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1. THE PETITION AND RESULTING SERVICE REQUIREMENTS

1.1 Required Actions

Section 4(b)(3)(A) of the Endangered Species Act of 1973 (16 U.S.C. §1531 *et seq*.), as amended (Act), requires that we, the U.S. Fish and Wildlife Service (Service), make a finding as to whether a petition to list, delist, or reclassify a species presents substantial scientific or commercial information indicating that the petitioned action may be warranted. If it is found that the petition action may be warranted, we begin a thorough review of the status of the species and make a finding within 12 months of the date of the receipt of the petition on whether the petitioned action is: (a) not warranted, or (b) warranted, or (c) warranted but that the immediate proposal of a regulation implementing the petitioned action is precluded by other pending proposals to determine whether any species is threatened or endangered, and expeditious progress is being made to add or remove qualified species from the List of Threatened and Endangered Species. Such 12-month findings are to be published promptly in the *Federal Register*. A positive 12-month finding for a petition to list a species does not itself constitute a proposal to list.

After review of the best available scientific and commercial information, we find that the petitioned action is warranted but precluded by pending proposals for other species with higher listing priorities.

1.2 Description of the Petition

On December 5, 2000, we received a petition dated November 28, 2000, to list a distinct population segment (DPS) of the fisher, including portions of California, Oregon, and Washington, as endangered pursuant to the Act, and to concurrently designate critical habitat for this distinct population segment. The petitioners are as follows: Center for Biological Diversity, Sierra Nevada Forest Protection Campaign, Noah Greenwald, American Lands, Biodiversity Legal Foundation, Center for Sierra Nevada Conservation, Central Sierra Environmental Resource Center, Environmental Protection Information Center, Forest Issues Group, Friends of the Kalmiopsis, Klamath Forest Alliance, Klamath-Siskiyou Wildlands Center, Natural Resources Defense Council, Northwest Ecosystem Alliance, Oregon Natural Resources Council, Plumas Forest Project, Predator Conservation Alliance, Siskiyou Project, Siskiyou Action Project, and Yosemite Area Audubon. The petition clearly identifies itself as such and contains the names, signatures, and addresses of the petitioners' representatives. The petition includes citations for supporting information related to the taxonomy, ecology, and distribution of the species, and threats to its survival.

The petition addresses the following subjects:

- The natural history and population status of the fisher:
  The petition describes the species, and discusses its taxonomy, habitat requirements, diet, hunting behavior, reproduction, and causes of mortality. It states that the fisher has a low reproductive rate, low dispersal abilities, and is dependent on closed-canopy, late-

successional forests in its West Coast range. The petition describes the fisher's historical distribution and current range in California, Oregon, and Washington, stating that three populations remain: one in northern California, one in the southern Sierra Nevada Mountains of California, and a reintroduced population in the southern Oregon Cascades. The petitioners cite a significant diminution of the fisher's range on the West Coast and on-going loss of habitat as evidence to support a positive listing decision.

- The status of the fisher in its West Coast range as a distinct population segment:

  The petitioners believe that the fisher in its West Coast range meets the qualifications of a distinct population segment pursuant to the Act and the Service's 1996 policy regarding the recognition of distinct vertebrate populations (61 FR 4722). The petitioners described this DPS as the fisher's "West Coast Range, which includes the Cascade Mountains and all areas west to the coast in Oregon and Washington, and the Sierra Nevada, North Coast, and Klamath Mountains of California." The petition refers to the fisher in its West Coast range as *Martes pennanti*.

- The status of the species:

  The petition provides an extensive overview of the threats to the species, organized according to the five listing factors in the Act (section 4(a)(1)). The primary threat mentioned in the petition is the loss and fragmentation of fisher habitat (Factor A: The present or threatened destruction, modification, or curtailment of the species' habitat or range), which the petitioners state is due to timber harvest, roads, urban development, recreation, and stand-replacing fire. The petitioners believe that past timber harvest in Washington, Oregon, and California has resulted in the loss of key components of fisher habitat over large portions of the landscape, and that the cumulative effects of continued timber harvest and fuels reduction projects on public and private lands would have dramatic effects on the fisher.

  The petition also points out that while trapping fishers is prohibited in California, Oregon, and Washington, poaching and incidental capture and injury remain threats to the fisher (Factor B: Overutilization for commercial, recreational, scientific, or educational purposes).

  The petitioners consider predation to be an important source of mortality for the fisher (Factor C: Disease or predation), citing documented mortalities.

  The petition addresses Federal, State, and Tribal regulations and evaluates their ability to protect fishers and their habitat (Factor D: The inadequacy of existing regulatory mechanisms). The petitioners discuss Federal regulations in existence or planned in 2000, including the Northwest Forest Plan, and alternatives that were proposed in the Sierra Nevada Forest Plan Amendment. They evaluate regulations governing National Forests. They describe regulations involving non-Federal lands in Washington, Oregon, and California, including State Forest Practice Rules and habitat conservation plans. The petitioners believe that the regulations fail to fully protect fisher habitat, do not provide adequate landscape-scale protection to ensure a well distributed viable population across

> its range, and do not offer any specific measures to recover the fisher in its West Coast range.
>
> Other threats addressed in the petition include mortality by vehicle collision, limited population size, and isolation of populations (Factor E: Other natural or manmade factors affecting the continued existence of the species).

A court order was issued on April 4, 2003, by the U.S. District Court, Northern District of California, that required us to submit for publication in the *Federal Register* a 90-day finding on the November 2000 petition (*Center for Biological Diversity v. Norton*, Order Granting Plaintiff's Motion for Summary Judgment, No. C 01-2950 SC). On July 10, 2003, we published a 90-day petition finding (68 FR 41169) that the petition provided substantial information that listing may be warranted and initiated a 12-month status review. The court set a deadline of April 3, 2004, for completion of the 12-month status review

1.3 Previous Service Attention to the Fisher

On June 5, 1990, we received a petition from Eric Beckwitt, Forest Issues Task Force, Sierra Biodiversity Project, to list the Pacific fisher (*Martes pennanti pacifica*) as endangered in California, Oregon, and Washington. We published a notice in the *Federal Register* (56 FR 1159) on January 11, 1991, stating that while the petition provided evidence that the Pacific fisher represented a listable entity ("a distinct population that interbreeds" – a definition which predates the 1996 policy (61 FR 4722) regarding the recognition of distinct vertebrate populations), it did not present substantial information indicating that the requested action may be warranted. The notice stated that the petition provided strong, well-documented evidence that mature and old growth coniferous or mixed deciduous/coniferous forest habitat has declined substantially in the past because of extensive logging in the three Pacific States. It asserted, however, that the petitioners did not provide substantive evidence that fishers prefer later seral stage vegetation in the Pacific States because only one study had examined fisher habitat use in the region. The notice stated that without better information on the habitat needs, population size and trends, and demographic parameters of the Pacific fisher population, insufficient scientific information exists to determine whether regulatory protection under the Act may be justified. In contrast to the lack of information about western fishers in 1990, current scientific and commercial information includes many studies which have been conducted in the intervening years.

On December 29, 1994, we received a petition from D.C. "Jasper" Carlton, Director for the Biodiversity Legal Foundation in Boulder, Colorado, to list two fisher (*Martes pennanti*) populations in the western United States (the Coastal Range population in Washington, Oregon, and California; and the Rocky Mountain population in Idaho, Montana, and Wyoming) as threatened. On March 1, 1996, the Service published a notice in the *Federal Register* (61 FR 8016) finding that the petition did not present substantial information indicating that the two fisher populations at issue constitute a distinct vertebrate population segment listable under the Act. The notice stated that no evidence was provided to indicate that populations from the Pacific Coast and the Rocky Mountain areas are separated from the rest of the species by physical, physiological, ecological, or behavioral factors. The taxonomic distinctness of fisher subspecies including the Pacific fisher was considered questionable. The best scientific evidence available at that time indicated that the range of the fisher was contiguous across Canada, with peninsular extensions projecting into the United States in the Pacific States, Rocky Mountains, and the central and eastern United States. The notice added that, "Because available information indicates fishers have experienced declines in the past, and may be vulnerable to the removal and fragmentation of mature/old growth habitat and incidental trapping pressure, the Service will continue to treat the entire fisher species as a species of concern." The fisher's current status as a "species of concern" confers no formal protection; conservation efforts on their behalf are voluntary.

2. BACKGROUND INFORMATION

The following is a summary of the fisher's description, taxonomy, distribution, habitat, and life history traits.

2.1 Description

The fisher belongs to the weasel family (Mustelidae), and is similar in body form to the many smaller weasels, having a long body with short legs. At 6.6 to 13.2 pounds (lbs) (3 to 6 kilograms (kg)), male fishers weigh about twice that of females (3.3 to 5.5 lbs; 1.5 to 2.5 kg). Males range in length from 35 to 47 inches (in) (90 to 120 centimeters (cm)) while females range from 29 to 37 in (75 to 95 cm) in length. The fishers from the Pacific States may weigh less than fishers in the eastern United States (Seglund 1995; Dark 1997; Golightly 1997; Aubry and Lewis 2003). The fisher's head is broad and flat with a sharp, pronounced muzzle; eyes face forward and ears are broad, rounded, and low. The fur ranges in length from 30 millimeters (mm) (1 in) on the stomach and chest to 3 in (70 mm) on the back (Powell 1993). The tail is long and bushy. Fur color varies from light brown to dark blackish brown, typically being darkest on lower back, legs, and tail. Their face, neck and shoulders may have a lighter grizzled gray appearance. Their chest and underside often have irregular white patches. Although Grinnell et al. (1937) noted that fishers from the Sierra Nevada had a "tendency" to be paler in color than fishers from other parts of the United States, Hagmeier (1959) concluded that the range of individual variation in color precluded the use of color variation to distinguish fishers from different geographic regions. Fishers have five toes on all four feet and retractable claws. Their feet are large with a pad on each toe and a group of four central pads (Powell 1993), and their walk is plantigrade (using the whole sole, as a human or bear would). Fishers are able to rotate their hindpaws almost 180 degrees allowing them to descend trees head first (like a squirrel) and to grasp limbs (Powell 1993). On the hindpaws, the central pads have circular patches of coarse hair that are associated with plantar glands which produce a distinctive odor and are believed to be used for communication during reproduction (Powell 1993). Powell (1993) estimated that fishers live up to 10 years.

2.2 Taxonomy

The fisher is classified in the order Carnivora, family Mustelidae, subfamily Mustelinae, and is the largest member of the genus *Martes* (Anderson 1994). Formerly included in the *Mustela* genus, the *Martes* genus is distinguished by several features, one of which is having an additional premolar in each jaw (Anderson 1994). The only other North American member of the genus *Martes* is the American marten (*M. americana*). The fisher (*Martes pennanti* Erxleben 1777) is the only extant species in its subgenus *Pekania*.

Goldman (1935) recognized three subspecies of fisher, although he stated they were difficult to distinguish: *M. p. pennanti* in the east and central regions of North America; *M. p. columbiana* in the central and northwestern regions of North America; and *M. p. pacifica* in the western region of North America. Anderson (1994) stated that many subspecies of *Martes* have been named chiefly on the basis of size and coat color, often ignoring individual variation. Both Grinnell et al. (1937) and Hagmeier (1959) examined specimens from across the range of the fisher and concluded that differences in skull morphology or pelage were not sufficient to support recognition of separate subspecies. Hall (1981) retained all three subspecies in his compilation of North American mammals, as did Anderson (1994), but neither addressed Hagmeier's conclusion that the subspecies should not be recognized (Powell 1993). Several authors address genetic variation in fisher populations in their northern and eastern ranges (Williams et al. 1999, 2000; Kyle et al. 2001) and in the west (Drew et al. 2003; Aubry and Lewis 2003; Wisely et al. in litt. 2003). These analyses found patterns of population subdivision similar to the earlier described subspecies (Drew et al. 2003). Drew et al. (2003) stated that, although it is not clear whether Goldman's (1935) subspecific designations are taxonomically valid, ". . . it is clear [based on genetic results] that population subdivision is occurring within the species, especially among populations in the western USA and Canada."

2.3 Distribution

Fishers occur in the northern coniferous and mixed forests of Canada and northern United States, from the mountainous areas in the southern Yukon and Labrador Provinces in Canada southward to central California and Wyoming, the Great Lakes and Appalachian regions, and New England (Graham and Graham 1994; Powell 1994). Compared with historical distributions in the 1600s (Hagmeier 1959; Hall 1981), the current North American distribution of fishers has been much reduced (Gibilisco 1994). Many authors discuss the extirpation of fishers over much of their former range in the United States and eastern Canada (Hall 1942; Schorger 1942; Rand 1944; deVos 1951, 1952; Coulter 1966; Weckwerth and Wright 1968; Dodds and Martell 1971; Brander and Books 1973; Ingram 1973). Apparently, the fisher's range was reduced dramatically in the 1800s and early 1900s through overtrapping, predator and pest control, and alterations of forested habitats by logging, fire, and farming (Douglas and Strickland 1987; Powell 1993; Powell and Zielinski 1994; Lewis and Stinson 1998). Since the 1950s, the distribution of fishers has recovered in some of the central and eastern portions of their historical range in the United States as a result of trapping closures, changes in forested habitats (e.g. forest regrowth in abandoned farmland), and reintroductions (Brander and Books 1973; Powell and Zielinski 1994). However, fishers are still absent from their former range south and east of the

Great Lakes (Gibilisco 1994), and populations in the west have continued to decline (Powell and Zielinski 1994). Fishers are believed to be extirpated from the lower mainland of British Columbia, however, they may still occupy the higher elevations of these areas in low densities (BC Species and Ecosystems Explorer 2003). In the Pacific states of Washington, Oregon, and California, the historical distribution of the fisher is thought to have extended throughout the Coastal and Cascade ranges to Marin and Lake Counties on the west coast of California, and south from Mt. Shasta along the southern Cascade and Sierra Nevada ranges to northern Kern County (Bailey 1936; Grinnell et al. 1937; Lewis and Stinson 1998; Aubry and Lewis 2003). Fishers are also thought to have occurred on the extreme northeastern and southeastern edge of Washington and the northeastern portion of Oregon. In the Pacific states, fishers were historically most common in low to mid-elevational forests up to 8,200 feet (ft) (2,500 meters (m)) (Grinnell et al. 1937; Schempf and White 1977; Aubry and Houston 1992). In recent decades, the scarcity of verifiable detections in Washington, Oregon, and the northern Sierra Nevada indicates that the fisher may be extirpated from much of this area (Aubry and Houston 1992; Zielinski et al. 1995; Aubry and Lewis 2003). The extent of area known to be currently occupied by fishers in Washington, Oregon, and California represents roughly 20 percent of their historical extent in these states (based on a mapping exercise assuming continuous occupancy within gross boundaries of polygons outlining historical and current ranges).

2.3.1 Washington

The fisher historically occurred both east and west of the Cascade Crest in Washington (Scheffer 1938; Aubry and Houston 1992). Lewis and Stinson (1998) conclude that, “Based on habitat, the historical range of fishers in Washington probably included all the wet and mesic forest habitats at low to mid-elevations. The distribution of trapping reports and fisher specimens collected in Washington confirms that fishers occurred throughout the Cascades, Olympic Peninsula, and probably southwestern and northeastern Washington.”

Aubry and Houston (1992) compared current and historical records of fishers in Washington to determine their distribution in relation to major vegetation and elevation zones. In total, they found 88 reliable records, dating from 1955 to 1991. West of the Cascades, fishers occurred from 328 to 5,900 ft (100 to 1800 m), with most records from below 3,280 ft (1,000 m). On the east slope of the Cascades where precipitation is lower, fishers were recorded from 1,970 to 7,200 ft (600 to 2,200 m) (Aubry and Houston 1992). Similar to elsewhere in the range, the upper elevation limit may be determined by snow depth (Krohn et al. 1997).

Based on a lack of recent sightings or trapping reports, the fisher is considered to be extirpated or reduced to scattered individuals in Washington (Aubry and Houston 1992; Lewis and Stinson 1998). Despite extensive surveys, there have been only two verifiable records (pictures, tracks, or specimens) in western Washington since 1969 (Aubry and Houston 1992). Lewis and Stinson (1998) reported that, “Extensive surveys by WDFW [Washington Department of Fish and Wildlife] and the U.S. Forest Service have failed to find a fisher population, or even confirm the presence of a fisher in areas where reports are concentrated. Infrequent sightings and [anecdotal] incidental captures indicate that a small number may remain that have gone undetected.”

2.3.2 Oregon

Based on work, beginning in 1888, of the U.S. Department of Agriculture (USDA) Bureau of Biological Survey, Bailey (1936) cites historical occurrences of Pacific fishers from 10 localities in western Oregon, extending from just south of The Dalles to the California-Oregon border and from 2 locations in northeastern Oregon. According to Bailey (1936), Pacific fishers occurred throughout the Coast and Cascade ranges in Oregon and in the Blue Mountain region. In 1913-1914, registered trappers reported to the Oregon State Game Commission, a total of 9 fishers taken; 3 from Lane County, 2 from Curry County, and 1 each from Douglas, Josephine, Marion, and Umatilla Counties.

Current information indicates that the range of the fisher has been severely reduced in Oregon. Extensive camera and track-plate surveys have been conducted throughout forested regions of Oregon (Lewis and Stinson 1998). The results of Aubry and Lewis' (2003) interviews, and review of records dating from 1954 to 2001, show that extant populations of fishers in Oregon are restricted to two disjunct and genetically isolated populations in the southwestern portion of the State: one in the northern Siskiyou Mountains of southwestern Oregon and one in the southern Cascade Range. The fishers in the Siskiyou Mountains of southwestern Oregon near the California border are probably a northern extension of the northern California population (Aubry and Lewis 2003). The population in the southern Cascade Range is reintroduced and is descended from fishers that were translocated to Oregon from British Columbia and Minnesota (Aubry and Lewis 2003). Elevations in the core area of this population, which is found in northeastern Jackson, northwestern Klamath, and eastern Douglas Counties, range from about 2,000 to 6,000 ft (610 to 1,830 m) (Aubry et al. 2002). The Oregon Cascade Range population is separated from known populations in British Columbia by more than 404 miles (mi) (650 kilometers (km)) (Aubry and Lewis 2003).

2.3.3 California

In eastern California, the fisher historically ranged throughout the Sierra Nevada from Greenhorn Mountain in northern Kern County northward to the southern Cascades at Mount Shasta (Grinnell et al. 1937). In western California, they ranged from the Klamath Mountains and north Coast Range near the Oregon border southward to Lake and Marin Counties (Grinnell et al. 1937). The fisher historically occurred in the Mendocino, Six Rivers, Klamath, Siskiyou, Shasta-Trinity, Lassen, Plumas, Tahoe, Lake Tahoe Basin, Eldorado, Stanislaus, Sierra, and Sequoia National Forests. Krohn et al. (1997) note that the map of fisher distributions by Grinnell et al. (1937) suggests that fishers may have been less common in the central Sierra Nevada than elsewhere in California during the early 1900s, but it is unknown whether this distribution was the historical condition or reflects human effects on forests and fishers prior to their assessment. The Grinnell et al. (1937) map was based on the trapping records of one 5-year period (1919-1924) prior to which there had been concern already that trapping had dangerously decreased the population of fisher in California. Additionally, there was wide-scale mining, logging, burning, and sheep-grazing occurring in California forests before the turn of the century.

Substantial efforts have been made in recent years to assess the status of fishers and other forest carnivores in California using systematic grids of baited track and camera stations (Zielinski et al. 1995, 1997a, 1997b, 2000; Zielinski and Stauffer 1996; Zielinski 1997). Zielinski et al. (1995) compiled the results of standardized local, regional, and an 84-station statewide survey, all of which were conducted between 1989 and 1994, throughout much of the historical range of the fisher, from Del Norte, Humboldt, and Siskiyou Counties in the north to northern Kern County at the southern extent of the range. Results from 510 survey sites, and several isolated instances where road-killed and trapped fishers confirmed fisher presence, indicate that fishers occupy less than half of the range they did in the early 1900s in California. Fishers were detected in 11 of 23 counties from which results were obtained: Del Norte, Humboldt, Mendocino, Trinity, Siskiyou, and Shasta Counties in the north and Mariposa, Madera, Fresno, Tulare, and Kern Counties in the south. Therefore, the current range is divided into two remnant populations that are separated by approximately 260 mi (420 km) (Zielinski et al. 1995), almost four times the species' maximum dispersal distance as reported by York (1996). One population area is in northwestern California in portions of Del Norte, Siskiyou, Humboldt, Trinity, and Shasta Counties, and across into Oregon in Curry, Josephine, and Jackson Counties. The other is in the southern Sierra Nevada Mountains in portions of Mariposa, Madera, Fresno, Tulare, Kern, Mono, and Inyo Counties. Since 1990, there have generally been no detections outside these areas except one in 1995 in Mendocino County and one in 1995 in Plumas County (CDFG NDDB 2003, updated November 13, 2003).

