal.

Item 4 would be logistically challenging to implement given the vast acreage of forested land in California and could distract efforts and funding from fisher population monitoring. However, assessment of suitable den and rest trees, downed logs, and snags could be incorporated into existing forest inventory systems. The Department recommends review of current inventory systems and efforts to standardize data collection on wildlife habitat elements.

Item 8 recommended actions to minimize the potential for disease transmission from domestic dogs to fishers. These actions would be difficult to enforce and animal control agencies usually have low operating budgets.

The Department recommends the following:

Engage all land owners/managers in fisher conservation, statewide. Initial efforts should be directed at peer-evaluation of unpublished and recently published fisher studies to develop a better understanding of the current status of fisher in California.

Continue involvement with *Martes* working groups in California.

Continue involvement with the Interagency West Coast Fisher Conservation Assessment and Strategy Team, and prioritize management recommendations in the Interagency Strategy with others noted here to help direct available funding and staff.

Continue involvement with the USFS SNAMP program and southern Sierra Fisher Working Group, and work towards implementing management suggestions contained in Spencer et al. (2007:41-43); *e.g*., the Kings River Administrative Project Area should be a focal area for increasing habitat value and contiguity.

Conduct large-scale long-term monitoring of fisher distribution and abundance.

Conduct large-scale long-term monitoring of northern California fisher populations.

Investigate fisher population demographics in managed forests.

Fully assess the implications of small population size, isolation, and population genetic structure on the viability of both California fisher populations.

Engage in a broad effort (*e.g*., Natural Community Conservation Plan) to maintain late-seral habitat elements within the managed forest landscape (both public and private lands).

Revise the Forest Practice Rules to require protection of late-seral habitat elements important to fisher.

Establish minimum thresholds in the Forest Practice Rules to retain or recruit late-seral stands within the landscape important to fisher.

Require timber harvest plan exemptions to proceed through usual CEQA review processes.

Continue research on disease to better understand mortality rates and effects on fitness from the diseases known to have infected fisher populations in California.

Establish "fisher friendly" areas of suitable habitat in relatively narrow bottlenecks in fisher habitat to facilitate fisher dispersal and movement (*e.g.*, Hatchet Mountain area near the Pit River and portions of the southern Sierra).

Plan for, establish, and maintain suitable habitat corridors between watersheds.

Establish corridors or large areas of suitable habitat to facilitate fisher dispersal and movement, especially near major roads/highways, and where rivers and existing land uses may act as secondary filters to fisher movements, *e.g*., from North to South across the Pit River and Highway 299.

Establish multiple fisher-friendly underpasses (culverts/bridges) or overpasses along Interstates, Highways, and major roads to decrease fisher mortality from vehicles.

Conduct studies in cooperation with Caltrans and others to quantify fisher mortality on roads and to determine if fisher are using culverts or other devices and drainage configurations to access habitat on each side of roads.

Explore alternative designs to median barriers on roads with the goal of reducing fisher mortality; factor in research and monitoring to test effectiveness.

Reintroduce fishers into portions of their historic range.

Conclusions

The fisher is now extirpated from approximately 43% of historical range encompassing the coast redwood area of California from Marin County to southern Humboldt county, and in the southern Cascades and the northern and central Sierras, generally from the Pit River in the north to the Merced River in the south. Fisher populations at both the north and south ends of the state have not been detected expanding naturally back into the Sierras or central coast redwood ecosystems despite the fact that legal trapping ended in 1946. Natural recolonization does not appear likely given the land use changes that have occurred, and that are ongoing, *e.g.*, timber harvest, habitat fragmentation, catastrophic wildfires, roads, housing developments, and recreational development.

If fishers in California currently have robust and increasing populations, and if they can truly thrive in managed and fragmented forest landscapes that exist today, one would expect natural recolonization of the Sierras and central coast redwood range. There is some evidence that rivers alone should not impede natural recolonization because fishers have been documented crossing rivers in various parts of California (Letter from S. Farber 2009; pers. comm. M. Higley) and are able to swim (Douglas and Strickland 1999:520).

The same highly-reduced quantity, and fragmented nature of late seral forest habitat that led to the federal listing of the northern spotted owl and the marbled murrelet (*Brachyrampus marmoratus*), and to the demise of the Humboldt marten (*Martes americana humboldtensis*), has probably contributed to the inability of fisher to naturally recolonize their historic range, and constrains fisher population growth to this day.

Additional factors affecting fisher conservation include:

1. Regulatory mechanisms on private lands are generally inadequate at protecting late seral forest habitat elements important to fisher, and in recruiting such elements into the future.

2. Fishers are forest habitat specialists and need late seral elements (large trees and snags with cavities, large limbs, downed logs) for denning and resting sites.

3. No large-scale combined private/public habitat conservation plan or conservation strategy exists for conservation of the fisher population in northern California.

4. No landscape-level late seral retention plan exists via the FPRs for the private ownerships in northern California in fisher range.