In 2002, the California Department of Fish and Game initiated a long-term habitat and wildlife monitoring project in the Southern Cascades ecological region (Smith, pers. comm. 2003). This region extends from the California-Oregon border in the eastern half of Siskiyou County, through eastern Shasta and Tehama Counties, into the northern portion of Butte County and includes the western portions of Modoc and Lassen Counties. In 2002, 43 randomly-placed baited camera stations failed to detect fishers from this region and in 2003, 61 baited camera stations, some of which were the same stations as had been sampled the previous year, also failed to detect any fishers.

Failure to detect fishers in the central and northern Sierra Nevada, despite reports of their presence there by Grinnell et al. (1937) and reports from the 1960s collected by Schempf and White (1977), suggests that the fisher population in this region has declined, effectively isolating fishers in the southern Sierra Nevada from fishers in northern California (Truex et al. 1998; Lamberson et al. 2000). However, none of the methods used to describe distribution are suitable indices of abundance, and differences in the type and quality of data available over the 60-year period make interpretation of distributional changes difficult (Zielinski et al. 1995).

The highest elevation recorded for a fisher in California was 11,400 ft (3,475 m) in the Sierra Nevada (Schempf and White 1977), but sightings have generally ranged from roughly 1,970 to 8,530 ft (600 to 2,600 m) in the Sierra Nevada (Grinnell et al. 1937; Zielinski et al. 1997b). In northern California, fishers are occasionally seen at sea level, but more commonly occur in the northern Coast Ranges and Klamath Province at elevations of 82 ft to 3,280 ft (25 m to 1,000 m) according to Golightly (1997), and up to 5,900 ft (1,800 m) according to Zielinski et al. (1995). Most observations in northern California forests have been below 3,280 ft (1,000 m) (Grinnell et al. 1937; Schempf and White 1977; Self and Kerns 1992). The upper elevational limit of the fisher's range generally corresponds with those areas that receive over 9 in (23 cm) of monthly winter snowfall, where fishers may not be able to travel efficiently (Krohn et al. 1997).

2.4 Population size

In 1994, Heinemeyer and Jones suggested that fishers were at low numbers or absent throughout most of their historical range in Washington, Oregon, and California. According to British Columbia's Furbearer Management Guidelines (Hatler et al. 2003), the fisher population estimated for all of British Columbia ranged from 10,000 to 15,000 animals in the mid-1970s based on apparent extrapolation from densities calculated in eastern populations. However, recent estimates range from 1100 to 2750, based on extrapolation from a small, local sample of radio-collared animals in north-central BC (Hatler et al. 2003). Based on lack of detections during systematic surveys (see above), fishers in California appear to occupy less than half of their historical range (Zielinski et al. 1995). The population in the Klamath region of northwestern California and southwestern Oregon may be the largest remaining in the western United States (Powell and Zielinski 1994).

Although reductions in the fisher's distribution in the Pacific states are well documented (Aubry and Lewis 2003; Gibilisco 1994; Powell and Zielinski 1994), accurate information on fisher densities and abundance outside the northeast region of the United States is very limited. There have been no empirical population estimates for fisher populations in California, Oregon, and Washington, so it is unknown precisely how many fishers exist. Estimates of fisher abundance and vital rates (e.g., survival, reproduction) are very difficult to obtain (Douglas and Strickland 1987) and may vary widely based on habitat composition and prey availability (York 1996). In addition, assumptions needed for use of many methods of estimating populations (e.g., equal trapability, no learned trap response, sufficient trapability to yield adequate sample sizes) may not be valid for fishers (Powell and Zielinski 1994). Consequently, only a few estimates of *local* fisher population density are available for the Pacific states and British Columbia and are summarized here. In British Columbia, densities of fishers are estimated to be between 1 and 1.54 fishers per 100 km² (38.6 mi²) in the highest quality habitats in the province (Weir 2003). Using the area of each habitat capability rank within the extent of occurrence of fishers in British Columbia, the late-winter population for the province is estimated to be between 1,113 and 2,759 fishers (Weir 2003). In northern California, Buck (1982) estimated a minimum density of roughly 8 individuals per 100 km² (38.6 mi²) in his 72.5 km² (28 mi²) study area in Trinity County. In a preliminary progress report of fisher studies on the Hoopa Valley Indian Reservation in the Klamath mountain range (Humboldt County, California), Higley et al. 1998 report high capture numbers and small home ranges, some of which overlap each other, indicating that densities in this 65 km² (25 mi²) study area may be very high relative to those in the rest of the occupied West Coast range. In their analysis of two fisher studies in California, Zielinski et al.(in press 2004a) provided a rough estimate of approximately 5 female fishers per 100 km² for their 400 km² north coast study area (in the Six Rivers and Shasta-Trinity National Forests of southeastern Humboldt and southwestern Trinity Counties), whereas they estimated approximately 8 females per 100 km² in their 280 km² southern Sierra Nevada study area (in the Sequoia National Forest in Tulare County). For the purpose of modeling population viability, Lamberson et al (2000) estimated that there were between 100 and 500 individuals in the southern Sierra Nevada fisher population.

Grinnell et al. (1937) expressed concern about the status of the fisher in California, noting that:

> Recently there has been a striking decline in the number of fishers reported as trapped in California, the catch dropping from 102 in 1920 to 34 in 1924. This is a loss of 67 per cent in five years. In 1924 only 14 of the 2590 licensed trappers in the state reported fisher catches, though of course it must be remembered that relatively few trappers operate chiefly in fisher country.

Based on trapping records from the 1920s, Grinnell and colleagues (1937) provided a dire estimate of 1 fisher per 100 mi^2, or 300 in California. It cannot be assumed, however, that the concentration or lack of trapping records in certain areas is the result of differing densities of fishers; trap sets likely were not uniformly distributed throughout fisher habitat, nor was trapping effort necessarily equivalent. Variable fisher densities across habitats, uneven trap distribution and trapping effort can all lead to unreliable population estimates.

Despite the lack of precise empirical data on fisher abundance in the western states, indications that extant fisher populations are small in size include the apparent reduction in the range of the fisher on the West Coast, the lack of detections or sightings over much of its historical distribution, and the apparently high degree of genetic relatedness within some populations.

2.5 Ecology

Diet

The fisher is an opportunistic predator with a diverse diet that includes birds, squirrels, mice, shrews, voles, reptiles, insects, carrion, vegetation and fruit (Powell 1993; Martin 1994; Zielinski et al. 1999, Zielinski and Duncan in press 2004). In a preliminary summary of their research findings, Aubry et al. (2002) identified the following prey species from remains collected at fisher den and rest sites in their study area on the west slope of the Cascade Range in southern Oregon: snowshoe hare, brush rabbit, California ground squirrel, Douglas' squirrel, northern flying squirrel, woodrat, opossum, striped skunk, porcupine, bobcat (killed by an adult male fisher), deer, elk, Stellar's jay, pileated woodpecker, hairy woodpecker, common flicker, ruffed grouse, turkey (apparently killed by an adult female), berries, and yellow jackets. Throughout most of its range, snowshoe hare (*Lepus americanus*) and porcupine (*Erithizon dorsatum*) are important components of the fisher's diet. The southern Sierra Nevada, however, is not within the range of the snowshoe hare, and the porcupine occurs only at very low densities (Zielinski et al. 1999). Both are present in northern California, but not abundant; the snowshoe hare does not occur in or west of the Coast Ranges in northern California. According to Zielinski and Duncan (in press 2004), the great diversity of the diet of fishers in California may be due to the absence or rarity of large prey (e.g., snowshoe hare, porcupines) or perhaps due to a greater diversity of available prey types in the southern Sierra Nevada compared to other *Martes* study sites in North America. Although mammals were still the most frequent prey found in fisher scat from the southern Sierra, reptiles constituted a major prey item, occurring in 20.4 percent of all observed scat (Zielinski et al. 1999). Similarly, reptiles were found to be an important prey item for fishers in northern California, but in the fisher populations of eastern North America they constitute a very minor portion of the fisher's diet (under one percent) (Zielinski et al. 1999). Also found in the fisher diet studies in the southern Sierra Nevada and northern California, were hypogeous fungi (false truffles; most commonly *Melanogaster* sp.) (Grenfell and Fasenfest 1979; Zielinski et al. 1999). Zielinski et al. (1999) found slight variation in diet with season. Mammals, in particular deer carrion, were consumed most in winter, presumably when other prey were hibernating; fruits were eaten more commonly in autumn and winter when they are typically available. No differences were found in diet between males and females, despite significant size differences between the sexes (Zielinski et al. 1999).

Fishers hunt largely in forested habitats and generally avoid openings (Earle 1978; Rosenberg and Raphael 1986; Powell 1993; Buskirk and Powell 1994; Jones and Garton 1994; Seglund 1995; Dark 1997), although fishers have been detected in shrub habitat adjacent to forested areas (pers. comm. Truex 2003). Fishers are known to occasionally forage in trees (Raine 1987; Powell 1993). Although fishers will dig holes in the snow to find prey, they exhibit far less activity under the snow than their close relative the American marten (Raine 1987). Being dietary generalists, fishers tend to forage in areas where prey are both abundant and vulnerable to capture (Powell 1993). Habitat components important to prey are discussed in the Habitat section.

Reproduction

Except during the breeding season, fishers are solitary animals. The breeding season for the fisher is reported to be generally from late February to the end of April (Leonard 1986; Douglas and Strickland 1987; Powell 1993; Frost and Krohn 1997). Beginning in March, males are more active and roam beyond the limits of their territories in search of females (Arthur and Krohn 1991; Powell 1993), sometimes coming into conflict with other males (Leonard 1986; Powell 1993). Females come into estrus and mate in March or April three to nine days after giving birth. Birth occurs nearly 1 year after copulation, due to delayed implantation in which the embryos remain in a state of arrested development for approximately 10 months. Following implantation, which may correlate with increasing number of daylight hours (Powell 1993), gestation lasts for approximately 30 days. Arthur and Krohn (1991) and Powell (1993) speculate that this system allows adults to breed in a time when it is energetically efficient, while still giving kits adequate time to develop before winter. Raised entirely by the female, kits are born with closed eyes and ears, and are completely dependent. By 10 weeks, kits wean (Powell 1993). The mother becomes increasingly active as kits grow in order to provide enough food (Arthur and Krohn 1991; Powell 1993). Females may move their kits periodically to new dens (Arthur and Krohn 1991). After about 4 months, the mother begins to show aggression towards kits and by 1 year, kits will have developed their own home range (Powell 1993).

Fishers have a low annual reproductive capacity. Females breed at the end of their first year, but because of delayed implantation do not produce a litter until their second year. One year old males are capable of breeding, but they may not be effective breeders (Powell 1993). Litter sizes are small, usually with 2 to 3 kits, but generally ranging from 1 to 4 (Powell 1993; Heinemeyer and Jones 1994; York 1996). Not all females produce young every year. Reproductive success may be dependent on the physical condition of the female during the winter. Truex et al. (1998) documented that of the females in the southern Sierra Nevada study area (one of three study areas that they analyzed in California), about 50 to 60 percent successfully gave birth to young. In the study area they analyzed on the North Coast, however, 73 percent of females gave birth to young in 1995, but only 14 percent (one of seven) did so in 1996, indicating fisher reproductive rates may fluctuate widely. Although their data are preliminary at this point, Aubry et al. (2002) found that 59.4 percent of the adult females gave birth to kits, but the average annual reproductive success was only 44 percent (success being the survivorship of kits past 2 months of age).

Home range size

A home range is an area repeatedly traveled by an individual in its normal activities of feeding, drinking, resting, and traveling. Fishers have large home ranges, with those of males considerably larger than those of females (Buck et al. 1983; Truex et al. 1998). Fisher home range sizes across North America vary from 3,954 to 30,147 ac (1,600 to 12,200 ha) for males and from 988 to 13,096 ac (400 to 5,300 ha) for females (Powell and Zielinski 1994; Lewis and Stinson 1998). In their study of fisher populations in the northern California Coast Ranges (in Humboldt and Trinity Counties) and southern Sierra Nevada (in Tulare County), Zielinski et al. (in press 2004a) found that male home ranges averaged about four times greater than female home ranges, with the largest difference occurring in the southern Sierra Nevada area. Male home ranges in California, based on minimum convex polygons (constructed by connecting the outer locations to form a convex polygon; White and Garrott 1990), average 11,178 ac (4,525 ha) compared to 3,922 ac (1,587 ha) for females (USDA Forest Service 2000). Truex et al. (1998) compared fisher home range sizes in three study areas (the Klamath Mountains – Shasta-Trinity National Forest, the North Coast Ranges – Six Rivers National Forest, and the southern Sierra Nevada – Sequoia National Forest) and found that they were largest in the eastern Klamath study area in northern California where habitat quality was generally considered poor. A preliminary summary of an unpublished study conducted in coastal redwood forests in the Coast Ranges of northwestern California indicates female home range sizes of 790 ac (320 ha) to 2,050 ac (830 ha) (Joel Thompson’s unpublished data; Ewald, pers. comm. 2003). Zielinski et al. (in press 2004a) found that females had home ranges that were almost three times larger in their northern California study area in the Coast Ranges than in their southern Sierra Nevada study area. They too suggest that this difference in home range size is a result of better quality habitats in the southern Sierra Nevada, which are occupied by a higher density of animals within a smaller area of suitable habitat (Zielinski et al. in press 2004a). Based on northeastern fisher home range sizes, Allen (1983) assumed that a minimum of 39,785 ac (16,100 ha) of potentially suitable and connected habitat must be present before an area can sustain a population of fishers. However, Allen's estimates of amount of habitat required to support a fisher population may be an underestimate when applied to western forests because male home ranges in northern California have been reported to be as large as 31,629 ac (12,800 ha) (Beyer and Golightly 1996). A habitat suitability model developed in British Columbia assumes that a minimum of 64,000 ac (26,040 ha) of contiguous habitat is required for fisher transplant attempts (Apps 1996 as cited in

Craighead et al 1999). Fishers may use smaller forest areas (but may not necessarily be sustained) if the area is connected to larger areas of suitable fisher habitat.

Dispersal

Dispersal is the movement of an animal away from its natal home range to establish a new home range, and is the primary mechanism for the spread of a population. Arthur et al. (1993) reported an average maximum dispersal distance of 3.18 and 10.7 mi (14.9 and 17.3 km) for females and males, respectively (range = 4.6 to 14 mi (7.5 to 22.6 km) for females and 6.8 to 14.3 mi (10.9 to 23.0 km) for males) in a population in Maine with high trapping mortality and low density. York (1996) reported dispersal distances for juvenile male and female fishers averaging 20 mi (33 km) (range = 6 to 66 mi; 10 to 107 km) for a high-density population in Massachusetts. To explain why fishers in the western United States have not shown the range expansion typical of recovered northeastern populations, Arthur et al. (1993) state that, "fishers may be reluctant to travel farther than 6.2 to 12.4 mi (10 to 20 km) to find appropriate habitat," and suggest that short dispersal distances cause problems with the maintenance of viable fisher populations in areas where suitable habitat is fragmented into small, widely separated patches. Based on field observation and microsatellite genotype analyses of the southern Cascades fisher population, Aubry et al. (USDA Forest Service, Pacific Northwest Research Station, in press 2003) found empirical evidence of male-biased juvenile dispersal and female philopatry in fishers, which may have a direct bearing on the rate at which the fisher may be able to colonize formerly occupied areas within its historical range.

2.6 Habitat

Fisher distribution may be influenced by processes operating at various spatial scales (Carroll 1997; Weir and Harestad 2003). At the regional level, variation in forest composition due to geology, climate and regional patterns in land use plays an important role in determining fisher distribution, and may include source/sink and metapopulation dynamics (e.g. regional barriers to dispersal could affect gene flow and rates of recolonization). At the landscape level, patterns of spacing and locations of multiple home ranges may be associated with general patterns of forest condition. Habitat selection by individual fishers is expressed during establishment of home ranges, presumably to maximize availability of resources (prey, resting and denning sites, and mates). At finer scales, individual fishers select habitats within their home ranges to obtain resources and maximize reproduction and survival.

Assessment of habitat relationships of fisher in contemporary forests of the western United States is confounded by broad-scale changes in forest structure and composition that have occurred during the past century. Grazing, suppression of wildfire, and timber harvest have resulted in dramatic changes in forest ecosystems, including reduction of large tree component, increased dominance of shade-tolerant conifer species, increased stand density, and reduced structural diversity (McKelvey and Johnston 1992; Agee 1993; Skinner 1995; Chang 1996; Norman 2002). These effects vary among forest ecosystems, but generally are more pronounced in drier interior forests of the eastern Cascades, Sierra Nevada, and eastern Klamath Mountain ranges. Modern habitat studies likely reflect responses of fishers to what are novel habitat characteristics at regional and landscape scales. The degree to which currently-described habitat relationships, particularly at broader scales, existed under historical conditions is unknown.

Distribution among forest ecosystems

According to Buskirk and Powell (1994), the physical structure of the forest and prey associated with forest structures are thought to be the critical features that explain fisher habitat use, rather than specific forest types. Powell (1993) stated that forest type is probably not as important to fishers as the vegetative and structural aspects that lead to abundant prey populations and reduced fisher vulnerability to predation, and that they may select forests that have low and closed canopies.

In Washington, the majority of fisher locations west of the Cascades were in the western hemlock forest zone (54 percent), followed by the Pacific silver fir (*Abies amabilis*) zone (26 percent) and the sitka spruce zone (20 percent); east of the crest, fishers were found primarily in the subalpine fir zone (53 percent) and grand fir (*A. grandis*)/Douglas-fir (*Pseudotsuga menziesii*) zone (37 percent) with a small number in the timberline/alpine zone (10 percent) (Aubry and Houston 1992).

There does not appear to be any published report of habitat in which fishers were historically recorded in Oregon. Verts and Carraway (1998) assumed that Oregon's habitat characteristics are similar to Washington's and used Aubry and Houston's (1992) description of fisher habitat in Washington for that in Oregon. Recent (2001) fisher detections in the southeastern portion of the Siskiyou National Forest in southern Oregon indicate that fishers use areas of non-serpentine forest habitat with dense (70 to 90 percent) canopy closure and a high coniferous component, dominated by Douglas-fir in the overstory with a significant hardwood understory of tanoak (*Lithocarpus densiflora*) and chinquapin (*Castanopsis chrysophylla*) (Slauson and Zielinski 2001). Additional fisher detections in the southwest segment of the Rogue River National Forest (Weir 2002) were recorded at 5000 to 7000-foot (1,524 to 2,133-meter) elevations in the white fir series near Mt. Ashland and in the moist Douglas-fir series in the Applegate watershed, as defined by the Forested Plant Associations of Southwestern Oregon (FPASO) (USDA Forest Service 1996). Most of the fisher sightings reported on the Umpqua National Forest were in either the white fir (*A. concolor*) series or the mountain hemlock (*Tsuga mertensiana*) series (FPASO). The study area in which Aubry et al. (2002) have radio-collared fishers in the upper Rogue River drainage on the west slope of the Cascade Range in southern Oregon falls primarily within the Mixed-Conifer zone as described by Franklin and Dyrness (1988); common tree species here include Douglas-fir, true firs, ponderosa pine (*Pinus ponderosa*), sugar pine (*P. lambertiana*), western white pine (*P. monticola*), incense cedar (*Calocedrus decurrens*), western hemlock, and chinquapin.