5. Fishers have relatively small litter sizes, and females may not breed or bear young every year, and prey populations also exhibit interannual variability.

6. Small population size in the southern Sierra is at risk because of loss of habitat, years of natural fire suppression leading to risk of catastrophic fire, and due to stochastic events.

7. No systematic or large-scale population monitoring is occurring in northern California, and the fisher is not a monitored species under the NW Forest Plan.

8. Population monitoring at a large scale is expensive, approximately $550,000 per year for the southern Sierra monitoring effort underway by USFS.

9. Late seral forest habitat retention policies and management direction on public land has occurred relatively recently compared to the time period needed for trees to exhibit the decadence required by fisher.

10. In much of northern California, public lands exist in a matrix with private lands. Fishers do not recognize these administrative boundaries, and rigorous large-scale demographic studies have not been conducted on fisher.

11. Generalist predators (*e.g.*, coyotes and bobcats) of fishers may fare better in managed landscapes than fisher do, and predation rates may help suppress fisher population expansion.

The interaction of these factors, and their combined effects result in cumulative impacts that probably limit natural recolonization of former range and constrain the 2 existing fisher populations in California. Additionally, long-term conservation and range expansion of the southern Sierra fisher population is dependent on the larger and most genetically similar northern California population. In the event of substantial and sustained population decline in the southern Sierra caused by a stochastic event, or a series of catastrophic fires, or a combination of events such as prolonged drought and poor reproduction years, the northern population of fisher in California would be essential for recovery of the southern

Sierra population. The 2 populations must be considered connected in terms of population rescue given their genetic similarities, though they exist hundreds of kilometers apart at the present time. Fisher populations in Oregon and Washington cannot be relied upon at this time to rescue fisher in California, given their small population sizes in those states, and because of lack of genetic similarity.

RECOMMENDATION

The Department recommends that designation of the fisher as threatened/endangered is / is not warranted.

“Endangered species” means a native species or subspecies of a bird, mammal, fish, amphibian, reptile, or plant which is in serious danger of becoming extinct throughout all, or a significant portion, of its range due to one or more causes, including loss of habitat, change in habitat, overexploitation, predation, competition, or disease (FGC §2062). "Threatened species" means a native species or subspecies of a bird, mammal, fish, amphibian, reptile, or plant that, although not presently threatened with extinction, is likely to become an endangered species in the foreseeable future in the absence of the special protection and management efforts required by this chapter” (FGC §2067).

PROTECTION AFFORDED BY LISTING

CESA defines “take” to mean “hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill.” (FGC § 86.). If the fisher is listed as threatened or endangered under CESA, take would be unlawful absent take authorization from the Department (FGC §§ 2080 et seq. and 2835). Take can be authorized by the Department pursuant to FGC §§ 2081.1, 2081, 2086, 2087 and 2835 (NCCP).

Take under FGC § 2081 (a) is authorized by the Department via permits or memoranda of understanding for individuals, public agencies, universities, zoological gardens, and scientific or educational institutions, to import, export, take, or possess any endangered species, threatened species, or candidate species for scientific, educational, or management purposes.

FGC § 2086 authorizes locally designed voluntary programs for routine and ongoing agricultural activities on farms or ranches that encourage habitat for candidate, threatened, and endangered species, and wildlife generally. Agricultural commissioners, extension agents, farmers, ranchers, or other agricultural experts, in cooperation with conservation groups, may propose such programs to the Department. Take of candidate, threatened, or endangered species, incidental to routine and ongoing agricultural activities that occurs consistent with the management practices identified in the code section, is authorized.

FGC § 2087 authorizes accidental take of candidate, threatened, or endangered species resulting from acts that occur on a farm or a ranch in the course of otherwise lawful routine and ongoing agricultural activities.

Although fisher may occasionally receive consideration under CEQA §§ 15380 (Endangered, Rare or Threatened Species) and 15065 (Mandatory Findings of Significance), the avoidance, minimization and mitigation measures tend to result in locally fragmented landscapes and a trend of cumulative habitat loss and fragmentation range-wide. CEQA-imposed mitigation measures do not necessarily result in compensation habitat being secured or the completion of other actions that benefit the species. As a CESA-listed species, fisher would be more likely to be included in Natural Community Conservation Plans (FGC § 2800 *et seq.*) and benefit from large-scale planning. Further, the full mitigation standard and funding assurances required by CESA would result in mitigation for the species that in general does not usually occur under CEQA.

Actions subject to CESA may result in an improvement of available information about fisher because information on fisher occurrence and habitat characteristics must be provided to the Department in order to analyze potential impacts from projects.

Economic Considerations

The Department is not required to prepare an analysis of economic impacts (FGC § 2074.6).

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Personal Communications

Dr. Carlos Carroll, Klamath Center for Conservation Research. Email 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.

Jesse Garcia, Wildlife Biologist, California Department of Fish and Game, Sacramento, CA. January 20, 2010.

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

Brian Rueger, Forester, Tule River Tribe. Phone conversation with Dan Applebee, California Department of Fish and Game. April 22, 2008.