Throughout California, fishers occur in Douglas-fir, Montane Hardwood-Conifer, Montane Hardwood, pine (Ponderosa Pine, Jeffrey Pine, Lodgepole Pine), mixed conifer (Sierran Mixed Conifer and Klamath Mixed Conifer), and true fir (White Fir and Red Fir) forest types (Zielinski et al. 1997b; Zielinski et al. 2000; Mazzoni 2002; Zielinski et al. in press 2004), as classified using the California Wildlife Habitat Relations (CWHR) system (Mayer and Laudenslayer 1988;

CDFG 2002). These forest types collectively include the following main species: aspen (*Populus tremuloides*), black oak (*Quercus kelloggii*), canyon live oak (*Q. chrysolepis*), coast live oak (*Q. agrifolia*), Coulter pine (*P. coulteri*), Douglas-fir, incense cedar, Jeffrey pine (*P. jeffreyi*), knobcone pine (*P. attenuata*), interior live oak (*Q. wislizenii*), lodgepole pine (*P. contorta*), madrone (*Arbutus menziesii*), mountain hemlock, noble fir (*A. procera*), ponderosa pine, red fir (*A. magnifica*), sugar pine, tanoak, and white fir. Based on systematic surveys conducted from 1996 to 1999 in forested areas of northwestern California, the Sierra Nevada, and southern Cascades, Zielinski et al. (2000) determined that of all fisher detections, roughly 45 percent were in pine types, 25 percent were in Douglas-fir, 18 percent were in the mixed conifer types, and 11 percent were in the true fir types. In addition, Beyer and Golightly (1996) commonly detected fishers in mixed redwood/Douglas-fir forest and coastal forests comprised of sitka spruce, red alder (*Alnus rubra*), and occasional coast redwood (*Sequoia sempervirens*).

Regional scale

Assessment of fisher habitat at the regional scale includes large-scale patterns of fisher distribution relative to geography, elevation, climate, distribution of forest habitat, and land ownership. Few studies have been conducted at scales adequate to assess regional differences in fisher populations.

Within a given region, the distribution of fishers is likely limited by elevation and snow depth (Krohn et al. 1997). Fisher are unlikely to occupy forest habitats in areas where elevation and snow depth act to limit their movements At middle elevations with intermediate snow depths, the influences of elevation, snow depth, and forest cover probably interact to determine the extent of habitat available to fisher during the winter. In these areas, fishers may use dense forest patches with large trees because the overstory closure increases snow interception (Weir 1995a). Here, fishers probably avoid open areas in winter because open areas have deeper, less supportive snow which inhibits travel (Leonard 1980; Raine 1983; Krohn et al. 1997).

In a study of fisher distribution in the Klamath region of northwestern California and southwestern Oregon, Carroll et al. (1999) found that models with habitat variables at landscape and regional scales predicted fisher distribution as well as a model incorporating fine-scale habitat attributes. The variables they found to be important at the regional level included annual precipitation and tree canopy closure, but did not include elevation. Applying the model across large areas, the authors found that mean predicted probability of fisher detection varied among physiographic areas and land-management categories. The highest mean detection probabilities were predicted in biologically productive low-elevation areas such as Redwood National Park (0.347) and Hoopa Valley Indian Reservation (0.440). Among Forest Service lands, predicted detection probabilities were highest in late-successional reserves (0.128) and lower in wilderness (0.103) and matrix (0.087). Nonpublic forest lands (other than tribal lands) ranked relatively low (0.062). The Klamath Mountains area studied by Carroll et al. (1999) did not include extensive areas of high elevation or high accumulation of snow, which may limit fisher distribution in other areas such as the Cascades and Sierra Nevada Mountain Ranges.

Landscape scale

At the landscape scale, habitat selection by fishers is expressed in terms of local patterns of abundance or density, and the locations of multiple home ranges. Formal comparisons of fisher abundance or density among various landscape conditions in the Pacific states have not been reported.

Based on patterns of fisher detections at track-plate and baited camera stations in the Klamath and north coast regions of California, Carroll et al. (1999) found distribution at this scale is strongly associated with landscapes with high levels of tree canopy cover, tree size class, and percent conifer.

Dark (1997) measured habitats within buffers surrounding trapping units “segments” on the Shasta-Trinity National Forest in the southern Klamath Mountains. Landscapes where fishers were detected contained more Douglas-fir forest cover, more dense (51-75 percent canopy cover) forest, and less barren ground than landscapes with no fisher detections. Landscape variables considered in this study did not include tree size or amount of late-successional forest habitat.

In Douglas-fir and mixed conifer-hardwood forests on the Hoopa Valley Indian Reservation in northwestern California, Higley et al. (1998) captured 46 individual fisher (36 females, 10 males) 118 times during 980 trap-days. Landscape conditions in the survey area were characterized by a matrix of second-growth stands, oak stands, brushfields, and remnant patches of late-successional conifer forest habitat.

Using track-plate and trapping capture success rates, Self and Kerns (1992 and 2001) investigated fisher use of four tracts (landscape units) of intensively-managed timberlands in the eastern Klamath Mountains and southern Cascades of California. At the Latour tract in the Mount Lassen area, fisher were not detected during 832 track-plate-days and 494 trap-days. Habitat at this tract was dominated by open conditions in mixed conifer and true fir forest. At the Buck Mountain tract, dominated by open ponderosa pine and true fir habitats roughly 20 mi (32 km) east of Mt. Shasta, a single fisher was detected during 15 track-plate days, but no captures were made during a subsequent 1092 trap-days. It should be noted that the Buck Mountain and Latour tracts are located in northeastern California where fisher are less expected to occur. The Castle Creek tract in the eastern Klamath Mountains had a checkerboard ownership pattern of alternating sections of Forest Service, State Park, and industrial timberlands. The majority of this landscape was composed of Klamath mixed conifer, mid-seral habitat (12 to 24 in diameter at breast height (dbh)), and open to moderate forest (10 to 59 percent canopy cover) (57.5, 61, and 71 percent, respectively). During 1991 and 1992, two male fisher were captured during 690 trap-days. Seven additional individuals (5 males, 2 females) were captured the following year. The Hazel Creek tract, located roughly 10 miles southeast of Castle Creek and dominated by intensively-managed mixed conifer forest, yielded no fisher detections during 69 trap-days.

In a track-plate study conducted on private timberlands in the redwood-Douglas-fir transition zone of the Coast Ranges of northwestern California, Klug (1997) detected fishers on 238 occasions at 26 of 40 (65 percent) of survey segments located in second-growth Douglas-fir and redwood. Fishers were detected more frequently than expected (based on availability) in areas at higher elevations, in stands where Douglas-fir was the dominant or co-dominant vegetation type, and with greater amounts of hardwoods. Klug (1997) found no relation between fisher occurrence and stand age or old-growth habitats, however there was less than 2 percent old-growth on his study area. The mean canopy cover for all stations Klug sampled was 94.7 percent, and mean stand age was 42.6 years, an age which, in productive lowland redwood and Douglas-fir habitats, often correlates with large-tree conditions. During subsequent studies in this area (Ewald, pers. comm. 2003), 24 individual fishers were captured (10 males, 14 females). Nine of 11 females showed signs of reproduction, and 9 natal and maternal dens were located. In their adjacent study area in Redwood National and State Parks with coastal forests dominated by redwood, Slauson et al. (2003) found that redwood was the dominant overstory and understory species where fishers were detected; Douglas-fir was dominant at sites where they were not. This study area had 38 percent old-growth habitat, however, fisher were detected more often in second-growth redwood stands.

Fragmentation

A number of studies have shown that the fisher avoids areas with little forest cover or significant human disturbance and conversely prefers large areas of contiguous interior forest (Coulter 1966; Kelly 1977; Buck 1982; Mullis 1985; Rosenberg and Raphael 1986; Arthur et al. 1989; Powell 1993; Jones and Garton 1994; Seglund 1995; Dark 1997).

Rosenberg and Raphael (1986) assessed fragmentation on three hierarchical scales: plot (25-ac (10-ha) areas within stand), stand (continuous area of similarly classified forest (age, stocking level) as delineated by timber-type maps), and 2471-ac (1000-ha) block surrounding each stand. The forest fragmentation measures in Rosenberg and Raphael’s (1986) northwestern California study suggest that fishers show a significant positive association with a plot’s distance to clearcut, and significant negative associations with a stand’s length of edge, degree of insulation (defined as “the percentage of its perimeter that was clearcut edge”), percent clearcut, and total edge. Rosenberg and Raphael (1986) state that, “Among the species suspected of being most sensitive to forest fragmentation in our study, only the fisher and spotted owl were also associated with old-growth forests.” They show a significant positive association between fisher presence and forest stand area, detecting fishers more frequently in stands over 247 ac (100 ha) (70 percent frequency of occurrence) and stands of 126 to 247 ac (51 to 100 ha) (90 percent frequency of occurrence) than in smaller stands; fishers were detected in 55 percent of stands that were 52 to 124 ac (21 to 50 ha), in 30 percent of stands that were 27 to 49 ac (11 to 20 ha), and in 17 percent of stands under 25 ac (10 ha).

The fisher’s need for overhead cover is very well-documented. Many researchers report that fishers select older seral stands with continuous canopy cover to provide security cover from predators (de Vos 1952; Coulter 1966; Kelly 1977; Arthur et al. 1989; Weir and Harestad 1997, 2003). Weir (2003) states, in a status review for fishers in British Columbia, that fishers seem to be able to use many different habitats as long as these areas provide overstory or shrub cover at the stand or patch spatial scales (a scale at which several stands would be included in a typical fisher home range, and several patches within stands). Forested areas with higher density overhead cover provide the fisher increased protection from predation and lower the energetic costs of traveling between foraging sites. High density cover provides cool shade in summer and limits snow depth in winter. Fishers probably avoid open areas because in winter open areas have deeper, less supportive snow which inhibits travel (Leonard 1980; Raine 1983; Krohn et al. 1997), and because they are more vulnerable to potential predators without forest cover (Powell 1993). Although fishers have been reported to cross areas without overhead cover (open bogs and frozen lakes), they never went below the snow cover to forage in such habitats (Raine 1987). Fishers may use forest patches with large trees because the overstory closure increases snow interception (Weir 1995 as cited in Weir 2003). Furthermore, preferred prey species may be more abundant or vulnerable in areas with higher canopy closure (Buskirk and Powell 1994).

Fishers are thought to prefer forests that are more mesic (with moderately moist conditions) than xeric (drier) in the parts of their geographic ranges that have a mixture of both (Buskirk and Powell 1994). In temperate latitudes such as in southern Oregon and California, mesic areas are commonly riparian. Several studies have shown that fishers are associated with riparian areas (Buck 1982; Jones 1991; Aubry and Houston 1992; Seglund 1995; Dark 1997; Zielinski et al. 1997c; Zielinski et al. in press 2004b, in press 2004a). For example, Aubry and Houston (1992) noted that many of the past sightings of the fisher in Washington State were in riparian areas or wetlands. The relationship may be confounded in coastal forests which are more mesic than inland forests, and generally have more watercourses. Riparian forests are in some cases protected from logging and are generally more productive, thus having the dense canopy closure, large trees and general structural complexity associated with fisher habitat (Dark 1997). According to Seglund (1995), riparian areas are important to fishers because they provide important rest site elements, such as broken tops, snags, and coarse woody debris.

Jones and Garton (1994) found seasonal variability in fisher use of successional stages in their study of fishers in Idaho. They state that fishers in their study were found to hunt in mature and old-growth forests more often than expected during summer, and in young forest more often than expected in winter based on availability (however, mature or old-growth forest types still represented 53 percent of winter-use locations).

Composition of home ranges

Wide-ranging predators, fishers encounter a broad range of habitat conditions within their home ranges. A small number of studies have used radio telemetry to characterize the habitat composition of fisher home ranges in the southern Sierra Nevada (Mazzoni 2002; Zielinski et al. in press 2004a), and the North Coast Range of California (Zielinski et al. in press 2004a).

Mazzoni (2002) measured habitat composition within the home ranges of 11 fishers in the southern Sierra Nevada. Home range areas averaged 24.8 percent coverage by "late-successional" (over 50 percent canopy cover, over 24 in diameter) conifer forest habitat (range 15.0 to 32.1 percent). The mean percent of home range area with dense (over 50 percent canopy cover) conifers of all sizes was 53.6 percent (range 34.9 to 76 percent). Also in the southern

Sierra Nevada, Zielinski et al. (in press 2004a) found that home ranges of 12 fishers consisted of 12.8 percent (SD=10.9) large tree (over 24 in) conditions. Intermediate tree size classes (12 to 24 in dbh), dense (over 60 percent) canopy closure, and Sierran Mixed Conifer forest type composed the greatest proportion of the home ranges studies (60.7, 66.3, and 40.1 percent, respectively).

In the North Coast Range of northern California, Zielinski et al. (in press 2004a) found that home ranges of nine fishers were dominated by mid-seral Douglas-fir and white fir (42.8 percent); home ranges included 14 percent (SD=13.36) late-successional Douglas-fir on average, and 13.97 percent true fir (SD=10.23) on average.

Resting and denning habitat

The characteristics of sites used for resting and denning are the best-known elements of habitat selection by fisher. In most studies, telemetry is used to locate fisher at resting and denning sites, where measurements of the denning or resting structure and the surrounding forest stand are obtained. Within the home range, fine-scale attributes (e.g. large trees, coarse woody debris) become relatively more important in the selection of denning and resting sites. Powell and Zielinski (1994) and Zielinski et al. (in press 2004b) suggest that habitat suitable for resting and denning sites may be more limiting for fishers than foraging habitat. Zielinski et al. (in press 2004b) cite previous work – including Kelly 1977, Arthur et al. 1989, Jones and Garton 1994, and Powell 1994 – that indicates that both fishers and American martens exhibit greater selection for natal dens and resting sites than for foraging locations. Numerous studies have documented that fishers in the western United States utilize stands with certain forest characteristics for resting and denning such as large trees and snags, coarse woody-debris, dense canopy closure and multiple-canopy layers, large diameter hardwoods, and steep slopes near water (Powell and Zielinski 1994; Seglund 1995; Dark 1997; Truex et al. 1998; Self and Kerns 2001; Aubry et al. 2002; Carroll et al. 1999; Mazzoni 2002; Zielinski et al. in press 2004b).

Rest sites have structures that provide protection from unfavorable weather and predators. Fishers also use rest sites as protected locations to consume prey following a successful foraging bout (Zielinski pers. comm.). Re-use of rest sites is relatively low (14 percent: Zielinski et al. in press 2004b), indicating that habitats providing suitable resting structures need to be widely distributed throughout home ranges of fishers (Powell and Zielinski 1994; Truex et al. 1998), and spatially interconnected with foraging habitats.

Rest site - stand characteristics

Zielinski et al. (in press 2004b) found indications that combinations of vegetation and topographic features contribute to rest site selection in California fisher populations. They state that the most influential variables included maximum tree sizes and dense canopy closure, but found other features to be important to rest site choice as well, such as large diameter hardwoods, large conifer snags, and steep slopes near water (Zielinski et al. in press 2004b). Their analysis indicates that fishers select areas as rest sites where structural features are most variable but where canopy cover is least variable, suggesting that resting fishers place a premium on continuous overhead cover but prefer resting locations that also have a diversity of sizes and types of structural elements (Zielinski et al. in press 2004b). In her study of fishers in the southern Sierra Nevada range, Mazzoni (2002) found that the following significant factors contribute to fisher rest site selection: high canopy closure, crown volume, log cover, basal area, canopy layering, and large snag abundance. She concludes that, "A majority of the rest site plots have greater than 60 percent cover with a higher degree of layering than the random sites with more than 60 percent cover," and that, ". . . the abundance of large trees and snags in the 1-ha plots surrounding the rest sites indicates a selection overall for areas with a high density of large trees and snags." Seglund (1995) found that a majority of fisher rest sites (83 percent) were further than 328 ft (100 m) from human disturbance and Dark (1997) found that fishers used and rested in areas with less habitat fragmentation and less human activity. Characteristics of forest stands containing rest sites on industrial timberlands were similar to those reported elsewhere in northern California. Fishers in Shasta County used rest sites in stands of the largest tree size classes available, with mean canopy closure of 71 percent (Self and Kerns 2001).

Rest site structure type

Rest site structures used by fishers include: cavities in live trees, snags, hollow logs, fallen trees, canopies of live trees, platforms formed by mistletoe ("witches brooms") or large or deformed branches, and to a lesser extent stick nests, rocks, ground cavities, and slash and brush piles (Heinemeyer and Jones 1994; Higley et al. 1998; Mazzoni 2002; Zielinski et al. in press 2004b). A high number of the largest woody structures available are used for resting (Mazzoni 2002; Zielinski et al. in press 2004b). Tree size, age, and structural features are important characteristics of a rest structure. Most rest locations in the study areas of Zielinski et al. (in press 2004b) were in cavities or broken tops of standing trees. Trees must be large and old enough to bear the type of stresses that initiate cavities, and the type of ecological processes (e.g., decay, woodpecker activity) that form cavities of sufficient size to be useful to fishers; tree species that typically decay to form cavities in the bole are more important than those that do not (Zielinski et al in press 2004b). Cavities in hardwoods were the most frequently used rest structure in the southern Sierra Nevada study area where Douglas-fir is absent (37.5 percent of rest structures were in black oaks); and in the North Coast study area, Douglas-firs were the most frequently used species (65.6 percent) and black oaks were used less frequently (11.4 percent) (Zielinski et al in press 2004b). Higley et al. (1998) found that fishers in their Klamath study area use live hardwood trees most frequently for resting (57.14 percent) followed by live conifer trees (26.29 percent), snags and logs (14.86 percent - hardwoods and conifers combined) and the ground (1.71 percent). They found that Douglas-fir was the most frequently used species of tree (37.93 percent) followed by black oak (26.44 percent) and tanoak (26.44 percent). On managed industrial timberlands in northwestern California, fisher resting sites (N=35) were predominantly located on dwarf mistletoe in western hemlocks, large lateral branches and mammal nests in Douglas-firs, and cavities in cedars (Ewald, pers. comm. 2003). The majority of 34 rest sites described by Self and Kerns (2001) were located in mistletoe brooms in live Douglas-firs, whereas only 20 percent were in snags or hardwoods.

Rest site structure size

Zielinski et al. (in press 2004b) stated that rest structures in their study areas in the North Coast and the southern Sierra Nevada were among the largest diameter trees available, averaging 46.2, 47.2, and 27.2 in (117.3, 119.8, and 69.0 cm) for live conifers, conifer snags, and hardwoods, respectively. Live conifers that Higley et al. (1998) recorded fishers using for rest sites had a mean diameter of 43.35 in (110.1 cm) and live hardwoods averaged 29.37 in (74.6 cm) in diameter. Diameter of trees and snags containing rest structures averaged 30 in (76 cm) and 42 in (107 cm), respectively, on industrial timberlands in western Shasta county, California (Self and Kerns 2001). Rest sites in managed stands in northwestern California were in trees ranging from 8.8 to 68.9 in diameter (mean = 33.3 in) (22.3 to 175 cm; mean = 84.6 cm) (Ewald, pers. comm. 2003).

Natal and maternal dens

Fisher rest sites are relatively more numerous and more easily located than are natal and maternal den sites. Consequently, a number of studies document rest site use whereas information on den site use is more limited. Fishers can use a broader range of structures and tree sizes for resting than for natal and maternal denning. Although rest sites can be in live trees, snags, logs, and other structures, dens are almost all found in live trees. The trees must be large enough for cavities that can be used for natal dens, where kits are born, and maternal dens, where kits are raised. Of 19 tree dens documented by Truex et al. (1998) across three study areas in California, the average diameter was 45 in (115 cm) for conifers and 25 in (63 cm) for hardwoods. Higley et al. (1998) located eight den sites of five females, all within cavities of hardwoods with a mean diameter of 24.96 in (63.4 cm). Of sixteen maternal and natal dens located on managed timberlands in northwestern California, nine were in cavities in hardwoods and seven were in conifer snags: diameters of den trees ranged from 24.6 in (62.5 cm) to 116 in (295 cm) (Ewald, pers. comm. 2003). Natal and maternal dens in British Columbia were found in declining black cottonwood (*Populus balsamifera* spp. *trichocarpa*) or balsam poplar (*P. b.* spp. *balsamifera*) trees with a mean dbh of 40 in (103 cm), which were the largest-diameter trees available (Weir and Harestad 2003). According to Lewis and Stinson (1998), natal dens are most commonly found in tree cavities at heights of greater than 20 ft (6 m), while maternal dens may be in cavities closer to the ground so active kits can avoid injury in the event of a fall from the den. The mean height of natal and maternal dens found in British Columbia was 99 ft (26 m) above ground (Weir and Harestad 2003). The height of these dens may help prevent predation by the larger male fishers or by other species.

Foraging habitats

Selection of habitats by foraging fishers is typically inferred from track-plate, camera, and telemetry studies. These studies provide information on the proportion of fisher locations relative to available habitats, and it is assumed that these non-resting locations are associated with foraging behavior. However, it is not known to what extent such locations represent detections of fisher moving among foraging habitats or seeking shelter versus actively foraging. While fishers may exhibit distinct habitat preferences for resting and denning sites, fishers in the Pacific states appear to be dietary generalists (see Ecology section above). Therefore, fishers may be more flexible in their requirements for foraging habitat. Selection of foraging habitat may be driven by habitat relationships of primary prey species, which may vary among study areas.