Richard L. Truex, Wildlife Biologist, USFS, Sequoia National Forest. Email to Esther Burkett, California Department of Fish and Game, January 8, 2010.

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 to Pete Figura, California Department of Fish and Game. May 13, 2008.

Department of Fish and Game 4/18/2010.

At the request of the Fish and Game Commission (April 2010 meeting, Monterey), the following is a summary describing the changes from the Departments “Confidential Internal Discussion Draft-Subject to Revision-Do Not Disclose” document of 1/23/2010 to the final fisher status report of the Department submitted to the Fish and Game Commission on 3/2/2010 that were listed by Dr. R. Barrett (one of the peer-reviewers) in his letter of 3/26/2010 to the Fish and Game Commission.

Omissions cited by Dr. Barrett are focused on here because the implication is that the deleted information changed the document to favor the timber industry. The information identified as omitted was either moved, removed, or edited.

Information in Dr. Barrett’s letter that was “added” material is not evaluated here as it is in the final document and can be evaluated there in its entirety and context with the balance of the document.

Additionally, at the end of the section on Dr. Barrett’s letter, we have included Department evaluations of the other letters that were submitted and were critical of the peer review process or disagreed with portions of the Department report. These letters were received from:

Reginald Barrett, Ph.D
Carlos Carroll, Ph.D
Natalie Dawson, Ph.D
Justin Augustine, Center for Biological Diversity
John Buckley, CSERC

Other letters received were not critical of the Department’s status report.

Omitted Comment from R. Barrett letter of March 26, 2010 DSR= Draft Status Review & page #	**Why the text was moved, omitted, or removed**	**Where information capturing the thought of the subject text can be found in final document**
DSR 6 omitted: “If fisher movements were constrained even under pre-European settlement conditions, it is likely that constraints are now multiplied given the anthropogenic changes that have occurred in the forested	This was removed as speculative opinion. We have no studies to support the statement. Constraints could be fewer for all we know.	Final describes and acknowledges change has occurred, e.g.: “It is well documented that timber harvest in the coast redwood ecosystem of California was important in the latter half of the 1800’s

landscape over the last 200 years or more.”		and there was much human activity.” Also see Page 11, page 12 on historic human impacts. Threats section as well.
DSR 18 omitted: “Thus, approximately 43% of historic range no longer has fisher present, or fisher are extremely rare. The range loss is best explained as the result of habitat loss due to timber harvest, along with overtrapping. On page 15 of the petition, loss of fisher in the northern Sierra Nevada is attributed to a combination of factors along with timber harvest and trapping. The other factors noted from various publications include: road building concurrent with logging, rapid population growth, and development. The Department concurs with this assessment, and these other factors are discussed in more detail in the Threats section of this report.”	This was a statement in evaluation of the petition. For developing the status report, these factors are addressed in threats. Also, range loss was best explained by trapping according to Grinnell; there does not appear to be scientific information to demonstrate otherwise.	Information repeated elsewhere in several places [“43% reduction” is mentioned 9 times in document.] see the threat sections for discussion of the various perceived threats. As we do not know how much the range has been reduced, we indicate up to 43%.
DSR 21-24 omitted- Rest site discussion (Zielinski et al. 2004a); habitat associations of fisher; snag abundance comparison…	Den/rest site importance is not in dispute. Lengthy quotation from scientific paper not needed. Much of that text was used in evaluating petition and petition comments. Much of what was removed was private timberland submission that Barrett argues we were favoring. Other parts were moved elsewhere in final document. The conclusion about loss of	Important habitat for survival described p.19-21; Rest/den site importance clearly described p.21-24; See p. 40 for “non-industrial” snags.

	snags & other factors resulting in 2 populations was removed as overly-speculative without supporting science of cause-and-effect.	
DSR 25 omitted: "For the Sierra Nevada, Campbell et al. (2000) noted the following: 'Logic dictates that fisher must be adapted to the natural frequent fire pattern historically common in lower- to mid-elevations due to long-term persistence in these habitats. However, the present situation is unique in all of the fisher's evolutionary history: individuals and their habitat are, and have been, impacted by many human-caused changes within a very short period of time (just over a century), with which they have not evolved. These changes have been made by activities including timber harvest, livestock grazing, roads, predator and pest control, recreation, mining, and urban development in a State with 32 million human inhabitants. Each of these factors acts in a yet-to-be quantified manner upon individual fisher, populations, and habitat, and may combine in a negatively synergistic fashion. Added to those stressors, potential effects of rapid-rate, large-scale reintroduction of fire into the ecosystem are unknown.'"	Lengthy Campbell et al. quote is published and is opinion and the uncertainty of it is clearly articulated by the authors. We do not have scientific information on what these various human-induced impacts have had on fisher populations, except perhaps trapping, one key factor not mentioned in the statement by Campbell et al. for some reason.	The presence of humans and their effects in the Sierra Nevada is covered on p. 11,12, 37, 101; it is also relevant in some of the threats related to roads and development. Fire is covered on p. 41 as well as numerous other pages.
DSR 28-29 omitted: "While there is reason to be cautious	Small population size discussed in pop.	Thought is captured on p. 47 now

about the absolute validity of these estimates, this is the best available scientific information available at this time, and they all point to a population small enough to be significantly impacted by stochastic events."	Isolation section.	
DSR 33 omitted: "Though a trend has not emerged from the USFS monitoring effort, the small population size of fisher in the southern Sierra is cause for concern, especially when coupled with the threat to fisher habitat by catastrophic and severe wildfire (Spencer et al. 2008). The high fisher mortality from road kill will likely not be resolved easily in the vicinity of Yosemite National Park due to the popularity of the park. Thus, a constraint on population growth for fisher will remain in the Merced River watershed."	This was removed because it was a discussion of threats in the So. Sierra population section rather than in the threat section. Threats discussion was moved to threat section. Stating that road mortality is "high" in Yosemite is premature until it is determined what impact it has on the population. It might be high, and it might be a significant factor restricting fisher movement.	USFS monitoring of population, small population size, catastrophic fire, and road kill around Yosemite are all presented elsewhere.
DSR 34 omitted: "The description of the degree to which late-seral forests have been impacted is based on published literature and is not disputed."	This is a statement from the evaluation of the petition, Dept. was agreeing with petitioners on this point. Not needed in the status report on fisher.	Changes to late seral forests in CA are acknowledged, and importance of them, on xii, 12, 21,22,23, 24, & in the private forest lands section.
DSR 36 omitted: "Though the science of fisher habitat management has not yet reached a stage where a simple prescription can be easily given on each THP, it appears the current system is not working favorably for fisher given 43% range loss and apparent lack of natural recolonization of formerly occupied habitat. Most fisher biologists agree that	This assumed range loss was caused by timber harvest activities. Grinnell work clearly indicated otherwise. One reviewer (Aubry) was confused by this section. It also is primarily a management recommendation rather that information on the fishers status. Studies of	The essence of the recommendation was captured and moved to the management recommendation section (#1, p. 81). Timber harvest, or overharvest, was identified as the largest threat to fisher (p. 37)

fisher range loss and population isolation is not caused just by historic or existing timber harvest practices, but those impacts are now acting in combination with a series of other threats that are described below. Timber harvest effects have a strong influence on fisher population persistence and viability though, given the long time frame needed for trees to reach the decadence stage necessary for den and rest sites (100 years or more)."	the impact of timber harvest practices on these fisher populations do not seem to exist.	
DSR 37 omitted: "The Department has on several occasions requested CALFIRE to consider the potential for significant impacts associated with plans under review. On such occasions, we have not received support to acknowledge the effects and identify appropriate mitigation measures to reduce or offset the effect."	This is a section on "gap in Sierra Nevada" and not mitigation of THPs with a sister agency. Discussion of private forestland mgt and regulation in the Priv. Forestland section. Also, there is no scientific data to indicate that THPs or the FPRs have had anything to do with the gap in fisher distribution in the Sierra Nevada. The statements were speculative.	The "gap" is discussed in several new places in the document. Private timber management and Forest Practice Rules are discussed in the Private forest lands section.
DSR 48 omitted: "In northern California, the Department is aware of the following projects and development activities within fisher range	Locations of specific developments were removed because listing them implied they had been reviewed in the context of their impacts on fisher and were determined to be negative. While possible, this is unknown. Also, it is unknown whether the projects have happened	Development as a potential threat is discussed in the threat section.

	and it would not have been a comprehensive list of all development projects in fisher range. The impact of development on fisher in CA does not appear to have been studied. Inclusion of this text was speculative.	
DSR 63 omitted: "The Department, based on its experience as a member of the interagency review team for the timber harvest review process, believes the petition's conclusions about the lack of specific protections for the fisher in the [Forest Practice Rules] FPR are correct…. **Through page 79**.	The entire private lands section (p. 62-79) was revised to better comport with the final petition evaluation which more specifically addressed the petition concerns. Issues that arise with CALFIRE and the THP and FPR process should be dealt with agency to agency rather than in a petition evaluation or status report on fisher populations.	This information in the status report was largely from the final text in the petition evaluation, and was updated as needed to include in the status report. The information was not provided by or written by the timber industry. The attention given to the timber industry information here (and it was provided prior to the petition evaluation in Spring 2008) is because the timber industry are the entities conducting the work on private lands. DFG scientists and some university investigators frequently work directly with private landowners in conducting this work. The USFS researchers and other university researchers, are generally conducting research on public lands, not on private lands.
DSR 64,66-68, 70, 71, 74-75, 78-79, omitted:	See above	See above
DSR 80 omitted: "The Department generally agrees with these suggested management actions, with the following caveats: Items 2 and 6 recommend retention of medium and large confer and	These were recommendations based in response to evaluating the petition. In the status report, the Department provided recommendations	See management recommendations in status report