Several studies have characterized foraging habitat which, similar to resting habitat, is often typified by characteristics associated with mature and late-successional forests (Jones and Garton 1994; Zielinski et al. 1997c). However, fishers have been found, in some studies, to use a broader range of successional stages for hunting than for resting (Jones 1991; Heinemeyer 1993; Jones and Garton 1994). Jones (1991) found that younger-aged forests appeared suitable for hunting but were rarely used for summer resting; more structurally complex forests seemed to have been preferred for both activities, but simpler stand structures were used for hunting. In their use of younger forests, fishers in Idaho still appeared to select localities with higher availability of large-diameter trees, snags, and logs (trees over 18 in (47 cm) diameter, snags over 20 in (52 cm) diameter, and logs over 18 in (47 cm) relative to randomly-located plots in the home range (Jones 1991).

Complex down woody material including large down logs, and multi-layered vegetative cover are considered to be important habitat elements for fishers. Fishers are often detected at sites with higher amounts of downed logs than at random sites (Klug 1997; Slauson et al. 2003), and high volumes of coarse woody debris and structural complexity near the forest floor (Weir and Harestad 2003). Slauson et al. (2003) state that, "high structural diversity is known to be associated with an increase in prey species richness and abundance and deadwood structures are positively associated with several potential prey species (e.g. red-backed voles *Clethrionomys californicus,* Hayes and Cross 1987)." The vulnerability of prey species to capture may also be affected by structural complexity near the ground (Buskirk and Powell 1994). Shrubs also provide food for prey and for fishers in the form of fruits and berries. Slauson et al. (2003) found that sites in their study area where fishers were detected had higher shrub cover (40 to 60 percent) than sites where they were not detected. In northwestern California, a matrix of shrubby early-successional habitats and second-growth redwood stands provide optimum habitat for dusky-footed woodrats (*Neotoma fuscipes*) (Sakai and Noon 1997), potential prey for fishers detected in adjacent forest habitat (Klug 1997). Fishers may also avoid areas with too much low shrub cover. Weir and Harestad (2003) found fishers in their study area in British Columbia to avoid stands with over 80 percent cover of the low shrub layer, suggesting that an overly complex forest floor may adversely affect the hunting success of fishers by reducing the likelihood of capturing prey.

Conclusion

The dominant opinion from published sources and species experts is that, while fishers use a broad variety of habitat types for different life requisites, the primary constituent elements of fisher habitat are best expressed in forest stands with late-successional characteristics. Multiple studies on the habitat use of fishers in the western United States indicate associations with high canopy closure, large trees and snags, large woody debris, large hardwoods, multiple canopy layers and, and avoidance of areas lacking overhead canopy cover (Aubry and Houston 1992;

Buskirk and Powell 1994; Buck et al. 1994; Seglund 1995; Klug 1996; Dark 1997; Truex et al. 1998; Mazzoni 2002; Weir and Harestad 2003; Zielinski et al. in press 2004a, in press 2004b). Many of these studies describe fisher habitat selection at relatively fine scales of resolution, such as resting and denning sites. At larger scales, such as home ranges and landscapes, habitat relationships of fisher are more uncertain. Powell and Zielinski (1994) noted, "While some recent work in northern California indicates that fishers are detected in second-growth forests and in areas with sparse overhead canopy, it is not known whether these habitats are used transiently or are the basis of stable home ranges. It is unlikely that early and mid-successional forests, especially those that have resulted from timber harvest will provide the same prey resources, rest sites and den sites as more mature forests." In the years since Powell and Zielinski's (1994) assertion, results from field studies on managed timberlands in northwestern California suggest that fisher also occupy and reproduce in some managed forest landscapes and forest stands not classified as late-successional. The managed forests studied provided some of the habitat elements important to fisher, such as relatively large trees, high canopy closure, large legacy trees, and large woody debris, in second-growth forest stands (Klug 1997, pers. comm. Ewald 2003). Their study area encompassed low-elevation redwood and Douglas-fir forests where high productivity and rapid growth rates result in second growth stands that exhibit many characteristics of mature stands. However, it is generally recognized that intensive management for fiber production on industrial timberlands does not typically provide for retention of these elements, particularly in drier interior forest types where productivity is lower and climatic conditions more limiting. Fisher studies on managed timberlands in these interior areas (Self and Kerns 1992, 2001), while preliminary in nature, are equivocal in terms of demonstrating habitat associations, and suggest low densities, a high proportion of males, and little evidence of reproduction.

Based on an extensive review of existing studies, Buskirk and Powell (1994) concluded that distributional losses of fisher populations in response to habitat change provide evidence that populations require the habitats shown to be preferred by individual behavior. However, demographic studies linking habitat quality to measures of fitness or population size have not been conducted in the Pacific states, nor have monitoring studies to detect changes in population size relative to habitat change. Late-successional coniferous or mixed forests are commonly thought to provide the most suitable fisher habitat because they provide abundant potential den sites and preferred prey species (Allen 1987). Forest structure of good quality fisher habitat should provide for three functions important for fishers: structure that leads to high diversity of dense prey populations, structure that leads to high vulnerability of prey to fishers, and structure that provides natal and maternal dens and resting sites (Powell and Zielinski 1994). Younger forests in which complex forest structural components such as large logs, snags, and tree cavities are maintained in significant numbers, and which provide a diverse prey base, may be suitable for fisher (Lewis and Stinson 1998).

3. THE STATUS OF THE PETITIONED ENTITY AS A DISTINCT POPULATION SEGMENT

Under the Act, we must consider for listing any species, subspecies, or, for vertebrates, any distinct population segment (DPS) of these taxa, if there is sufficient information to indicate that such action may be warranted. To implement the measures prescribed by the Act and its Congressional guidance, we and the National Marine Fisheries Service (National Oceanic and Atmospheric Administration - Fisheries), developed a joint policy that addresses the recognition of DPSs of vertebrate species for potential listing actions (61 FR 4722). The policy allows for a more refined application of the Act that better reflects the biological needs of the taxon being considered, and avoids the inclusion of entities that do not require its protective measures. The DPS policy specifies that we are to use two elements to assess whether a population segment under consideration for listing may be recognized as a DPS: (1) the population segment's discreteness from the remainder of the species to which it belongs; (2) the significance of the population segment to the species to which it belongs; and (3) the population segment's conservation status in relation to the Act's standard for listing. Our evaluation of significance is made in light of Congressional guidance that the authority to list DPSs be used "sparingly" while encouraging the conservation of genetic diversity. If we determine that a population segment meets the discreteness and significance standards, then the level of threat to that population segment is evaluated based on the five listing factors established by the Act to determine whether listing the DPS as either threatened or endangered is warranted.

Below, we address under our DPS policy the population segment of the fisher that occurs in the western United States in Washington, Oregon and California. The area for this DPS includes the Cascade Mountains and all areas west to the coast in Oregon and Washington; and in California, the North Coast from Mendocino County north to Oregon, east across the Klamath (Siskiyou, Trinity, and Marble) Mountains, across the southern Cascade Mountains and south through the Sierra Nevada Mountains. The mountainous areas east of the Okanogan River in Washington and the Blue Mountains west to the Ochoco National Forest in eastern Oregon are not included in this DPS due to geographical isolation from the remainder of the DPS.

3.1 Discreteness

Under our DPS policy, a population segment of a vertebrate species may be considered discrete if it satisfies either one of the following two conditions: (1) it is markedly separated from other populations of the same taxon as a consequence of physical, physiological, ecological, or behavioral factors (quantitative measures of genetic or morphological discontinuity may provide evidence of this separation); or (2) it is delimited by international governmental boundaries within which differences in control of exploitation, management of habitat, conservation status, or regulatory mechanisms exist that are significant with regard to conservation of the taxon in light of section 4(a)(1)(D) of the Act.

The proposed DPS is markedly separated from other fisher populations as a result of several factors. Native populations of the fisher in California and the reintroduced population in the southern Cascade Mountains of Oregon are isolated from the Canadian populations due to the lack of viable populations of the fisher in Washington and northern Oregon (Drew et al. 2003) and the northward contraction of the British Columbia population (Weir 2003) in Canada. Substantial information is available indicating the West Coast population is also physically separated from known populations of the fisher to the east. The range of the fisher in Washington, Oregon, and California is separated from the Rocky Mountains and the rest of the taxon in the central and eastern United States by natural physical barriers including, the non-forested high desert areas of the Great Basin in Nevada and eastern Oregon, and the Okanogan Valley in eastern Washington. The smallest distance between known fisher populations in the west and in the Rocky Mountains is approximately 249 to 311 mi (400 to 500 km). Other physical barriers that separate the West Coast population from Rocky Mountain and eastern U.S. fisher populations include major highways, urban and rural open-canopied areas, and agricultural development, and other nonforested areas. Fishers have a strong aversion to areas lacking in forest cover or to crossing large rivers that do not freeze in the winter (Powell 1993; Powell and Zielinski 1994; Aubry and Lewis 2003); these behavioral factors, along with the other numerous barriers identified above, represent a significant impediment to eastward movement for the fisher.

We currently have limited information on dispersal distances of fishers in the western United States; however, studies have been conducted in the northeast. The average maximum dispersal distances are 9.3 and 10.7 mi (14.9 and 17.3 km) for females and males, respectively, in a population in Maine with high trapping mortality and low density (Arthur et al. 1993). Dispersal distances for a high-density population of fishers in Massachusetts averaged 20.5 mi (33 km) (range = 6 to 66 mi; 10 to 107 km) (York 1996). Apparently, fishers are not successfully dispersing outside of known population areas in California and Oregon, potentially due to the extent of habitat fragmentation, developed or disturbed landscapes, and highways and interstate corridors (see dispersal section above).

Based on genetic information (Drew et al. 2003), the West Coast population of fisher originally colonized the Pacific states from British Columbia. The current range of fisher in British Columbia has been reduced and connection to fisher populations in the continental United States no longer exists (Weir 2003, BC Species and Ecosystems Explorer 2003). The Oregon Cascade Range population is separated from known populations in British Columbia by more than 404 mi (650 km) (Aubry and Lewis 2003). Movement of fisher from British Columbia southward to areas occupied by the West Coast population is not possible based on habitat availability, habitat preferences, and dispersal behavior of the fisher. Different management protections in Canada also play a role in defining the discreteness of the West Coast fisher and movement of fisher from British Columbia southward, and are discussed below.

The West Coast population also appears to be separated from other populations as a result of ecological factors, as they use forest types that differ in species composition, tree size, and habitat structure as compared to those used by fishers in other populations. It is not clear to what extent this is a result of the availability of different types of habitat. The fisher is regarded as a habitat specialist in the western United States (Buskirk and Powell 1994), occurring only at mid to lower elevation in mature conifer and mixed conifer/hardwood forests characterized by dense canopies and abundant large trees, snags, and logs (Powell and Zielinski 1994). In contrast, fishers in the northeastern United States and the Great Lakes region inhabit areas with a large component of deciduous hardwood forest containing American beech (*Fagus grandifolia*), sugar maple (*Acer saccharum*), and other broadleaf species (Powell and Zielinski 1994). The majority of conifer forest habitat in Canada is characterized as boreal forest, which is different from the relatively dryer environmental conditions associated with Washington, Oregon, and California.

The apparent differences in the fisher=s association with mature/old-growth forests on the west coast may be influenced by the extended, hot, dry summers that characterize the west=s unique Mediterranean climate; western fishers may select rest sites and structures with cavities that minimize the effects of heat and dryness (Zielinski et al. in press 2004b). Zielinski et al. (in press 2004b) state that, "Perhaps fishers in the East find less need for the protection from heat and water loss that cavities in old-growth trees provide because summer habitats are not subject to the persistent hot and dry conditions." In the Rocky Mountains of north central Idaho, certain all-conifer habitat types which include grand fir and Engelmann spruce appear to be important to, and preferentially selected by fishers (Jones 1991).

With regard to physiological differences, the fishers in the native northern California population are significantly smaller in size (based on condylobasal length) than fishers from western and central Canada (Hagmeier 1959; Zielinski et al. 1995; Aubry and Lewis 2003). Both male and female fishers from the Klamath-Siskiyou region in northwestern California were significantly lighter than those from the reintroduced population (largely descendants of fishers from British Columbia) in the southern Cascade Range in Oregon, which, according to Aubry and Lewis (2003), cannot be explained solely on the basis of food supply differences.

Information pertaining to the second criterion for discreteness suggests that the West Coast population of the fisher is delimited to the north by the international governmental boundary between the United States and Canada because of differences in control of exploitation, management of habitat, conservation status, and regulatory mechanisms that may be significant with respect to section 4(a)(1)(D) of the Act. Canada has no overarching forest practices laws governing management of its national lands. In contrast, lands within the National Forest System in the United States are considered under the National Forest Management Act of 1976, as amended (16 U.S.C. 1600), and associated planning regulations. The fisher is covered by British Columbia=s Wildlife Act which protects virtually all vertebrate animals from direct harm, except as allowed by regulation (e.g. hunting or trapping). The fisher is designated as a Class 2 furbearer in British Columbia and, as such, can be legally harvested by licensed trappers under regional regulations. However, the fisher was reclassified to the Red List in British Columbia in 2003 with a provincial conservation ranking of "S2," as assigned by the British Columbia Conservation Data Centre to "score" the risk of extinction or extirpation (BC Species and Ecosystems Explorer 2003). The "S2" rank means the species is considered imperiled at the provincial level. In response to the fisher=s new designation, trapping seasons for it are closed until new information is collected that indicates the population is secure (BC Ministry of Land, Water, and Air Protection 2003). Trapping the species has been prohibited for decades in Washington, Oregon, and California (Lewis and Stinson 1998). For the reasons stated above, we believe that these factors collectively play a role in delimiting the northern DPS boundary along the international border with Canada from the Cascade Mountains west to the Pacific Ocean.

Based on the available information on fisher range and distribution, we conclude that the West Coast population of fisher is distinct and separate from other fisher populations in the United States and meets the requirements of our DPS policy for discreteness. The West Coast population of fisher is separated from fisher populations to the east by geographical barriers and to the north by habitat availability and the international boundary with Canada.

3.2 Significance to the Species

Under our DPS policy, once we have determined that a population segment is discrete, we consider its biological and ecological significance to the larger taxon to which it belongs. This consideration may include, but is not limited to, the following factors: (1) persistence of the discrete population segment in an ecological setting unusual or unique for the taxon; (2) evidence that loss of the discrete population segment would result in a significant gap in the range of the taxon; (3) evidence that the population segment represents the only surviving natural occurrence of a taxon that may be more abundant elsewhere as an introduced population outside its historical range; and (4) evidence that the discrete population segment differs markedly from other populations of the species in its genetic characteristics. Significance is not determined by a quantitative analysis, but instead by a qualitative finding. We have found substantial evidence that the West Coast DPS of the fisher meets two of the significance factors and is supported by a third significance factor, and we have described them below.

Fishers in the West Coast population persist in an ecological setting that is unusual in comparison to the rest of the taxon, with a different climate, topography, and habitat than that found in the majority of its range. The forests inhabited by fishers on the West Coast lack the extensive broadleaf hardwood component that is common in the eastern portions of the species= range. The Pacific coast=s wet winter followed by a dry summer is unique in comparison to climate types in the east and Canada, and produces distinctive sclerophyll forests of hardleaved evergreen trees and shrubs (Smith et al. 2001). This climate is characterized by mild, wet winters and warm, dry summers (Bailey 1995), while the climate in the animal=s range in the Rocky Mountains consists of cold winters and cool, dry summers, and in the Great Lake States, eastern Canada, and the northeast United States it is characterized by cold winters, and warm, wet summers. Fishers on the West Coast primarily occur in habitat in steep, mountainous terrain, while those in the Great Lakes region, eastern Canada, and the northeastern United States inhabit level terrain or low lying glaciated mountains. Releases of eastern fishers into western forests have generally been unsuccessful; Powell and Zielinski (1994) state that, “Roy's (1991) results [unsuccessful attempts to reintroduce Minnesota fishers to Montana] indicate that many fishers from eastern North America may lack behaviors, and perhaps genetic background, to survive in western ecological settings.” The repeated introductions of fishers from British Columbia and Minnesota to the southern Cascade Mountains of Oregon (from 1960s to 1980s) have resulted in an apparently stable, but small population there; however, the species is not expanding and dispersing from the areas into which it was introduced.

The loss of the West Coast DPS of the fisher would eliminate the entire southwest portion of the fisher=s range. Additionally, the West Coast DPS of the fisher represents the southernmost range of the *Martes* genus. The West Coast populations represent three of the known remaining four populations in the west (fourth being the Rocky Mountain population). Based on our review of Lewis and Stinson=s (1998) maps (modified from Gibilisco 1994), these are three of only six or seven remaining areas occupied by fishers in the United States. Also, the populations in the southern Sierra Nevada and northern California/southern Oregon appear to be the only native populations of the fisher remaining in the west (Truex et al. 1998; Aubry et al. in press 2003; Drew et al. 2003), and are “the only populations that have not been augmented with individuals (and genes) from other regions” (Zielinski et al. in press 2004b).

As stated earlier (see distribution section), the extent of area known to be currently occupied by fishers in Washington, Oregon, and California is roughly 20 percent of their historical extent in these States. The loss of the species from the United States west of the Rocky Mountains and south of British Columbia would result in a significant gap in the range of the species as a whole and represent the loss of a major geographical area of the range of the taxon. It would represent a loss of the species from about 20 percent of its historical range in the United States, recognizing that the historical range was not continuously occupied spatially or temporally, and that the present range we identify is also not occupied continuously nor is all of the historical habitat still available, especially in the midwest and east.

The extinction of fishers in their West Coast range would also result in the loss of a significant genetic entity, since they have been described as being genetically distinct from fishers in the remainder of North America. More specifically, native fishers in California have reduced genetic diversity compared to other populations (Drew et al. 2003). Additionally, the extant native populations in California share one haplotype that is not found in any other populations (Drew et al. 2003).

Quantitative measures of genetic discontinuity indicate that there is a marked separation of the West Coast fishers from other populations of the taxon, indicating that no natural interchange occurs. Based on genetic evidence, and supported by paleontological and archeological evidence, Wisely et al. (in litt. 2003) theorize that fishers probably colonized the Pacific peninsula from the north, not the east. The fisher was once distributed throughout much of the dense coniferous forests in British Columbia, Washington, Oregon, and California (Drew et al. 2003). This historical connectivity among populations along the Pacific Coast is evidenced by the presence of British Columbia haplotypes in museum specimens from California and Washington (Drew et al. 2003). The historical continuity in fisher distribution no longer exists, as discussed above. Genetic variation shows the Oregon southern Cascade population is a reintroduced population descended from fishers translocated to Oregon from British Columbia and Minnesota (Drew et al. 2003). There is evidence that there has been no genetic interchange between the native northern California/southwestern Oregon Siskiyou population and the reintroduced southern Cascade Oregon population (Aubry et al. in press 2003).

Conclusion

We have evaluated as a DPS the population of fishers in the west coast range and have addressed two of the elements our policy requires us to consider in deciding whether a vertebrate population may be recognized as a DPS and considered for listing under the Act. In assessing the population segment=s discreteness from the remainder of the taxon, we have described the factors separating it from other populations. We considered distributional, ecological, behavioral, morphological, and genetic information, information from status surveys, and geographical and biogeographical patterns, and have concluded that this population segment is discrete under our DPS policy. In assessing the population segment’s significance to the taxon to which it belongs, we have considered the geographical area represented by the western DPS, its genetic distinctness from fisher populations in the central and eastern United States, its unique ecological setting, and other considerations and factors as they relate to the species as a whole. We conclude that loss of the species from the west coast range in the United States would represent a significant gap in the species' range, the loss of genetic differences from fisher in the central and eastern United States, and the loss of the species from a unique ecological setting. Therefore, as the population segment meets both the discreteness and significance criteria of our DPS policy, it qualifies as an entity that may be considered for listing. We now evaluate it under the third element; i.e., its status as endangered or threatened. In making this determination, we evaluate the factors enumerated in section 4(a)(1) of the Act (16 U.S.C. §1533 (a)(1)).

4. CONSERVATION STATUS

Section 4 of the Act (16 U.S.C. § 1533) and implementing regulations at 50 CFR §424, set forth procedures for adding species to the Federal endangered and threatened species list. These procedures require us to determine whether a species is endangered or threatened based on an analysis of five factors described in section 4(a)(1). The factors are (1) the present or threatened destruction, modification, or curtailment of the species' habitat or range; (2) overutilization; (3) disease or predation; (4) other natural or manmade factors affecting the continued existence of the species; (5) and the inadequacy of existing regulatory mechanisms. The following addresses the extent to which available information demonstrates that listing based on these factors may be warranted.

4.1 The Present or Threatened Destruction, Modification, or Curtailment of the Species' Habitat or Range

Many anthropogenic activities and naturally occurring events can destroy, alter, or fragment forest habitat suitable for fishers. Contributors to the loss and fragmentation of habitat include vegetation management activities such as timber harvest and fuels reduction treatments, urban and recreational development, stand-replacing fire, road-building, hydroelectric projects, livestock grazing, large-scale forest disease outbreaks or insect infestations (e.g., pine beetle), wind-throw, vulcanism, and climate change. Given the fisher's apparent reluctance to cross open areas, their limited mobility relative to birds, and their limited dispersal distances, it is difficult for fishers to locate and occupy distant, but suitable, habitat. Habitat fragmentation has contributed to the decline of fisher populations and their failure to recolonize historical habitat. Based on northeastern fisher home range sizes, Allen (1983) assumed that a minimum of 161 km^2 of potentially suitable and connected habitat must be present before an area can sustain a population of fishers. However, Allen's estimates of amount of habitat required to support a fisher population may be an underestimate when applied to western forests because male home ranges in northern California have been reported to be as large as 128 km^2 (Beyer and Golightly 1996). A habitat suitability model developed in British Columbia assumes that a minimum of 259 km^2 of contiguous habitat is required for fisher transplant attempts (Apps 1996 as cited in Craighead et al 1999). Fishers may use smaller forest areas (but may not necessarily be sustained) if the area is connected to larger areas of suitable fisher habitat.

Fishers use large areas of primarily coniferous forests with fairly dense canopies and large trees, snags, and down logs; vegetated understory and large woody debris appear important for their prey species (see section 2.4 Habitat). Because these characteristics are generally found in late-successional forests, loss of late-successional forest habitat is an indicator of the severity of loss of fisher habitat in the west. Studies that have been conducted in the Pacific northwest region indicate that fishers use late-successional forest more frequently than the early to mid-successional forests that result from timber harvest (Aubry and Houston 1992; Buck et al. 1994; Rosenberg and Raphael 1986). Lewis and Stinson (1998) state that elimination of late-successional forest characteristics from large portions of the Sierra Nevada and Pacific Northwest (Morrison et al. 1991; Aubry and Houston 1992; McKelvey and Johnston 1992; Franklin and Fites-Kauffman 1996) has probably contributed to the significant diminution of the fisher's historical range on the West Coast.

Several studies estimate the decline of late-successional/ old-growth forests including Beardsley et al. (1999), Bolsinger and Waddell (1993), the Report of the Forest Ecosystem Management Assessment Team (FEMAT 1993), Franklin and Fites-Kaufmann (1996), Morrison et al. (1991), and the Service (1990). Although the studies differed in their definitions and use of the terms "old growth" and "late successional," all studies indicate sharp declines in late-successional/old-growth forests. Old growth was estimated to occupy about 50 percent of the forests of Washington, Oregon, and California in the 1930s and 1940s, whereas it made up less than 20 percent of the forests in 1992 (about 10.3 million ac (ac)) (Bolsinger and Waddell 1993). About 83 percent of this 1992 old growth was reported to be on Federal lands, primarily in National Forests, 2 percent was on State lands, 1 percent on Native American lands, and 15 percent was on other private lands. Bolsinger and Waddell (1993) state, "Most of the forest land at lower elevations [below 2000 feet] is in private ownership, and most of the privately owned old growth has been logged, usually by clearcutting. Some areas have been clearcut twice, and the land is now occupied by the third generation of forest since settlement." The Forest Ecosystem Management Assessment Team (FEMAT) (1993) reports the status of forests in several regions: private and state lands within western Washington and western Oregon Cascades are mostly cut over, whereas Forest Service and Bureau of Land Management lands still include significant areas (albeit highly fragmented) of late successional/old growth forest; the Klamath Provinces of southwestern Oregon and northwestern California have forests that are highly fragmented by timber harvest and by natural factors (poor soils, dry climate, wildfires); the southern end of the Cascades Range in Oregon extending into California have forests that are highly fragmented due to harvest activities and natural factors.

The *Final Supplemental Environmental Impact Statement* (FSEIS) *on Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl*, otherwise known as the Northwest Forest Plan (NWFP), states that fisher populations are believed to have declined on Federal lands within the range of the northern spotted owl (*Strix occidentalis caurina*; a species also associated with old growth habitat) for two primary reasons, both of which are related to the widespread conversion of old-growth Douglas-fir forests to young plantations: (1) loss of habitat due to forest fragmentation resulting from clearcutting, and (2) the removal of large down coarse woody debris and snags from the cutting units (USDA Forest Service and U.S. Department of Interior (USDI) Bureau of Land

Management 1994). Annual harvest levels from Federal forests within the range of the northern spotted owl averaged 4.5 billion board feet during the period 1980 to 1989 (USDA Forest Service and USDI Bureau of Land Management 1994).

In their assessment of late-successional forests of the Sierra Nevada of California, Franklin and Fites-Kaufman (1996) state that forests with high late successional/old growth structural rankings are currently uncommon (8 percent of mapped area) in the Sierra Nevada. They note that forest types such as the mixed conifer forests are particularly deficient relative to their potential as a result of past timber harvesting, and that key structural features of late successional/old growth forests – such as large-diameter trees, snags, and logs – are generally at low levels (Franklin and Fites-Kaufman 1996). The current extent of high-quality late successional/old growth forest is far below levels that existed prior to western settlement; based upon several lines of evidence, the majority of commercial forestlands were probably occupied by late-successional forests at that time (Franklin and Fites-Kaufman 1996). In the Sierra Nevada of California, old-growth stands in 1945 amounted to 45 percent of the pine, fir, and mixed-conifer forests. Old growth amounted to approximately 11 percent of these types in 1993 (Beardsley et al. 1999). The Forest Service indicates in their *Final Environmental Impact Statement* (FEIS) *for the Sierra Nevada Forest Plan Amendment* (SNFPA) that the loss of structurally complex forest (Franklin and Fites-Kaufman 1996) and the loss and fragmentation of suitable habitat by roads and residential development has likely played a significant role in both the loss of fishers from the central and northern Sierra Nevada and its failure to recolonize these areas (USDA Forest Service 2000).

Truex et al. (1998) reviewed fisher studies in three different areas of California, one with a history of more severe timber harvest than the others. The eastern Klamath area of northern California apparently has lower fisher densities, larger home ranges, low capture rates and a high proportion of juveniles in the population (Truex et al. 1998) compared to other California populations (specifically, to one in the North Coast study area in the North Coast Range, and one in the southern Sierra Nevada). The causes for these differences are not certain; Truex et al. (1998) indicate that the harvested habitat was of poorer quality, but stated that some of the differences may be climatic – inland forests receive less moisture and therefore have lower productivity than coastal forests.

The long-term average regional abundance of late-successional and old-growth communities prior to modern timber harvest practices can only be approximated in Oregon. Within the Northwest Forest Plan area, which includes western Oregon, 60 to 70 percent of the forest area of the region was typically dominated by late-successional and old-growth forest conditions. Most of the total percentage (perhaps 80 percent) would probably have occurred as relatively large (greater than 1000 ac) areas of connected forests (USDA Forest Service and USDI Bureau of Land Management 1994a). Franklin and Spies (1986) estimated that 15 million ac of old-growth forest existed west of the Cascade Mountains in Oregon and Washington in the 1800s, and only about 5 million ac (33 percent remain). More recently, based on forest conditions measured by Current Vegetation Survey grid plots (installed 1994-1997), about 20 to 25 percent of Forest Service lands in western Oregon currently contain forest stands in which the average

age of the overstory trees is 120 years and older and the average diameter of overstory trees is 21 inches and larger (pers. comm. Moeur 2003).

The conversion of low-elevation forests in western Washington to plantations and non-forest uses may have eliminated a large portion of the fisher habitat in the state (Powell and Zielinski 1994). Because fire return intervals are relatively long in western Washington's wetter forests (up to 750 years), there were historically many mature and old-growth stands (Aubry and Houston 1992). Over 60 percent of the 24.7 million ac (10 million ha) of forest believed to be present in Washington when white settlers first arrived were probably potential fisher habitat (Lewis and Stinson 1998). The standing volume of sawtimber for 1869 is estimated to be 3.8 times the volume present today (Bolsinger et al. 1997). Nearly all the forests in the Puget lowlands and other readily accessible areas were logged by the early 1900s (Lewis and Stinson 1998). Since the 1930s, about 10 percent of the forest was converted to other uses (Bolsinger et al. 1997), and by 1992, the area of old-growth forest was reduced to 1.1 million ha (Bolsinger and Waddell 1993). During the last 50 years, the structure, composition, and landscape context of much of Washington's 16,803,100 ac (68,000 km^2) of commercial timberland has significantly changed because of intensive timber harvesting activities in the Pacific Northwest (Morrison 1988). Most of the remaining younger low and mid-elevation forest is fragmented and has reduced amounts of large snags and coarse woody debris, and may not be able to sustain fisher populations (Rosenberg and Raphael 1986, Lyon et al 1994, Powell and Zielinski 1994). The higher elevation forests are considered to be less suitable for fishers because of the restrictions of deep snowpacks (Aubry and Houston 1992; FEMAT 1993).

Some forest management practices change the dominance of certain forest subtypes in western states. For example, much of western Washington's original mixed-species stands were converted to managed stands of Douglas-fir (Lewis and Stinson 1998). Inventories in about 66 percent of western Washington timberlands in 1967 and 1991 indicate changes in species representation; western hemlock composed the highest percentage of growing-stock volume in 1967, but declined across all ownerships (Lewis and Stinson 1998). Western hemlock was one of the forest types fishers were historically associated with in Washington west of the Cascade Mountain crest. Bouldin (1999) provides evidence indicating that certain forest subtypes have increased their proportional dominance of the northern/central Sierra landscape over the 57-year span of his study data. He states the greatest change has been in the mixed conifer type, where the white fir-dominated subtype has increased by 37 percent of the type, accompanied by decreases in subtypes dominated generally by pines such as ponderosa and sugar pine subtypes, which have decreased in areal extent by an estimated 12 percent and 25 percent respectively. This change in forest structure is important when considering that certain habitat types or tree species may be less suitable for fishers (see section 2.4 Habitat).

Parsons and DeBenedetti (1979) state, "One hundred years of fire suppression in a mixed conifer forest [in Sequoia and Kings Canyon National Parks] which evolved with frequent natural fires has shifted successional patterns, increased the density of small trees, and produced an unnatural accumulation of ground fuels." Logging and fire suppression have led to higher densities of small trees which has led to higher insect and pathogen-induced mortality, the loss of structural diversity, and increased chances for stand-destroying fires (Bouldin 1999). The effects of these changes on fishers are not clear; apparently, the fisher's existence in this context has no precedence. Increased densities of trees may increase fire risk, but may enhance conditions for fishers.

In her study of fishers and habitat in the southern Sierra Nevada, Mazzoni (2002) described more recent changes attributed to timber harvest, fire, and succession within the period from 1958 to 1997 as resulting in a more fragmented habitat for fishers. Rosenberg and Raphael (1986) emphasize that the fragmentation of northwestern California Douglas-fir forests is relatively recent in comparison with forests of other regions, and that the true long-term responses of species to the break-up of their habitat cannot yet be discerned.

Continued loss of late-successional forest elements may put the fisher in its West Coast range at further risk. It is difficult to determine the current rate of habitat loss from all elements involved. Also, several factors make it difficult to determine the specific effects of habitat alteration on fishers in their West Coast range: (1) fishers are difficult to study because of their low densities and other traits; (2) until recently, most studies of fisher habitat were conducted in the eastern United States, and results may not translate well to the west; (3) many study designs may not incorporate the investigation of habitat quality at spatial scales to which fishers respond (Carroll 1997).

Silvicultural and vegetation management activities that remove overhead cover, large diameter trees, and coarse woody debris are risk factors for the fisher. These activities include various forms of forest management such as even-aged timber management, group selection, site preparation, thinning, salvage harvesting, hazard tree removal, fuelwood collection, and fuels reduction treatments. A silvicultural prescription consists of a combination of vegetation management treatments applied to forest stands to achieve a specified objective. Even-aged silviculture is used to regenerate a stand of trees of approximately the same age by harvesting stands in blocks that typically range in size from 20 to 30 ac. Harvest methods include seed tree removal, shelterwood removal, and clearcutting. Uneven-aged silviculture is used to harvest trees individually or in small groups, with the goal of developing or maintaining a variety of age classes within a stand. Typically, sites are restocked through natural regeneration or, where necessary, seedlings obtained from a nursery. Site preparation includes removing excessive amounts of slash and unwanted shrub and tree species on clearcuts through broadcast burning or mechanical methods, to ensure uniform planting of trees throughout the harvest unit and to reduce wildfire potential. Herbicides, pesticides, and fertilizers may be applied to control unwanted vegetation and pests. Young overstocked, even-aged stands may be thinned to redistribute the growth potential to conifer trees; stems are cut down and left on the site to decay. Commercial thinning may be applied to stands as young as 35 years. Harvested trees are removed from the site and commercially processed.

In areas subject to timber harvest, the effects of harvest on fisher habitat may be dependent upon the silvicultural prescriptions used, and to a lesser degree, the condition of the habitat prior to harvest. Loss of large contiguous habitat and loss of connectivity is a concern. Clearcutting, selective logging, and thinning changes the suitability of fisher habitat by removing overhead cover and insulating canopy, exposing the site to the drying effects of sun and wind (Buck et al.

1994) or to increased snow deposition, removing prime resting and denning trees, and increasing exposure of the fisher to predators. A shift to a predominance of younger-aged stands may cause fishers to spend more time traveling and foraging away from protective cover, exposing them to greater risk of predation. Management practices that result in open stands over large areas may result in xeric conditions unfavorable to fishers. The creation of large openings that fishers are reluctant to cross affects local fisher distribution and possibly limits population expansion.

Timber harvest may reduce the quantity and quality of important habitat components such as large green trees, snags, hardwood trees, and down logs. The elimination of woody debris and loss of understory cover can decrease prey abundance and negatively affect fishers (Allen 1987) because these components are used either directly by fishers or by their prey for breeding, feeding, or cover. Short stand rotations and selective logging of mature trees reduces the availability of large trees, and may reduce levels of seed or cone production which may also affect prey diversity or abundance. Clearcutting removes approximately 90 percent of the live stem volume, and the remaining 10 percent is small and decays rapidly leaving little down woody debris. Spies et al. (1988) state that, "Thinning operations in young stands reduce the inputs of CWD [coarse woody debris] from suppression mortality in the stand, and short rotations of 100 years or less keep accumulations low. One or two rotations after the harvest of old growth, most of the preharvest CWD is lost and accumulations of CWD remain very low, with . . . little or no large pieces." Salvage logging and hazard tree removal eliminates decadent trees and snags used for rest sites and dens, and removes the next generation of large down logs used for cover, resting, and foraging.

Fuels reduction treatments include thinning by mechanical means or by prescribed fire (underburning; controlled fire applied for specific management objectives) and, in some areas, the creation of defensible fuels profile zones (DFPZs) of protection. DFPZs are strips of land where the vegetation has been modified to a less dense fuel type, strategically located along ridgetops, roads, and other places where firefighters would best be able to contain wildland fires. Down woody debris, dense understory, snags, and low overstory tree crowns are removed in order to interrupt the pathway between a surface fire and the forest canopy. Because DFPZs are intended to be permanent on the landscape, the alteration of this habitat may significantly affect local fishers.

Prescribed burning is practiced on forest lands as a means to reduce risk of stand-replacing wildfire and to remove unwanted vegetation and logging slash after harvest. In general, prescribed burns tend to ultimately promote forest health, and can enhance suitability for wildlife, but because the size and intensity of individual prescribed burns are variable, it is difficult to generalize the risks to fishers associated with underburning. Small fires theoretically should not be detrimental to fishers because of their large home ranges (unless they impact natal dens during breeding season); however, fires can burn out of control or become hotter or more widespread than intended, and displace fishers or destroy habitat. Prescribed fire can consume habitat structural elements such as snags and downed logs that are important to fishers. In areas that have not burned in many years, there may be an accumulation of duff that can burn snags and girdle and eventually kill large trees if not physically pulled away from their bases. Reducing canopy cover and coarse woody debris over large areas or the disruption of habitat connectivity through thinning or prescribed fire may reduce habitat quality for fishers. The location of the prescribed burn in relation to other heavily impacted areas (such as clearcuts, development, recent burns) and other available suitable habitat could influence the degree of risk.

Loss of habitat from fire

The relationship between fuels reduction to prevent catastrophic wildfires and maintaining dense cover for fisher must be balanced in such a way as to maintain the habitat characteristics beneficial for fisher while still working toward promoting forests which are not prone to large scale or stand replacing wildfires. In our evaluation of threats regarding fuels reduction and catastrophic fire we analyzed the degree and scope of the habitat disturbance as it affects those habitat characteristics necessary for the fisher.

Habitat loss due to stand-replacing fire is a major threat in areas where fire suppression has raised the fuel load to excessively high levels. Stand replacing fires can impact large areas, and render them unsuitable for fisher for several decades (Lewis and Stinson 1998). Species that prefer the interior of forest patches will be negatively affected by severe fires that fragment older forests, whereas they may be positively affected by moderate or low intensity fires that increase old-growth structure (Carroll 1997). By increasing the risk of stand-replacing fire, the combination of increased tree density and standing tree mortality (with probable enormously increased surface/ground fuel loads) over the past century presents the greatest single threat to the integrity of Sierra Nevada forest ecosystems (McKelvey et al. 1996; USDA Forest Service 2000). These increases have led directly to the greatly increased high-severity fire risk over many millions of acres. During unusually dry and windy conditions, past wildfires and reburns destroyed the forest on millions of acres in the northern Rockies and Pacific Northwest (Lewis and Stinson 1998), as well as in the Sierra Nevada range. For example, the Yacoult fire of 1902 burned over 4047 km^2 (1 million ac) in the Lewis Valley of Washington and Oregon; the 1933 Tillamook Burn in Oregon burned 1259 km^2 (311,000 ac); the 1977 Marble Cone Fire in California burned 716 km^2 (177,000 ac); the Stanislaus Fire of 1987 in California burned 603 km^2 (149,000 ac); and the 2002 Manter Fire in California burned over 300 km^2 (74,000 ac) (National Interagency Fire Center 2003).

Current landscape conditions in forests managed for timber production may be qualitatively different from conditions caused by historical natural disturbance regimes (Carroll 1997). Before European settlement, landscape dynamics in Pacific Northwest forests were driven primarily by the patterns of wildfire (Wallin et al. 1996). Wallin et al. (1996) quantified the range of landscape conditions that existed historically (between the late 1400s and 1990) on two large watersheds in public forest lands managed for timber production in the Oregon Cascades. They found that present conditions are distinct from those that existed during most of the reconstructed pre-settlement era which included a greater abundance of older stands and much larger patch sizes with higher spatial and temporal variability in age-class distributions. Wallin et al. (1996) state that “Continued use of short (50- to 100-year) timber rotation lengths would push these watersheds even farther outside of this range [of conditions found historically]. The use of much longer rotation lengths (200+ years) could bring these watersheds back to within or very near this range of pre-settlement conditions." The Record of Decision for the NWFP states that, in the drier areas of Washington, Oregon, and California (i.e., the eastern Cascades, the California southern Cascades, and the Oregon and California Klamath Ranges), "fire control and timber harvest have decreased the abundance of some types of old growth, such as ponderosa pine, that are dependent on frequent, low-intensity fires. Other types of late successional forest that are less fire resistant or are less desirable for harvest have become more widely distributed. In these areas, the potential for stand-replacing wildfires has increased, resulting in a higher risk to the stability of current stands reserved for late successional species." (USDA Forest Service and USDI Bureau of Land Management 1994b)

Fire suppression policies have apparently altered the disturbance regime in some areas from one of frequent, low intensity fires of small areal extent to rare, high intensity fires of potentially large extent. While the former played a crucial role in maintaining a landscape where forests with large trees and multi-storied canopies were more common, the latter can result in large stand-replacing fires, resulting in habitat of little or no value to fishers (Lamberson et al. 2000). As a result of Euro-American influences such as fire suppression and forest management practices, Sierra Nevada forests are now denser, have fewer large trees, and lower basal area (Bouldin 1999). Most also have increased numbers of standing dead trees, which increases fire hazard. Shade-tolerant species have increased dramatically, creating dense stands with vertical fuel continuities, also leading to high fire hazards (Bouldin 1999). These changes have resulted in fishers existing in a context that has no precedence; while increased density of trees and woody debris ("fuel loading") increase risk of stand-replacing fire, they may also have resulted in enhanced habitat. Little research has been conducted on the effects of habitat change.