hardwood trees and snags greater than 15 inches dbh. The Department believes emphasis should also be on retention of larger trees covering the size classes that fisher have been documented to use. Additionally, maintaining trees of various sizes (and species) in perpetuity, to provide replacement habitat in the long term should be a goal.”	independent of what was evaluated in the petition, although many are similar.	
DSR 83 omitted: “Fisher populations at both the north and south ends of the state have not been detected expanding naturally back into the Sierras or central coast redwood ecosystems despite the fact that legal trapping ended in 1946. Natural recolonization does not appear likely given the land use changes that have occurred, and that are ongoing, e.g. timber harvest, habitat fragmentation, catastrophic wildfires, roads, housing developments, and recreational development.”	Conclusions were updated and the essence of these omitted words are captured in the status report. Further, the statement was speculative in that studies have not been initiated to detect whether fisher are expanding naturally. The exception is a study that the Department is currently funding R. Barrett to initiate at the northern extent of the Sierra population range.	Lack of natural recolonization, and the potential effects of the threats are described in the status report.
DSR 83 omitted: “If fishers in California currently have robust and increasing populations, and if they truly thrive in managed and fragmented forest landscapes that exist today, one would expect natural recolonization of the Sierras and central coast redwood range.”	This was speculation and was removed. How fast should fisher be able to recolonize historic range? It is unknown and unstudied—perhaps they have been expandind since the 1920s, or since trapping ended in the 1940s, or since predacide/rodenticide use decreased in the 1970s and no one has noticed? The question	The status report describes in several places the uncertainty of knowledge related to the fisher and its range. Threats in the Southern Sierra Nevada are the best example; the translocation update section is another.

	about whether fisher in 2009 are increasing or expanding their range compared to 10, 20, 90 years ago is unknown. We do suspect that their range has contracted by up to 43% of historical range.	
DSR 83 omitted: "The same highly-reduced quantity, and fragmented nature of late seral forest habitat that led to the federal listing of the northern spotted owl and the marbled murrelet (*Brachyramphus marmoratus*), and to the demise of the Humboldt marten (*Martes american humboldtensis*), has probably contributed to the inability of fisher to naturally recolonize their historic range, and constrains fisher population growth to this day."	This was removed as speculative text without science-based information that demonstrate such conditions prevent recolonization. In particular, there is not study that such conditions constrain the population.	The status report describes late seral forest conditions as fisher habitat and that overharvest of such stands would be detrimental to the fisher (p. xi,xiv, 20,24, 37,38,40, etc.)
Comment from R. Barrett letter of March 26, 2010 & page #	**What aspect does the comment address?**	**Department evaluation of the subject text and whether it is in final document**
R. Barrett, P12; comments that the peer-review draft has changed	Ideally, we would have had the time to complete a draft of the status report and circulate it for peer review. However, because of furloughs, other duties, and personal (family) issues experienced by our lead scientist in developing the document, we had to provide the reviewers an early draft with only a few days to respond so that we could incorporate the	The peer-reviewers were advised that the document they were reviewing was a internal discussion draft and was subject to change. A read of that document would indicate that it was not a complete document. Additionally, the draft did not have the department recommendation/conclusion because it was still a working draft. We were soliciting a peer review of the scientific information in particular. We do not believe that any relevant

	comments and make the Commission deadline for March 2010.	scientific information was removed from the draft.
R. Barrett, P12; Comment on use of "gray literature" and unpublished material.	Comment considers that grey literature should either not be used, or should not have the same weight as peer-reviewed literature.	The Department agrees about the peer-review process. However, much of the information is oriented toward survey, inventory, or monitoring information to establish distribution, trend, and population size. That information is not typically submitted to scientific journals for peer-review publication (it is not experimental research information). The Department gives high credibility to the scientific research that demonstrates fisher habitat preferences and key attributes of fisher habitat as published in peer-review journals.
R. Barrett, P13; Comment that the report attempts to assert that fisher may not have inhabited the northern Sierra Nevada for thousands of years.	This comment is in relation to the preliminary genetics work that suggests a discontinuous occurrence by fisher somewhere in the Sierra Nevada	The Department does not (and did not) assert that fisher were absent from the Sierra Nevada; in fact, for this report we provide additional information (albeit anecdotal as it all is) that suggests fisher did occur throughout much if not all the Sierra Nevada. This is despite one peer-reviewer considering all the anecdotal information suspect. The Department indicated we believe fisher inhabited the Sierra Nevada.
R. Barrett, P13; Comment about addition of information on food habits and finding a deer and a reptile in late seral	This topic was also described in the petition evaluation so it is not new. As Dr. Barrett	It appears that the deer and reptile information is based on one observation of each as food habits of the fisher.

forest as fisher food item.	suggests, the loss of the porcupine historically could have been an impact on the fisher, but it is unstudied.	This is hardly the kind of comprehensive food habits work needed to conclude what foods fisher rely on—the Department is appreciative of the clarification.
R. Barrett, P13; Comment on the lack of a statewide fisher monitoring program and inability to determine whether the population is increasing or decreasing.	The topic is relevant in that much of the report similarly describes the uncertainty in fisher population estimates or trend.	The Department agrees there is no species monitoring program as is done for game species such as deer, elk, bighorn sheep, or black bear. Few nongame species have such information, while game species have had it collected for decades.
R. Barrett, P14; size of the fisher population in southern Sierra Nevada is estimated at 350; and should be 5,000 for sustainability.	Dr. Barrett's unpublished estimate is within the range estimated by the Department at less than 500 animals. The 5,000 estimate is based on population viability models.	The Department does not believe that there is enough habitat in the southern Sierra Nevada for 5,000 fisher, if there are only 350-500 there now. The Department perspective is that the total numbers are largely irrelevant and essentially a static snapshot in time (just as it would be for game species that are regularly monitored); what is relevant is the trend and perhaps density estimates in the species population based on monitoring data over time.
C. Carroll, p. 1; document does not provide the level of scientifically-rigorous review and analysis for informing decision-makers.	It is not clear where Dr. Carroll considers the document is lacking in scientifically-rigorous review, but we suspect it is in regard to the impacts of timber harvesting on fisher populations.	The Department agrees in the document that fisher rely on late seral components, high canopy cover forests, and these attributes are most likely provided by late seral forest habitat. There are several scientific sources for this information. There is also evidence that late seral

		forests have been significantly reduced in California, as indicated in the document. There are no scientific findings that the Department is aware of that indicate that the fisher population is or has been limited by such activities or has been reduced because of such activities in the past 100 years. To the contrary, there is increasing information from private land surveying and monitoring efforts that fisher inhabit these intensively managed forests. Peer-reviewers felt the scientific information was present; and despite the transition from draft to final, the Department does not believe any of the science was removed.
C. Carroll, p.2; comment that the USFWS has determined the fisher to be warranted but precluded for listing	This comment suggests that because the USFWS made this determination for fisher in Oregon and Washington (where the Fisher is largely extirpated) and California (where it clearly is not) that the Department and Commission should agree.	The Department assessed the fisher status only in California. Dr. Carroll describes the California populations as a potential “key source” for recovery. The Department understand that fisher in WA and OR are possibly more threatened than the population in the southern Sierra Nevada.
C. Carroll, p. 2; considers general statements to be non-informative for decision-making; does not help inform an evaluation of factors which may limit distribution and viability.	The comment suggests that the Department could provide greater certainty in some of the comments to better inform the Commission. More analysis and thoughtful discussion of	The Departments role was to provide information on aspects that were certain as well as uncertain. Where uncertainty exists, the Department agrees it is less than satisifying. The Department is aware that

	habitat relationships could help inform about factors that could limit distribution and populations of fisher.	the peer-review science indicates that fisher rely on late seral forests, & that most of this work is based on studies of habitat use on public lands. Private land survey, monitoring work indicates fisher also inhabit forest that is not late seral. In neither cases, are there studies to link the fisher population to the habitats in question. Consequently, while there are numerous factors that could limit distribution and viability of wildlife species such as fisher, there does not appear to be demonstrable scientific evidence that distribution or viability is being limited by such factors.
C. Carroll, p.2; reliance on personal communication and unpubl. Work by S. Self, etc. This information does not constitute best available science.	The comment indicates that survey, inventory, and monitoring data collected on private lands is not reliable because it has not been published in a peer-reviewed journal. The information ascribed to Mr. Self was information provided in advance of the Petition Evaluation, and was brought forward from the petition evaluation for consistency reasons. The peer-reviewed draft report material on the same subject (private lands forestry) was inadvertantly added from very early draft material from Spring	The Department also desires there to be more scientific inquiry conducted on private lands. As most of the scientific research efforts occur on public lands, we rely on private landownders, who may not have an incentive to conduct scientifically rigorous research, but do provide legitimate survey, monitoring, and assessment information needed to assess habitat selection and distribution. The Department is a collaborator on much of this work being conducted on private lands and already is supportive of the methodologies. The department routinely

	2008 and was was edited by the Department prior to the petition evaluation.	conducts population surveys and assessments of distribution of wildlife and bases management decisions on such information without peer-review publication.
C. Carroll, p.3 Lack of a coherent linkage between the science review and the status recommendation	Lack of a coherent linkage between the science review and the status recommendation. Recommendation is just the recommendation based on the conclusion sections, which in turn, are based on the previous sections that considered habitat required, populations, and threats, etc.	The review document was a draft, subject to substantial change as pointed out to the reviewers such as R. Golightly. The Department has concluded (p. xiii-xvi, 84-87) there is not adequate science to indicate that the fisher population has declined in the past 100 years as a result of timber harvesting or timber management. The Department considers the decline, and now apparent recovery based on animals trapped, due specifically to trapping, poisoning, and elimination of prey species such as the porcupine. These are known facts to have occurred in past decades. Timber harvesting, grazing, mining, recreation, fire, etc. have also occurred. The peer-reviewed scientific information that examines habitat relationships of fisher is adequately described in the report. Lacking in this science is a comprehensive assessment of prey relationships and foraging ecology, lack of cause-and-effect manipulative experiments regarding impacts of timber management, lack of