Livestock grazing

Grinnell (1937) noted the impacts of livestock grazing on the prey base of carnivores early in the twentieth century:

> Aside from the vegetarian beaver and muskrat, the majority of our most valuable furbearers are dependent in very large measure upon rodents for their food supply. Any factor that reduces the minimal quantity of rodents will inevitably affect unfavorably the dependent population of carnivores. Besides the direct influence, in this regard, of poisoning operations on uncultivated ground, we would stress the obvious limiting influence of the heavy grazing by domestic stock which has been prevalent upon our mountain slopes. In final analysis, the production of furs from a given wild area is limited by the quantity of the annual growth of grasses and other plants, especially the seed-producing ones. Thus the ultimate depletional effects of overgrazing are intensified in years of unusual drouth.

Forest disease and insect outbreaks

Mortality is a natural part of every forest. Smith and others (2001) state that:

> Usually, losses due to native insects, disease, and suppression occur at low and predictable rates. Little of this type of timber loss is harvested because the dead trees are widely scattered and do not provide concentrations of timber volume sufficient to support a profitable harvest operation. Timber volume loss to mortality can also occur in high concentrations in localized areas, through

> epidemic insect infestations such as gypsy moth and spruce budworm, wildfire, windstorms, and geologic events such as earthquakes or volcanic activity. Timber killed, but not destroyed, in such catastrophic events is often salvaged and utilized for timber products.

Although large area epidemics may cause localized displacement if canopy cover is lost, the usual pattern of localization and low density of insect and disease damage is probably not a great threat to fisher habitat. In some cases, the diseased trees are beneficial, providing structures conducive to resting and denning. Timber removal and thinning prescriptions in response to outbreaks, however, may fragment or degrade habitat. In addressing outbreaks of the mountain pine beetle (*Dendroctonus ponderosae*) and other insects in British Columbia, Weir (2003) states that reduction in overhead cover may be detrimental to fishers, but that wide-scale salvage operations may substantially reduce the availability and suitability of fisher habitat.

Sudden Oak Death, caused by a fungal-like water mold microorganism (*Phytophthora ramorum*) affects oaks and redwoods (Goheen 2001). Douglas-fir, tanoak, evergreen huckleberry (*Vaccinium ovatum*), Pacific madrone, and other plants have also been found to host *P. ramorum*. It is a potentially significant threat if it spreads into areas in which oaks are the primary trees used for fisher denning. The pathogen has killed thousands of oaks in coastal central California and has been located in southern Humboldt County (California Oak Mortality Task Force 2003). Four sites on federal, private industrial, and private nonindustrial forestlands in Oregon (near Brookings) have been confirmed as having Sudden Oak Death. The outbreaks at these sites affect from less than one acre to approximately 8 ac in size. Chances of continued introductions and establishment appear high in southwest Oregon and northwestern California because these areas have the hosts, the climatic conditions preferred by the pathogen, and many potential pathways for its movement. The areas at high risk for spread of Sudden Oak Death overlap areas fishers are known to occur and may have considerable impact to fisher populations if spread continues.

Development, Recreation, and Roads

The growth of urban areas and increased density of roads result in the loss and fragmentation of habitat. Other impacts of developments and roads as well as impacts on habitat are discussed in this section for the sake of cohesiveness.

Urban growth and development

According to Alig et al. (2003), forests are the largest source of land converted to urban and developed uses in the United States. In the Pacific coast states, the portion of land in forest dropped from 42 percent in 1630 to 38 percent in 1997 (Smith et al. 2001) Forest area in the Pacific coast region decreased by about 8.5 million ac between 1953 and 1997 (Smith et al. 2001). A large part of the decrease in forest area was due to conversion of forest to nonforest uses as a result of the region’s population increase, which in recent decades has been increasing faster than the national rate. Alig et al. (2003) state that “Forest cover area [in the Pacific coast states] is projected to continue to decrease through 2050, with timberland area projected to be about 6 percent smaller in 2050 than in 1997. Forest area is projected to decline in all three subregions [Washington, Oregon, and California]. Population and income are expected to further fuel development in the region, as population is projected to increase at rates above the national average, leading to more conversion of forest to nonforest uses." They also state that land prices for developable land in some cases may be much more than for nondeveloped uses which makes it questionable whether efforts to restrain urban spread and congestion are likely to have long-term effectiveness (Alig et al 2003).

Urban development can result in the loss and fragmentation of fisher habitat. Increasing human populations have resulted in urbanization and additional recreational pressures within forested areas. The human population doubled in the Sierra Nevada between 1970 and 1999 to 650,000; officials expect this number to triple again by 2040 (Duane 1996). Forty percent of this population growth occurred in El Dorado, Nevada, and Placer Counties (Duane 1996), where fishers are not presently detected in the central Sierra Nevada. Oregon's population is expected to grow 18 percent from the year 2000 to the year 2015, and Washington's population is expected to grow over 20 percent over the same time period. In all forest types in the Sierra Nevada, human settlement reduces tree canopy cover and density (McBride et al. 1996), key components of fisher habitat.

Rural and recreational development, such as campgrounds, recreation areas, and hiking, biking, off-road vehicle and snowmobile trails, may fragment fisher habitat. There have been significant increases in the number of people participating in outdoor recreational activities. For example, the number of people participating in camping in 1995 was 58 million nationwide, which is a growth of about 350 percent in the 35 years since the first national survey in 1960 (Cordell 1999). Between national surveys conducted in 1982 and 1995, developed camping grew about 42 percent, primitive camping grew by about 72 percent, and off-road driving grew about 44 percent (Cordell 1999). Although the relationship of recreational activities to wildlife species is not well understood (Knight and Gutzwiller 1995), these activities can adversely affect wildlife species. Recreational activities can alter wildlife behavior, cause displacement from preferred habitat, and decrease reproductive success and individual vigor (USDA Forest Service 2000). It is not clear, however, how results from studies on other species might apply to fishers and their habitat.

Fishers may be disturbed by construction, forest management, or recreational activities around resting or den sites. The use of vehicles, motorized equipment, helicopters, or blasting during the breeding season near occupied habitat has the potential to disrupt essential foraging or breeding behaviors by: 1) causing abandonment of the breeding effort by failure to initiate courtship or denning, 2) disrupting denning activity such as feeding young, and 3) causing premature dispersal of juveniles. A lack of breeding effort or breeding activity would negatively affect annual reproduction. Premature dispersal of juveniles may result in the increased likelihood of death or injury due to predation, lack of sheltering, or injury. A study of fisher habitat use on the Shasta-Trinity National Forest suggested that fishers use landscapes with more contiguous, unfragmented Douglas-fir forest and less human activity (Dark 1997).

Roads

Increased levels of road development and resulting traffic levels within forest areas result in habitat alteration and fragmentation. Roads result in barriers to dispersal, increased mortality from vehicle collisions, and increased exposure to human disturbances. Highways and associated developments can substantially influence movement patterns of wildlife (Bier 1995). The adverse effects of roads include direct loss of habitat, displacement from noise and human activity, direct mortality, secondary loss of habitat due to the spread of human development, increased exotic species invasion, and creation of barriers to fisher dispersal. The impacts of these effects on low density carnivores like fishers are more severe than most other wildlife species due to their large home ranges, relatively low fecundity, and low natural population density (Ruediger et al. 1999), and their general avoidance of non-forested habitats. The fragmentation of habitat with roads creates barriers to fisher dispersal. Disruption of movements can contribute to a loss of available habitat (Mansergh and Scotts 1989) while disruption of dispersal movements can isolate populations and increase the probability of local extinctions (Mader 1984). These effects can be magnified by human disturbance and changes in habitat configuration or composition due to past resource management practices, development, and recreation (Forman 1995). The loss of structurally complex forest (Beesley 1996) and the loss and fragmentation of suitable habitat by roads and residential development (Duane 1996) has likely played a significant role in both the loss of fishers from the central and northern Sierra Nevada and its failure to recolonize these areas.

Few features in the modern landscape have such a dramatic influence on patterns of human development, landscape changes, and habitat fragmentation as highways (Forman 2000). Highways have the potential to reduce the viability of metapopulations in two main ways: (1) within patches, highways can contribute to increased extinction rates by increasing mortality from motor vehicle collisions, increasing human disturbance, and decreasing availability of food or other resources by acting as barriers to intra-territorial movement, and (2) between patches of habitat, highways can modify behavior and decrease movement because of landscape barrier effects of direct mortality from motor vehicle collisions (Singleton et al 2002). The ecological effects of roads can resonate substantial distances from the road in terrestrial ecosystems, creating habitat fragmentation and facilitating ensuing fragmentation through the support of human extractive activities (Trombulak and Frissell 2000).

Areas with more roads may have increased fisher mortality due to road kill (Heinemeyer and Jones 1994). Given patterns of human population growth in areas near and within fisher habitat, road development and traffic, and associated mortality, can be expected to increase. Campbell et al. (2000) stated that many records of fisher locations are in the form of roadkills; for example, Yosemite National Park reported four fishers killed by automobiles between 1992 and 1998. Proulx et al.(1994), York (1996), and Zielinski et al. (1995, 1997a) all cite the risk of fishers being struck and killed by vehicles as a potential threat to populations. The potential for vehicle collisions increases with the density of open roads in suitable habitat. Vehicles caused the death of two of the 50 radio-collared fishers in a 5-year Maine study (Krohn et al. 1994), and three of 97 fishers in a 3-year study in Massachusetts (York 1996). Vehicle collisions could be a significant mortality factor, especially for small fisher populations. Off-highway and over-snow vehicles are used throughout the range of the fisher, and can also directly kill fishers or cause behavioral changes due to disturbance.

Vehicle traffic that occurs during the breeding season in or near late-seral habitat has the potential to disrupt essential foraging or breeding behaviors by: 1) causing abandonment of the breeding effort by failure to initiate courtship or denning, 2) disrupting denning activity such as feeding young, and 3) causing premature dispersal of juveniles. A lack of breeding effort or breeding activity would negatively affect annual reproduction. Premature dispersal of juveniles may result in the increased likelihood of death or injury due to predation, lack of sheltering, or injury. Dark (1997) found that fishers used areas with a greater than average density of low use roads more often, and may not have used areas that were dissected by moderate to high use roads. In a study of habitat associations of carnivores in the central and southern Sierra Nevada, Campbell (2004) found that sample units within the region fishers are known to occupy were negatively associated with precipitation, road density and habitat variability; this negative association with road density was significant at multiple spatial scales (from 2 km^2 to 30 km^2). In a stand-scale level study which examined the response of a species similar to the fisher, Robitaille and Aubry (2000) found that martens were less active near roads than away from roads. Paved roads are expected to cause more mortality than unpaved roads because of the higher use and speeds associated.

The access to forest areas provided by roads leads to increased human disturbances from activities such as logging, mining, grazing, hunting, trapping, recreation, and urban development. These disturbances result in an overall degradation of habitat integrity. Because fishers occur at relatively low elevations, they are likely to be directly affected by human activities (Campbell et al. 2000). Roads provide access for trappers who target other species, but might incidentally trap fishers (Lewis and Zielinski 1996), and allow for the increase of other human disturbances of surrounding areas (Trombulak and Frissell 2000). Roads built to support logging operations often remain open after harvest and allow increased human access. Roads and power line corridors also provide increased access for exotic species and human-habituated species such as the coyote which may compete for resources.

Beside resulting in increased habitat fragmentation, disturbance and mortality, and increased human access, road building in natural forest areas also results in increased erosion, air and water pollution, spread of invasive exotic species, and increased mortality of animals and plants (Trombulak and Frissell 2000). Roads degrade forest ecosystems by altering the environment, such as increasing temperature and light in surrounding areas, redirecting water flow, and polluting habitat with dioxins, hydrocarbons, and gasoline additives.

These projects are mostly located in mountain ranges where flowing water is abundant. The impoundments can inundate substantial portions of the most productive riparian habitat that is found within a watershed, causing significant local effects.

Riparian areas in fisher habitat in Washington, Oregon, and California have been directly removed or have had their functions impaired by many factors such as timber harvest, urbanization, construction of roads and railroads, gold mining, hydroelectric development, and livestock grazing. There are many hundreds of dams and reservoirs for hydroelectric projects, flood control, and water storage throughout the Cascade and Sierra Nevada mountain ranges. In the Sierra Nevada alone, reservoir inundation has created more than 150 gaps over 0.5 km long and eliminated at least 1,000 km of riparian corridor (Kondolf et al 1996). "Reservoirs drown existing riparian vegetation, and fluctuating water levels usually prevent the establishment of comparable new vegetation stands along reservoir margins. Thus, reservoirs constitute significant gaps in the riparian corridors. The largest reservoirs are located in the foothills [e.g., Shasta and Trinity Lakes], but reservoirs large enough to constitute significant gaps occur at virtually all elevations." (Kondolf et al. 1996). Weir (2003) states that "flooding of approximately 700 km^2 of valley bottom habitats along the Columbia River likely removed much of the capable habitat for fishers in many areas of the Kootenay region (B. Warkentin, pers. comm.)."

Other threats to habitat

Other threats to fisher habitat include wind, vulcanism, and climate change. Although rare, unusual occurrences such as extreme weather events and volcanic eruptions could directly impact large areas of fisher habitat. Severe wind storms that produce large blowdowns can impact large areas of forest, primarily in coastal areas. A hurricane hit the Olympic Peninsula in 1921 and leveled large areas of forest, and a 1962 windstorm felled 7 billion board feet of timber (Pyne 1982). The 1980 eruption of Mt. St. Helens in Oregon leveled large areas of forest with the initial blast and subsequent mudflows. Lassen Peak in California had a series of intermittent eruptions from 1914 until 1921, resulting in lava flows, massive lava-triggered mudflows, and explosive eruptions of steam and ash. These are only two of a string of volcanoes in the Cascade Range between northern California and southern British Columbia that are "active" (erupted at least once during historical times). It is generally accepted that a species occupying the periphery of its biogeographic range, occurring at mid to upper elevations is at the greatest risk from climate change; the fisher is at the southernmost extent of its range in the Sierra Nevada. Assuming that individuals in a species' southernmost extent already exist on the edge of environmental tolerances, climate change could severely impact fishers in California. These southern latitudes are the hottest and driest areas in which fishers are found; warmer temperatures may become intolerable. Warmer temperatures may also cause an upward altitudinal shift in forest habitat, but higher soils may not be as productive, preventing the formation of suitable habitat. However, temperatures and precipitation amounts could vary widely in different areas, making the effects of global warming difficult to predict, and there may be mitigating effects such as the increase in hardwoods which fishers use for resting and denning.

Conclusion – The Present or Threatened Destruction, Modification, or Curtailment of the Species' Habitat or Range

It is clear that much of the fisher's historical habitat has been lost to past timber harvest, fire, forest insect and disease outbreaks, development, recreation, hydroelectric projects, and roads. The extent of past timber harvest is one of the primary causes of fisher decline across the United States (Powell 1993), and may be one of the main reasons fishers have not recovered in

Washington, Oregon, and portions of California (Aubry and Houston 1992; Powell and Zielinski 1994; Lewis and Stinson 1998; Truex et al. 1998). It is difficult to determine the current rate and future predicted extent of factors contributing to the loss and fragmentation of habitat, and to determine, with present information, the precise level of threat of each of the factors. Very little research has been done regarding the effects on fishers of vegetation treatments, fire, or other habitat-altering factors, making it difficult to assess potential impacts. However, the combination of these factors continue to threaten the habitat of fishers with further loss and fragmentation.

4.2 Overutilization

Historical trapping has caused a severe decline in fisher populations and incidental trapping and poaching threaten the continued existence of fishers on the West Coast.

Aubry and Lewis (2003) state that overtrapping appears to have been the primary initial cause of fisher population losses in southwestern Oregon. Sumner and Dixon (1953) state that trapping has exterminated the fisher from large portions of its former range in California. The high value of the skins, the ease of trapping fishers (Powell 1993), year-round accessibility in the low to mid-elevation coniferous forests, and the lack of trapping regulations resulted in heavy trapping pressure on fishers in the late 1800s and early 1900s (Aubry and Lewis 2003).
A fur inventory at the Pacific Fur Company Astoria from 1813 to 1814 counted 106 fisher as well as many other species (Astoria Inventories 1823). From 1834 to 1838, the Hudson Bay Company shipped millions of furs, including fisher, from Oregon to China and England (Gaston 1912). In one shipment on November 20, 1843, a total of 668 fisher pelts were shipped out of Fort Vancouver (Fort Vancouver 1843). After 1843, the Hudson Bay Company subsequently withdrew from the region due to an exhaustion of furs (Clark 1927). Although furs became scarce in Oregon (Ward 1996), the fur trade in Oregon continued because it was an important source of revenue for settlers during the winter (Wright 1982, Mace 1970). A former trapper from the western Cascades of Oregon recalled in historical records that “Oregon was settled for the fur – the wildlife was quite plentiful; some are now extirpated. For instance, the fisher, there was quite a number of fisher and they were quite valuable, we got about $25.00 apiece for them. There were fur buying houses all over” (Payzant 1965). By the turn of the century, most of the furbearers, including beaver, were near extinction in Oregon. A report submitted by the Oregon State Advisory Committee on Wildlife (1936) blamed years of continual overtrapping for the fact that “furbearing species are only a pitiful remnant of former numbers,” and recommended taking immediate conservation measures. In 1936, the Chief of the U.S. Biological Survey, urged closing the hunting/trapping season for five years to save fisher and other furbearers from joining the list of extinct wild animals, noting that these species had disappeared from much of their former range in Oregon, Washington, and other states (USDA 1936).

Commercial trapping of fishers has been prohibited in Oregon since 1937, in California since 1946 (Aubry and Lewis 2003), and in Washington since 1933 (Lewis and Stinson 1998). Where trapping is legal in other states and in Canada, it is a significant source of mortality. Krohn et al. (1994), for example, found that over a 5-year period, trapping was responsible for 94 percent of all mortality for a population of the fisher in Maine. In British Columbia, the fisher is classified as a furbearing mammal that may be legally harvested, however, because the fisher's conservation status has recently been upgraded to "red-listed" (considered "imperiled" at the provincial level), the trapping season has been closed until it can be determined that the populations can withstand trapping pressure.

Fishers are considered one of the easiest furbearers to capture (Coulter 1966; Earle 1978; Powell 1993). Although it is currently not legal to trap fishers intentionally, they are often incidentally captured in traps set for other species (Earle 1978; Luque 1983; Lewis and Zielinski 1996). In a review of historical records in California, Lewis and Zielinski (1996) found that "fisher harvests were positively related to fisher pelt price, but were more strongly related to the number of trapping licenses sold, indicating that fishers were vulnerable to trappers in general as opposed to only those trappers specifically targeting them." In Washington, Oregon, and California, it is currently legal to harvest many mammals that are found in fisher habitat including bobcat (*Lynx rufus*), gray fox (*Urocyon cinereoargenteus*), coyote (*Canis latrans*), mink (*Mustela vison*) and other furbearers. Red fox (*Vulpes vulpes*) and marten (*Martes americana*) may also be trapped in Oregon and Washington. Incidental captures are not illegal provided the animal is released when possible, but these captures often result in crippling injury or mortality (Luque 1983; Strickland and Douglas 1984; Cole and Proulx 1994). There are apparently no State records kept of incidental captures in areas of current fisher occupation. USDA Animal and Plant Health Inspection Services (APHIS; 1994) reported that from 1989 to 1991, APHIS Wildlife Services incidentally caught a total eight fishers in traps, four of which were released and four of which were destroyed. Lewis and Zielinski (1996) estimated an incidental capture of 1 per 407 trap set-nights (number of set locations – where usually 1 or 2 leg-hold traps were set – multiplied by the number of nights when traps were set) and an average mortality-injury rate of 24 percent, based on reports from five practicing trappers in California (72 incidental fisher captures over 50,908 set-nights). During a two-season (1991-1992 and 1992-1993) trapping closure for fishers in British Columbia, trappers incidentally captured 302 fishers in traps set for other furbearers (M. Badry pers. comm. as cited in Weir 2003).

California (since 1998) and Washington (since 2000) currently have prohibitions against using body-gripping traps (leg-hold traps, conibear traps, and snares) for recreational or commercial trapping of furbearing or nongame mammals (CCR §465.5c; Washington Administrative Code (WAC) 232-12-141). This is expected to decrease injury and mortality associated with incidental capture. However, the use of body-gripping traps remains legal in Oregon. Washington's regulations direct trappers to release any unharmed wildlife, and state that "any wildlife that cannot be released unharmed must be left in the trap, and a WDFW representative must be notified immediately" (WAC 232-12-141). California's regulations state that any legally trapped animal be released immediately. Because fishers are not legal quarry, their capture and condition at release are rarely reported (e.g., Luque 1983).

Even low rates of additive mortality from trapping would negatively affect fisher population stability (Powell 1979, Lewis and Stinson 1998), and may slow or negate population responses to habitat improvement (Powell and Zielinski 1994). Powell (1979) reported that as few as one to four additional mortalities per year due to trapping over a 100 km^2 (39 mi^2) area could cause a significant decline in a reduced fisher population. Fisher conservation may be hindered by the lack of information on the amount and effects of incidental capture. The potential effects on fishers of legal trapping of other species may be significant when considered in conjunction with habitat loss and other sources of mortality.

Conclusion – Overutilization

In summary, information available suggests that historical trapping has caused a severe population decline, and current mortalities and injuries from incidental captures of fishers could be frequent and widespread enough to prevent local recovery of populations, or prevent the re-occupation of suitable habitat.

4.3 Disease or Predation

Disease

Fishers appear to exhibit a low incidence of external parasites (Powell 1993; Boroski et al. 1998), with only one species each of fleas, ticks, and mites identified to date (Hatler et al. 2003). Hatler et al. (2003) state that "they are known to carry several species of tapeworms and roundworms and at least one fluke, but none of those are known to be either chronic or a threat to fisher populations." They are susceptible to many viral-borne diseases such as rabies (Family Rhabdoviridae), canine and feline distemper (*Mobillivirus* sp.), and plague (*Yersinia pestis*). Contact between fishers and domesticated dogs and cats and other wild animals susceptible to diseases (raccoons, coyotes, martens, bobcats, chipmunks, squirrels, etc.) may lead to infection of fishers, however, the low densities of fisher populations may ameliorate the risk of transmission. Although specific information on fisher diseases is limited, three other mustelids, the black-footed ferret (*Mustela nigripes*), the marten, and the sea otter (*Enhydra lutris*), have had outbreaks of various parasitic, fungal, or bacterial diseases. An epidemic of canine distemper in black-footed ferret in 1985 led to the extirpation of the species from the wild (Thorne and Williams 1988). Martens in California were found to have been exposed to plague, probably transmitted by fleas from infected chipmunks and ground squirrels (Zielinski 1984). It was determined that infectious disease caused the deaths of 38.5 percent of the sea otters examined at the National Wildlife Health Center collected in California between 1992 and 1995 (Thomas and Cole 1996).

Predation

Mortality from predation could be a significant threat to fishers. Potential predators include mountain lions (*Puma concolor*), bobcats, coyotes, and large raptors (Powell 1993, Powell and Zielinski 1994, Truex et al. 1998). Although generalist predators such as bobcats and mountain lions are not common in dense forest environments, they can invade disturbed habitat. Healthy adult fishers are apparently not usually subject to predation, except for those that have been translocated (Powell and Zielinski 1994) to an unfamiliar area, or those in areas with less canopy cover and forest structure (Buck et al. 1994). Removing important sheltering habitat elements such as canopy cover and coarse down woody debris could allow predation to become a more significant factor. Powell and Zielinski (1994) and Truex et al. (1998), state that predation as well as human-caused death are significant sources of mortality. Of mortalities recorded by Truex et al. (1998), nine were suspected to be from predation and five were suspected to be human caused, including two vehicle collisions, two cases where the collar was cut (indicating poaching), and one fisher that died after being trapped in a water tank. Four fishers out of seven that died during a study by Buck et al. (1994) were killed by other carnivores; the death of one juvenile was suspected to be caused by another fisher. The most common known human-caused mortality factors for western fishers are road kills and incidental trapping, addressed in other sections.

Conclusion – Disease or Predation

Mortality from predation may be a significant threat to fisher populations when considering Powell's (1979) statement that the additive effects of one to four mortalities per 100 km² per year may jeopardize populations at equilibrium.

4.4 Other Natural or Manmade Factors Affecting the Continued Existence of the Species

Because of small population sizes and isolation, fisher populations on the West Coast may be in danger of extinction from inbreeding depression and unpredictable variation (stochasticity) in demographic or environmental characteristics such as factors included in the section on habitat loss (e.g., stand-replacing fire, timber harvest, and development), and other threats such as pest and predator trapping and poisoning, and accidental trapping in manmade structures.

Pesticides and toxins

It is well recognized that fisher populations in Oregon have declined and only limited numbers remain; population stability and viability are questionable (Marshall 1996). Trapping and the use of strychnine baits, used to eliminate wolves and control coyotes in the 1920s, combined to cause the fisher to decline (Marshall 1996) and few remained after the 1940s (Mace 1970). In addition to fur trappers, private hunters, and the bounty work of individual citizens, government trappers made enormous contributions to the campaign against predators. In the 1920s, the Biological Survey employed more than 80 government trappers working solely to exterminate predators in Oregon and Washington (Oregonian 1920). Grinnell et al. (1937) state that poisoning was the second most effective factor in depleting the numbers of furbearers in California (trapping being the first). They expressed concern for the future of furbearer populations (1937):

> Poison put out for squirrels is, we believe, the chief cause for depletion of fur-animal populations in many localities in California, and especially in the southern half of the State. As a rule, the fur animals die of secondary poisoning from eating the poison-killed seed-eating mammals, or of starvation caused by a too thorough removal of the smaller animals. These two factors operate in combination to make the local reduction in carnivores more certain.

In 1945, US Fish and Wildlife Service press releases reported that "in the relentless war against predators" a total of 1,884,114 predators were destroyed by federal control activities in the western U.S. since 1915 despite wartime handicaps; Oregon and California had the second and fifth largest amounts, respectively, of reported predators removed in the nation (USDI Fish and

Wildlife Service 1945). In 1957-58, federally funded hunters destroyed 22,802 predators in Oregon (ODFW 1958). The number of animals taken is likely underestimated because poisoned animals that die some distance from baits may not be found (Advisory Committee on Predator Control 1972). The USDI Fish and Wildlife Service cooperated with county agents, ranchers, USDA Forest Service, and the Oregon Game Commission in conducting aerial poisoning programs designed to reduce predator populations in numerous counties (Miller 1947, USDI Fish and Wildlife Service 1950).

Predator control agents began using strychnine poisons prior to 1920 (Gildemeister 1992). Non-target furbearers, including fishers, were killed by the aerial poisoning of predators. One of the most common practices throughout the National Forests and on National Refuge lands was to broadcast horse meat from an airplane along with open tins of lard pellets with strychnine pills inside (Miller 1947; USDI Fish and Wildlife Service 1952). Based on the large number of coyotes killed, the aerial method of dropping poison over large areas was considered an effective way to control predators, although non-target species such as birds of prey also died from ingesting the strychnine pellets (Miller 1947). Remote backcountry areas that had seldom been visited before by predator control officers or free lance predator trappers were being impacted by aerial predator control (Miller 1947), and it negatively impacted non-target species (Environmental Defense Fund 1982). Tim Schommer (pers. comm. 2000) interviewed local residents and found that poison bait stations were distributed onto virtually every ridge system on the National Forests in Oregon.

M-44 cyanide-ejecting traps, poison baits, steel traps, and firearms were also used to control predators (USDI Fish and Wildlife Service 1950). The M-44, currently still in use, is a small steel cylinder with a baited trigger that, when pulled, ejects sodium cyanide into an animal's mouth and releases sodium cyanide gas upon contact with moisture. Leghold traps are discussed in section 4.2 (Overutilization). Beginning in 1930, bait infused with sodium monofluoroacetate, a highly lethal poison known as compound 1080, was widely distributed across the landscape in areas that are sparsely inhabited and not generally frequented by the public in order to intercept wide-ranging predators (USDI Fish and Wildlife Service 1950). In the 1950s and 1960s, stations baited with 1080 poison were widely used (Gildemeister 1992), and massive programs to poison porcupines (strychnine salt blocks) and ground squirrels (1080 coated grain) resulted in the secondary poisoning of many mesocarnivores (Barrett 1997). In 1972, EPA cancelled registration of products containing 1080 due to its hazardous impact on non-target animals (Environmental Defense Fund 1982) such as rare carnivores and raptors. In a report that reappraised the problem of animal control, Aldo Leopold and others (1964) expressed the following concerns:

> Many animals that have never offended are killed unnecessarily. The federal government, the states, the counties, and livestock associations all have predator control programs; bounties are still paid by a number of states and counties. Many animals are taken inadvertently and there is much damage due to secondary poisoning. . . . We recommend entirely eliminating the broadcast distribution of poison baits and we find no justification whatsoever in the payment of bounties. Much of the unnecessary and unjustified killing of wildlife in the western US is also resulting from the use of steel traps set for coyotes.

Predator control is relevant to the fisher, because fishers would have occupied many of the same areas where 1080, strychnine, M-44s, and traps were used, and fishers were likely killed by these methods. For example, the USDA APHIS (1994) documented that four fishers were unintentionally killed in the early 1990s by predator control activities. In addition to direct mortality from ingestion of poisoned bait, there is the potential for secondary poisoning from eating prey killed by poisons. Strychnine-laced rolled oats and milo are used to control pocket gophers and ground squirrels in and near forest plantations. Many National Forests use gopher bait and ground squirrel poisoning to protect tree seedlings from being damaged (pers. comm. Zalunardo 2000). Until 1989, strychnine-laced salt blocks were used by USDA APHIS Wildlife Services in coniferous forests to control damage by porcupines, being placed in cubbies at the bases of trees, or attached to the trunk above one of the large branches (USDA APHIS 1994). This type of control is still legal for use, and may be used on some national and private forests, and is a threat to fishers since their ingestion directly of the poison or of intoxicated animals and carcasses could result in mortality. There are no estimates of the number of fishers killed due to direct or secondary poisoning, but it may have contributed to the reduction of fisher populations already impacted by bounty programs, trapping for the fur trade, and other factors already mentioned.

The reduction of prey from control methods may have had an impact on the abundance and distribution of fishers, although this information is not available. The predator bounty system, initiated as early as the 1840s (USDA Forest Service 1957), was a system whereby the government provided a financial incentive for citizens to trap and kill predators and rodents. In Washington, the First Washington Territorial Legislature gave counties the authority to offer a bounty for killing “wild animals” in 1854; the amount of the bounty and the definition of “wild animal” was left up to each county (Washington Historical Records Survey 1941). Bounties were placed on predators such as mountain lions, bobcats, and gray foxes to protect livestock, and on other animals such as squirrels, gophers, moles, porcupines and jack-rabbits to reduce damage to trees and crops. The USDI Fish and Wildlife Service, county agents, ranchers, USDA Forest Service officers, and State game agencies also conducted extensive rodent control programs designed to reduce populations in many counties (USDI Fish and Wildlife Service 1950). Thousands of porcupines are recorded in predator bounty claim registers (e.g., Jackson County 1901-1968). In Oregon during fiscal year 1988, USDA APHIS Wildlife Services destroyed 672 porcupines in Oregon (USDA APHIS 1994). Porcupines continue to be killed by private landowners and USDA Forest Service personnel. The decline of various prey species may have exacerbated the impact of predator bounties and overtrapping of fisher.

Other causes of mortality

There have been several incidents of fishers being found dead in water tanks left open. The remains of eight fishers were discovered in an abandoned water tank near a logging road in the northwestern California Coast Ranges (Folliard 1997). The tank had been used to store water for transferring into tank trucks to spread on roads for dust abatement during summer months. The fishers had entered the cylindrical 13-foot-long, 7.5-foot-deep tank from a lidless, 1.5-foot opening in the top. Fisher remains were the only species found inside. It was apparent from the carcasses’ different stages of decay that the fishers had been trapped over a period of several years. In another instance of a manmade structure trapping fishers, Truex et al. (1998) reported that a 5-year-old female fisher died in the southern Sierra Nevada study area due to a combination of starvation and exposure after becoming entrapped in an uncovered, empty water storage tank. The attraction for fishers to openings is cause for concern and may have been one of the factors contributing to their present low numbers; there are thousands of mines in the Sierra Nevada range with vertical digs and vents which could entrap fishers.

Population size and isolation

Preliminary analyses indicate West Coast fisher populations, particularly in the southern Sierra, may be at significant risk of extinction because of several factors including small population size, isolation, low reproductive capacity, demographic and environmental stochasticity, and ongoing habitat loss (Lamberson et al. 2000, Drew et al. 2003). A scarcity of sightings in Washington, Oregon, and the northern and central Sierra Nevada of California suggests that fisher is extirpated from most of their historical range in Washington, Oregon, and California (Zielinski et al. 1997b; Carroll et al. 1999; Aubry et al. 2000) (see section 2.4 Population Size). The southern Sierra Nevada and northern California/Oregon Siskiyou populations may be the only naturally-occurring, known breeding populations of fishers in the Pacific region from southern British Columbia to California (Zielinski et al. 1997b).

The current rarity of fishers in Washington brings their continued existence there into question. Eleven years ago, Thomas et al. (1993) stated that existing fisher populations in northern Oregon and Washington were at a medium to high risk of extirpation on National Forest lands within the next 50 years. According to the Forest Ecosystem Management Assessment Team (FEMAT 1993), it was unknown whether the individual fishers that may exist in Washington could repopulate the State in the future. The fisher population in Washington may have been kept from recovering by a combination of factors, including a reduction in quality and quantity of habitat due to development and logging, past predator and pest control programs, low inherent reproductive capacity of the species, and demographic and genetic effects of small population size (Lewis and Stinson 1998). Recovery of the fisher in Washington will probably not occur without reintroductions (Lewis and Stinson 1998). Immigration of fishers into Washington from British Columbia, Idaho, or Montana is unlikely to provide significant demographic support to Washington's fisher population; fisher populations in adjacent parts of Idaho and British Columbia are small, the number of dispersing individuals is probably very low (Heinemeyer 1993), and the geographical separation is large. Reintroductions have apparently been successful in some, but not all other parts of the fisher's national range.

The introduced population in the southern Cascades of Oregon is small and isolated. It stems from the release of 28 fishers from British Columbia between 1961 and 1980, and an additional release of 13 fishers from Minnesota in 1981 (Aubry et al. 2002, Drew et al. 2003). Aubry et al. (in press 2003) concluded, "The high degree of relatedness among fishers in the southern Cascade Range (R = .56) is consistent with the hypothesis that this population is small and isolated." This reintroduced population is separated from the northwestern California/southwestern Oregon population by large expanses of non-forested areas, an interstate highway (Interstate 5), recreational developments, and densely populated areas. The isolation of these populations from each other in Oregon is further demonstrated by evidence indicating that there has been no genetic exchange between fishers in the northern Siskiyou Mountains and those in the southern Cascade Range (Aubry et al. in press 2003). Small size and isolation make the Oregon populations vulnerable to extinction.

Because of the apparent loss of viable fisher populations from most of Oregon and Washington, and the northern contraction in the British Columbia populations, fishers in California are reproductively isolated from fishers in the rest of North America. This isolation precludes both immigration and associated genetic interchange, increasing the vulnerability of the California/southern Oregon populations to the adverse effects of deterministic and stochastic factors. Wisely et al. (in litt. 2003) documented that fishers in northern California already have lower genetic diversity than other populations in North America. Drew et al. (2003) cites evidence of genetic divergence between the California and British Columbia fisher populations; since becoming isolated, the California populations have lost a genetic haplotype still found in British Columbian fishers. The genetic divergence of CA populations from each other and from BC fishers could be associated with adaptation to local conditions, but is more likely the result of reduction of population numbers with habitat loss (Drew et al. 2003). Furthermore, isolation makes it unlikely that in the event of population decline, immigration from other populations could temporarily augment the population, rescuing it from extinction.

Genetic studies using mitochondrial and nuclear DNA sequencing indicate that California populations, in particular, differ strongly in haplotype frequencies from each other and from all other populations (Drew et al. 2003). These results are consistent with the conclusions of Aubry and Lewis (2003) that native populations in California and the reintroduced population in southwestern Oregon have become isolated from the main body of the species' range due to the apparent extirpation of fishers in Washington and northern Oregon. According to Drew et al. (2003), their findings suggest that gene flow once occurred between fisher populations in British Columbia and those in the Pacific states, but extant populations in these regions are now genetically isolated. The southern Sierra Nevada population is geographically isolated from others by approximately 420 km (260 mi) (Zielinski et al. 1995, 1997b). There is a low probability that it could be rescued through migration of individuals from other populations were it to decline, since the gap to the nearest is almost four times the species' maximum dispersal distance of 66 mi (107 km) as reported by York (1996). The unexpected magnitude of Pacific states fishers' genetic structure and lack of gene flow indicates that intermediate distances may represent evolutionarily important barriers to movement that can facilitate rapid genetic divergence (Wisely et al. in litt. 2003). Truex et al. (1998) concluded that, "Recolonization of the central and northern Sierra Nevada may be the only way to prevent fisher extinction in the isolated southern Sierra Nevada population."

Indications that extant fisher populations are small in size include the apparent reduction in the range of the fisher on the West Coast, the lack of detections or sightings over much of its historical distribution, and the apparently high degree of genetic relatedness within some populations. Small fisher population sizes are cause for concern, particularly considering that the West Coast populations are isolated from the larger continental populations and may have high female mortality (Truex et al. 1998). Small populations are at risk of extinction solely from demographic and environmental stochasticity, independent of deterministic factors such as anthropogenic habitat loss (Lande and Barrowclough 1987, Lande 1993). Random fluctuations in gender ratio, fecundity, mortality, droughts, cold weather, heavy snow years and other temporal environmental changes can lead to declines that, in small populations, result in rapid extinction. These factors present threats to the long-term survival of isolated populations such as the southern Sierra Nevada population (Lamberson et al. 2000). Catastrophes, such as stand-replacing fire or severe storms, magnify risk of extinction further (Shaffer 1987, Lande 1993).

According to Heinemeyer and Jones (1994), the greatest long-term risk to the fisher in the western United States is probably population extinction due to isolation of small populations. Fishers are known to be solitary and territorial with large home ranges. This results in low population densities as the population requires a large amount of quality habitat for survival and proliferation. Additionally, fishers are long-lived, have low reproductive rates, and small dispersal distances (see 2.5 Ecology). Given the apparent reluctance of fishers to cross open areas (Coulter 1966; Kelly 1977; Powell 1977; Buck et al. 1994; Jones and Garton 1994), and the more limited mobility of terrestrial mammals relative to birds, it is more difficult for fishers to locate and occupy distant, but suitable, habitat. These factors together imply that fishers are highly prone to localized extirpation, their colonizing ability is somewhat limited, and their populations are slow to recover from deleterious impacts. Isolated populations are therefore unlikely to persist.

Some fisher populations in northeastern North America have shown patterns of rapid density fluctuation consistent with those following cycles in prey numbers (deVos 1952; Rand 1944), or with changes expected for animals whose density-dependent feedback comes through changes in mortality rather than in reproduction, allowing them to recover into areas from which they had been extirpated. Western populations, however, do not appear to be recovering from early overtrapping and habitat degradation. Powell and Zielinski (1994) state:

> This pattern of rapid population increase has not been observed in western populations, many of which have failed to recover despite decades of protection from trapping (e.g., northern Sierra Nevada, Olympic Peninsula), reintroductions (e.g., Oregon), or both. Therefore, one or more major life requisites must be missing. Suitable habitat may be limited, colonization of suitable habitat may be limited due to habitat fragmentation, or some other factor or combination of factors may be involved.

Low fecundity retards the recovery of populations from declines, further increasing their vulnerability. As stated above, fishers have very low reproductive capacity. After two years of age, they generally produce only one to four kits per year, and only a portion of all females breed (Powell 1993, Truex et al. 1998, Lamberson et al. 2000). Truex et al. (1998) documented that of the females in the southern Sierra Nevada study area (one of three study areas that they analyzed in California), about 50 to 60 percent successfully gave birth to young. In the study area they analyzed on the North Coast, however, 73 percent of females gave birth to young in 1995, but only 14 percent (one of seven) did so in 1996, indicating fisher reproductive rates may fluctuate widely. Low survival rates for kits, coupled with low reproductive rates, would result in very low reproductive success rates. In their study on the west slope of the Cascade Range in southern Oregon, Aubry et al. (2002) radio-collared 13 females and monitored two to four adult females each year from 1995 to 2001. Although their data are preliminary at this point, they found that the average annual reproductive success was only 44 percent.