		population trend information, and a lack of knowledge about whether the population is increasing or decreasing now that the significant factors of trapping, poisoning, and porcupine reduction are no longer major issues.
N. Dawson, p1; The Department relies on incomplete reports	Concern that the Department and or Commission may base management decisions on incomplete or preliminary information related to genetic studies.	Throughout the report, we repeatedly indicate the preliminary nature of the genetics work, as we are finding the lumping or splitting by geneticists to be a sliding scale depending on whose data, how much data, and what methodology was used.
N. Dawson, p.3; comment on the potential gap in distribution in the Sierra Nevada	Comment implies that Department does not consider fisher to have contracted their range in the Sierra Nevada, or that the gap is of some signifi	Department repeatedly indicates that fisher may no longer inhabit as much as 43% of its range in the report; but the exact amount will not likely ever be known. Department repeatedly cautioned about the uncertainty of the possible gap suggested by the preliminary genetics work.
N. Dawson, p. 3; Comment that there is potential loss of a species throughout a significant portion of its range without changes in current management.	Comment suggests that current management has not occurred to benefit the fisher and that the fisher is potentially going to be lost.	Although “current” is undefined in time, at the current time, there is no trapping or poisoning of fisher allowed, there is no widespread control measures for porcupine, and there is far greater protections in place to conserve late seral forests on both private and public lands. Current management is working to translocate fisher to historic range, investigate disease vectors,

		and assess fisher distribution at its northernmost point in the Southern Sierra Nevada. As Dr. Barrett pointed out along with the Department, we do not know if the fisher is increasing or decreasing although all preliminary evidence indicates it is increasing in California since the near extirpation of the 1920s from trapping.
N. Dawson, p.3; comment that work cited on private land by timber companies was dismissive of peer-reviewed work by other scientists.	Comment is consistent with several others that the report should rely on peer-review scientific information and not rely on unpublished material.	As mentioned above in other responses, there is not much peer-review literature on the topic on private lands; much of the distribution of fisher information is basic information not typically appropriate for peer reviewed journals; and, most of the work is very recent in illustrating some new and different findings on the habitat relationships of fisher on managed forests- it was not at issue until recent years. The unpublished information on intensively managed timberlands is adding to the body of knowledge regarding fisher habitat use. Hopefully, fisher researchers will increasingly examine use in such situations and begin to examine the effects of timber management on fisher populations. Timber companies frequently work in collaboration with Department biologists because of the permitting

		required for handling fisher. The work is
N. Dawson, p. 4; comment that the Department should use peer-review work such as Purcell 2009 to make management decisions.	Comment is incorrect in stating that a management decision has been made by this report. It is a Department finding and recommendation to the Commission.	Purcell's 2009 paper is consistent with the Department's assessment that fisher prefer high canopy cover and large trees for resting. It does not appear to have studied the impacts of timber harvesting on the fisher population as perhaps inferred by the commentors paragraph.
J. Augustine, p.1; Comment that two distinct documents exist. Peer review of the status report does not exist.	Comment implies that the Department should not update a preliminary draft document that was so-labeled for peer review of the scientific information contained within.	As mentioned, the peer-review draft was sent out incomplete, and for short-turnaround time due to time constraints. All the reviewers were aware they were reviewing an internal draft- subject to substantial change. Peer review was solicited on the scientific information in the document.
J. Augustine, p. 2; Comment that reviewer comments would likely have been different had they had the final completed document	Comment suggests that the reviewers would have came to different conclusions about the science contained in the document had they had the entire document in completed form.	This is very possible that the reviewers would have had different comments. Hopefully, their comments on the scientific information cited would be the same, but undoubtedly, reviewers would be commenting and influenced by the Department finding, rather than the science examined.
J. Augustine, p.2; Comment that staff were forbidden from writing the final recommendation and that staff input was suppressed for political expedience	Comment implies that staff did not make their recommendations or thoughts known; and that the final Department report should be that of the staff working on the	Staff are not forbidden from expressing their thoughts and recommendations. The Department sought peer-review on the scientific information presented, the findings of fact as they are known about fisher

	document without input from management.	populations, threats, and habitat affinities. The staff work on the scientific information was maintained, although conclusions and statements that were considered speculative or not supported by scientific fact, were either edited to indicate uncertainty or were removed as unsupported conclusions.
J. Augustine, p. 2; Comment that the recommendation contains no logic to support it.	Comment implies there was no logical thought linking the scientific information presented in the report with the Department finding.	As mentioned previously (above), the Department assessed the scientific information regarding the required sections for a status review (populations, abundance threats, etc.). On pages xiii-xvi and 84-88, the Department provides conclusions regarding the scientific information and logic used to arrive at the final recommendation.
J. Augustine, p. 3; Comment that the document provides no guidance regarding whether the fisher is threatened in the Southern Sierra.	Comment implies that the report considers the fisher in total in California without regard to the two populations that are considered to exist.	Throughout the document, the Department explicitly describes conditions in the southern Sierra Nevada separate from the northern California population. Had the Department concluded that northern California, southern Sierra Nevada, or statewide in California listing be warranted, such would have been stated.
J. Augustine, p. 4; Comment that only one statement in the report could be used to conclude not listing the species. Comment suggests a statement (by Spencer) is taken out of context.	Comment suggests that there is no information provided in the report to demonstrate the current conditions for fisher in California and the current status of fisher	All through the document, the Department describes the uncertainty of the science, the changes in management strategies, the recent work demonstrating occurrence of fisher in

	do not warrant listing. Comment also suggests that the Department is trying to manipulate statements.	alternate habitats. The conclusions sections on pages xiii-xvi and 84-88 summarizes the reasoning for the Department recommendation. The statement by Spencer is taken verbatim from Spencer to the end of the statement with no intent to misrepresent the statement. Additionally, elsewhere in the status report, the Department includes the Spencer conclusion (based on models rather than actual population data) regarding the potential for stochastic events to affect the population (p. 30, 31, 47)
J. Buckley- CSERC, p.1; Comment that political pressure and pressure from the timber industry caused the Department to weaken the report.	Comment suggests that the scientific information was weakened or misinterpreted to favor timber industry.	The Department staff were under no pressure to manipulate the report to favor any entity. Instead, the Department staff developed and reviewed the draft report, including the peer-review of the scientific information provided, and completed a final report that focused on the facts that are known. Uncertainties in the scientific facts and conclusions were identified and speculation about what Department staff think the conclusions mean were limited to those supported by facts. The intent is to provide the Commission with what the Department knows more so than what the Department thinks; knowing full well that the Commission regulatory and APA process and public

		testimony can further provide information on what any entity thinks.
J. Buckley, p. 1; fisher has not only been unable to re-bound from historic trapping that devastated the species across much of its range, but the fisher is presently either extremely rare or currently extirpated across a vast portion of the Sierra Nevada region.	Comment suggests that the fisher should have rebounded in population, and particularly through the Sierra Nevada in the time frame since 1946 when trapping ceased.	What little available scientific evidence there is indicates that the fisher has rebounded since the 1920s from being nearly extirpated and virtually untrappable to abundant enough that studies can capture 50+ animals rather easily. The science indicates that fisher are not very good dispersers, consequently, how fast (in years) should they recolonize the entire length of the Sierra Nevada? The Department believes it will require assistance from us to recolonize these animals to the central and northern Sierra Nevada.
J. Buckley, p. 1-2; Comment on fisher abundance in the 1920s in the Stanislaus NF area. Comment regarding fisher inhabiting the gap.	Comment suggests there were 800 fisher on the Stanislaus forest alone, and that the fisher clearly inhabited the area considered the gap during the 1920s. Comment implies the Department concluded that fisher did not inhabit the area considered the gap. Comment suggests that logging was partly responsible for near extirpation of fisher from the Sierra Nevada	The Department does not have this report, although such historical unpublished reports throughout California would be valuable for many species. It is impossible to ascertain the accuracy of the population estimates although 800 seems high considering the trapping records available for this period. The Department concluded that fisher did inhabit the area considered the “gap” despite reservations from one peer reviewer, and that most of the available information was anecdotal. The Department repeatedly considered the so-called

		gap and articulated that the extent and location of such a gap if it occurred historically, could not likely be determined. The best available scientific information from three UC Berkeley scientists of the 1920s-40s (Grinnell, Dixon, Hall), clearly attribute the loss of fisher to trapping, not habitat change as a result of logging.
J. Buckley, p. 3-4; Comment on fisher reliance on late seral forest and forest elements and citing the reports statement about the current gap.	Comment suggests the status report contradicts itself. The comment quoted is taken out of context by quoting only a portion of the statement.	The report clearly articulates the importance of late seral attributes to fisher. Additionally, it identifies recent work on private lands in particular that indicate fisher also inhabit forests that are not late seral forests, but that do have the required elements. Page 40 provides the paragraph that was taken out of context in its entirety.
J. Buckley, p. 4; Comment that report suggests that habitat does not matter and that fisher have not recolonized yet.	Comment implies that the Department is unaware of habitat changes in forests and that they do not matter. Comment suggests that the fisher should have recolonized the central Sierra Nevada on its own by now.	The Department clearly identifies habitat as the key for fisher or any wildlife species. However, what the scientific information does not provide is any factual basis that habitat is limiting the fisher, particularly in the Sierra Nevada. Peer-reviewer North addresses this topic by suggesting that even in the Sierra Nevada, there will be patches of suitable habitat. The low dispersal capability of the fisher has been addressed previously, and in the report. We do not know the appropriate time it should take for fisher to recolonize

		habitat on their own—management should facilitate it as is occurring in the northern Sierra Nevada.