Female survival has been shown to be the most important single demographic parameter determining fisher population stability (Truex et al. 1998, Lamberson et al. 2000). Truex et al. (1998) documented a low annual survival rate, pooled across years, of 61.2 percent of adult female fishers in the southern Sierra Nevada from 1994 to 1996, 72.9 percent for females and 85.5 percent for males in their eastern Klamath study area, and 83.8 percent for both females and males in their North Coast study area. Addressing the southern Sierra Nevada population, Truex et al. (1998) conclude that, "High annual mortality rates raise concerns about the long-term viability of this population."

Lamberson et al. (2000) used a model (deterministic, Leslie stage-based matrix) to gauge risk of extinction for the southern Sierra Nevada population of the fisher and found that the population has a very high likelihood of extinction given reasonable assumptions with respect to demographic parameters. They concluded, "In our model population, growth only occurs when parameter combinations are extremely optimistic and likely unrealistic: if female survival and fecundity are high, other parameters can be relaxed to medium or low values. If female survival and fecundity are medium and all other parameters high, a steady decline toward extinction occurs."

As with any small, isolated population, risks of extinction are enhanced by stochastic factors (Lamberson et al. 2000). Demographic stochasticity, the chance events associated with annual survival and reproduction, and environmental stochasticity, temporal fluctuations in environmental conditions, tend to reduce population persistence (Shaffer 1981, Boyce 1992). Habitat specificity coupled with human-induced habitat fragmentation may also contribute to the exceptionally low levels of gene flow (migrants per generation) estimated among populations of fishers (Wisely et al. in litt. 2003). Wisely et al. (in litt. 2003) found that populations of the fisher exhibit high genetic structure (FST = 0.45, SE = 0.07) and limited gene flow (Nm < 1) within their >1600-km-long peninsular distribution down through Washington, Oregon, and California. They state concerns about the future viability of the western fisher:

> . . . we found that . . . genetic diversity decreases from the base [British Columbia] to the tip [southern Sierra Nevada] of the peninsula, and that populations do not show an equilibrium pattern of isolation-by-distance. Genetic structure was greater at the periphery than at the core of the distribution and our data fit a one-dimensional model of stepping-stone range expansion. Multiple lines of paleontological and genetic evidence suggest that the fisher recently (< 5000 ybp) expanded into the mountain forests of the Pacific coast. The reduced dimensionality of the distribution of the fisher in the West appears to have contributed to the high levels of structure and decreasing diversity from north to south. These effects were likely exacerbated by human-caused changes to the environment. The low genetic diversity and high genetic structure of populations in the southern Sierra Nevada suggest that populations in this part of the geographic range are vulnerable to extinction.

It is difficult for subpopulations to rescue each other when distributed in such a narrow, linear fashion north-south peninsular distribution. Even isolated from other threats, the north-south peninsular distribution of fishers in the Sierra Nevada is a risk factor for the southern Sierra Nevada population. Being at the southernmost extent of the genus' distribution, the population already exists at the edge of environmental tolerances. The loss of remaining genetic diversity may lead to inbreeding and inbreeding depression. Given the recent evidence for elevated extinction rates of inbred populations, inbreeding may be a greater general threat to population persistence than is generally recognized (Vucetich and Waite 1999).

Combinations of factors can interact to produce significant cumulative risk. Lamberson et al. (2000) give the following example: if demographic stochasticity results in lower than average recruitment of female kits into a population for three consecutive years, and this is followed by two heavy-snow winters and one large fire, the population may quickly become in jeopardy of local extinction. Wisely and others (in litt. 2003) "have demonstrated isolation among populations with limited exchange suggesting that populations on the Pacific coast have little demographic buffer from variation in the population growth rate. Immediate conservation action may be needed to limit further erosion of the unique genetic architecture found in this one-dimensional metapopulation."

Conclusion – Other Natural or Manmade Factors

Unregulated trapping for furs began in the 1700s; predator bounties began in the 1800s and extended to 1960; extensive, lethal predator control programs were used until the mid-1970s. These factors have likely impacted fishers for nearly two centuries and are now exacerbated by loss and fragmentation of habitat from urban growth and development, forest management activities, and road construction. Potential threats include mortality from vehicle collisions, continued pest and predator trapping and poisoning, accidental trapping in manmade structures, inbreeding depression, and demographic or environmental stochasticity. There is substantial information indicating that the interaction of all the factors above may allow the populations of fishers in their West Coast range to become significantly at risk of extirpation.

4.5 The Inadequacy of Existing Regulatory Mechanisms

Although existing regulatory mechanisms provide some benefits to the fisher, they may not provide sufficient certainty that conservation efforts will be implemented or that they will be effective in reducing the level of threat to the fisher. Although many States, Tribes and Federal agencies recognize the fisher as a species which has declined substantially, their use of available regulatory mechanisms to conserve the species is limited. There are *no* regulatory mechanisms that address the management or conservation of functional fisher habitat, although the states in the petitioned area provide the fisher with some protections from hunting and trapping, and some regulatory mechanisms with other purposes incidentally provide limited conservation benefits for the species.

The fisher is not listed or regulated under the Convention on International Trade in Endangered Species (CITES), a treaty established to prevent international trade that may be detrimental to the survival of plants and animals.

4.5.1 States

4.5.1.1 California

4.5.1.1.1 Management of California State Lands

The State of California manages relatively little forested lands. California has eight Demonstration State Forests totaling 71,000 ac, of which less than 20,000 ac are within the current range of the fisher. These forests are managed primarily to achieve maximum sustained production of forest products, not for late-successional characteristics, and appear to provide little conservation benefit to the fisher. California has about 270 State Park units and 1.3 million ac, which are mostly outside the historical range of the fisher and appear to provide little conservation benefit for fishers. The largest state park in the fisher's historical range, Humboldt Redwoods State Park, includes about 53,000 ac in southern Humboldt County and has a Preliminary General Plan (June 2001) with a stated goal of protecting California species of concern, but it does not include specific measures for fisher management.

4.5.1.1.2 California Regulations

The State of California classifies the fisher as a furbearing mammal that is protected from commercial harvest, which provides protection to the fisher in the form of minor fines for illegal trapping; trapping is discussed further under Factor B, Overutilization. The fisher is not listed under the California Endangered Species Act or as a State "fully protected" species, thus does not receive protections available under those regulations.

The California Department of Fish and Game (CDFG) has identified the fisher as a Species of Special Concern (CDFG 1986). This status is applied to animals not listed under the Federal or the State endangered species acts, but judged vulnerable to extinction. The designation does not provide legal status or enforceable protections.

In 1970, the State of California enacted the California Environmental Quality Act (CEQA). CEQA requires disclosure of potential environmental impacts of public or private projects carried out or authorized by all non-federal agencies in California. CEQA guidelines require a finding of significance if the project has the potential to "reduce the number or restrict the range of an endangered, rare or threatened species" (CEQA Guidelines §15065). The lead agency can either require mitigation for unavoidable significant effects, or decide that overriding considerations make mitigation infeasible (CEQA §21002), although such overrides are rare. CEQA can provide protections for a species that, although not listed as threatened or endangered, meets one of several criteria for rarity (CEQA §15380). To date, this CEQA provision has apparently not been used to protect the fisher or its habitat (pers. comm. Moore 2003; pers. comm. Osborn 2003; pers. comm. Richter 2003). Therefore, although CEQA includes provisions which could be used to protect a rare species such as the fisher, it is not used for this purpose and thus is not an effective regulatory mechanism for conserving the species.

Regulatory Mechanisms for Private and State Timberlands

In California, logging activities on commercial (private and State) forestlands are regulated through a process that is separate from but parallel to CEQA. Under CEQA provisions, the State has established an independent regulatory program to oversee timber management activities on commercial forestlands, under the Z'berg-Nejedly Forest Practice Act of 1973 and the California Forest Practice Rules (FPRs) (CDF 2003). The results of regulation, however, are similar to those under CEQA, with little or no actual protection afforded the species, and minimal protection of fisher habitats on commercial forestlands. The California FPRs are administered by the California Department of Forestry and Fire Protection (CDF), and apply to commercial harvesting operation for non-federal, non-tribal landowners of all sizes.

The rules require management of California's commercial forestlands to produce a long-term sustained yield of forest products, primarily saw logs, and require preparation and approval of timber harvest plans before logging operations may commence. The rules also require "due consideration of watershed, recreation, wildlife, range, aesthetic, and fishery values", and that where significant impacts to non-listed species may result, the harvest plan "shall incorporate feasible practices to reduce impacts" (FPR §919.4, 939.4, 959.4).

Some timber operations, such as salvage, fuelwood harvest, powerline right-of-way clearing, and fire hazard reduction are exempt from timber harvest plan preparation and submission requirements. CDF considers applications for exemptions as ministerial in nature, and therefore exemptions receive minimal review by the CDF. In 2002, new rules were passed that prohibit the harvest of large old trees under exemptions, although harvest is still allowed in cases of safety, building construction, or when the tree is dead or will be dead within 1 year.

California's FPRs are not effective at protecting fishers or their habitat. While the FPRs may incidentally protect some habitat or habitat elements used by the fisher, the rules do not require fisher surveys, protection of fisher or fisher den sites, or a mechanism for identifying individual or cumulative impacts to the fisher or its habitat. The FPR focus on timber production does not encourage protection of the key elements of fisher habitat discussed above under "Habitat."

The California FPRs provide specific, enforceable protections for species listed as threatened or endangered under California Endangered Species Act or the Federal Endangered Species Act, and for species identified by the California Board of Forestry as "sensitive species" (CDF 2003); however, the fisher is not currently on any of these lists, nor has the species received FPR protection through use of CEQA section 15380. The FPRs also include intent language about reducing significant impacts to non-listed species (FPR §919.4, 939.4, 959.4) and maintaining functional wildlife habitat (FPR §897(b)(1)). This language has not been effective in securing protections for the species, due to the lack of specific enforceable measures in the rules, and because FPR language (§1037.5(f)) makes it difficult for CDF to adopt mitigation measures above those specified in the California FPRs, unless the landowner agrees to them. In comments to CDF on timber harvest plans in northwestern California, CDFG has raised concerns regarding adverse effects on fishers and other species associated with late seral habitat elements and recommended retention of such elements. These efforts have generally not been successful in effecting mitigation measures for the fisher and other late-seral species (pers. comm. Moore 2003; pers. comm. Osborn 2003).

Some California FPR provisions could incidentally contribute to protection of important elements of fisher habitat, such as late seral forests and the snags, downed wood, and large live trees containing the structural attributes that are used by fishers for resting and denning sites and contribute to the diversity and abundance of prey species. These are discussed below.

The California FPRs require that all snags within a logged area be retained to provide wildlife habitat, but also allow broad discretionary exceptions to this requirement, greatly reducing the effectiveness of the snag retention requirement. The FPRs do not require the retention of downed woody material, making retention of these structural elements voluntary. Similarly, the California FPRs do not contain enforceable measures for protection of decadent or other large trees with structural features used by fishers and their prey, such as platforms, cavities, and basal hollows, and which appear to be important components of fisher habitat. An exception, noted above, is the 2002 rule prohibiting the harvest of large old trees under exemptions, but this prohibition only applies to very limited situations.

California's Forest Practice Rules provide for disclosure of impacts to late successional forest stands, in some cases. The rules require information about late successional stands to be included in a timber harvest plan when late successional stands over 8 ha (20 ac) in size are proposed for harvesting and such harvest will "significantly reduce the amount and distribution of late succession forest stands" (FPR §919.16, 939.16, 959.16). If the harvest is found to be "significant", FPR §919.16 requires mitigation of impacts where it is feasible. In practice, such a finding during plan review is very rare and likely to be successfully challenged by the landowner. Also, few proposed harvests trigger the late successional analysis because very little forest on commercial timberlands meets the definition of late successional forest, due to past logging history (pers. comm. Babcock 2003).

The California FPRs require retention of trees within riparian buffers to maintain a minimum canopy cover, dependant on stream classification and slope. The FPR prescriptions are not designed or intended to provide late seral habitat, but this may occur at times. The rules currently mandate retention of large trees in watersheds identified as having "threatened or impaired" values (watersheds with listed anadromous fish). For Class I (fish-bearing) streams, the 10 largest conifer trees per 330 feet of stream channel must be retained along qualifying watercourses. These trees are retained within the first 50 feet of permanent woody vegetation measured out from the stream channel; this provides about 26 trees per acre within that zone. There are no additional protection measures required for non-fish-bearing streams (classes II and III) within "threatened or impaired" watersheds. The threatened and impaired provision applies to many streams within the fisher's range in northern California, but not to most of the Sierra Nevada nor to most of the upper Trinity River basin (where fishers still occur), and is set to expire in 3 years. Where applied, the threatened and impaired rules should result in the retention of some large trees of value to fishers, although the protective value is limited, as it applies to only a small part of any affected watershed, and in a fragmentary pattern. Averaged over the landscape, the measure provides on average less than one retained tree per forested acre in qualifying watersheds, based on an evaluation of a sample of timber harvest plans (pers. comm. Osborn 2003), and on USDI Fish and Wildlife Service calculations on watercourse density on commercial timberland ownerships in northwestern California. Also, in many watersheds, few large trees remain along watercourses, thus most of the trees retained under this measure are likely to be of a size and age that provide little current value as late seral elements commonly used by fishers. Over time, the retained trees may develop late seral and decadent characteristics, but this is likely to take place over time scales of decades and centuries.

Outside of “threatened and impaired” watersheds, watercourse protection measures are limited. Class I streams must retain at least 50 percent of the overstory and 50 percent of the understory. No minimum canopy closure requirements are specified for Class II and Class III streams. Harvest plans are required to leave 50 percent of the existing total canopy including understory, and provide no protection for large trees or other late-seral habitat elements.

4.5.1.2 Oregon

4.5.1.2.1 Management of Oregon State Lands

In Oregon, two final forest management plans for state forests in northwest and southwest Oregon were approved by the Oregon Board of Forestry in January 2001: the Northwest Oregon State Forests Plan and the Southwest Oregon State Forests Plan. The Elliott State Forest Management Plan was approved in 1994 and the Elliott State Forest Habitat Conservation Plan for northern spotted owls and marbled murrelets was approved in 1995, however, both the management plan and habitat conservation plan are now being revised. Additionally, Oregon has proposed to develop the Western Oregon State Forests Habitat Conservation Plan for threatened and endangered species and other species of concern on western Oregon state forests in 2004-2005.

The management plans for Oregon’s State Forests generally appear to be of little benefit to the fisher. The 18,074 ac (73 km^2) of state forest lands in the Southwest Oregon State Forests Plan area consists of generally small parcels that range in size from 40 ac to 3,500 ac (0.16 km^2 to 14 km^2) and are widely scattered. There are no specific measures for or mention of the fisher in the plan. The Northwest Oregon State Forests Management Plan provides management direction for 615,680 ac (2,491 km^2) of state forest land, located in twelve northwest Oregon counties, but also has no specific provisions for fishers. Both plans include provisions to protect some forest reserves, but these are not likely to benefit the fisher because of the fragmented nature of the lands.

4.5.1.2.2 Oregon Regulations

In Oregon, the fisher is designated a protected non-game species, and is listed as a “Sensitive Species – Critical Category.” The Oregon Department of Fish and Wildlife does not allow take of fisher in Oregon, but some fishers may be injured and killed by traps set for other species. Training and testing is required of applicants for trapping licenses in order to minimize the potential take of non-target species such as fisher.

The Oregon Department of Forestry implements the Forest Practice Administrative Rules and Forest Practices Act (Oregon Department of Forestry 2000). These rules contain no specific provisions to protect fishers or fisher habitat, but they do protect sensitive wildlife sites that are designated by Oregon Department of Forestry. Although not specified, a den site could potentially be considered a “critical wildlife site” under the rules, with concomitant requisites for protection, if one were identified for protection as a sensitive wildlife resource site. However, den sites are very difficult to detect and there are no requirements to survey for fisher dens. Interim procedures (section §629-605-0180, Oregon Forest Practice Rules) exist for protecting sensitive resource sites (including sensitive wildlife sites) on all State, county, and private lands in Oregon. These procedures apply only to threatened and endangered species, biological sites that are ecologically significant, and to bird species listed as “sensitive” in the rules, and currently do not apply to the fisher. Prior approval from the State Forester is also required before operating near or within critical wildlife habitat sites (§629-605-0190), including habitat of species classified by the Oregon Department of Fish and Wildlife as threatened or endangered, or any federally listed species, but fisher does not currently benefit from this status.

Although Oregon’s rules governing forest management on State, county, private, and other non-federal lands do not protect the fisher or its habitat, the rules may provide some fisher habitat elements. In clearcut harvest units that exceed 25 ac, operations must retain two snags or two green trees, and two downed logs per acre. Green trees must be over 11 inches dbh and 30 feet in height, and down logs must be over 6 feet long and 10 cubic feet in volume. Riparian management areas (RMAs) provide for vegetation retention along fish-bearing (Type F) and domestic-use streams without fish (Type D), in a band of 20 to 100 feet width, depending on stream size and type. In general, RMAs for fish-bearing and domestic-use streams require no tree harvesting within 20 feet of the stream, and, within the entire RMA, retention of a minimum basal area of conifer trees (40 trees per 1000 feet of stream for thinning operations). Along fish-bearing streams, the RMAs are intended to become similar to mature streamside stands, dominated by conifers; streams lacking \fish will have sufficient streamside vegetation to support the functions and processes important to downstream fisheries, domestic water use, and wildlife habitat. Similar guidelines retain vegetation around wetlands, lakes, seeps and springs. No RMA is required for streams that do not provide for domestic water use or bear fish, for small wetlands, or for lakes 0.5 acre or less.

None of the above rules would retain a sufficient amount of key habitat elements to maintain denning or resting quality fisher habitat, or to provide substantial patches of late-successional habitat, however they may maintain connectivity between any remaining areas of suitable habitat.

4.5.1.3 Washington

4.5.1.3.1 Washington State Lands

The Washington Department of Natural Resources (WDNR) manages the State lands in Washington. State lands occupy a substantial portion of the fisher’s historical range in the State, consisting of roughly 1.6 million ac (6,475 km^2) of forest within the range of the northern spotted owl (primarily lands west of the crest of the Cascade Mountains). Because these lands generally occur at lower elevations than National Forest lands, a higher proportion is within the elevation range preferred by the fisher (Aubry and Houston 1992, WDNR 1997). Thus, State lands are important to the survival and recovery of the fisher. However, over half of all WDNR forests are less than 60 years in age and less than 150,000 ac (607 km^2, about 9 percent) are over 150 years, indicating that most old-growth on Washington State lands has been liquidated (WDNR 1997).

Several State Parks in Washington contain remnant stands of mature and late-successional forest and may have suitable habitat for the fisher. Like elsewhere, these parks are widely scattered and isolated by large areas that are unsuitable for fishers. There are approximately 18,858 ac of mature or old growth forests within State Parks in Washington. Unfortunately, many of the larger parks are on islands and would not contribute to the recovery of the fisher. A few state parks and forests, such as Mount Pilchuck State Forest, Rockport, Ollalie, Hamilton Mountain/Beacon Rock, Twin Falls, and Wallace Falls State Parks have limited habitat which may provide some foraging opportunities for dispersing fishers and extend the habitat on federal lands in the Cascades.

4.5.1.3.2 Washington Regulations

Trapping of fishers has been prohibited in Washington since 1933, but fishers have been caught incidentally in traps set for other species, and the impact of incidental captures in Washington is unknown (Lewis and Stinson 1998).

In October 1998, the State of Washington listed the fisher as Endangered (WAC 232-12-297), which provides additional protections in the form of more stringent fines for poaching and a process for environmental analysis of projects affecting the species. There are no special regulations to protect habitat for the fisher or to conduct surveys for this species prior to obtaining forest activity permits. Although a few individuals may still reside in remote areas, the species is believed to be extirpated from Washington and the State is currently in the process of completing a feasibility report to determine suitable areas for reintroduction.

About 7 million ac (28,330 km^2) of non-federal forest lands exist within the possible range of the fisher in the Olympic Peninsula and Cascades in Washington. A geographic information system analysis of general habitat suitability typed about 2 percent (approximately 152,300 ac; 616 km^2) as suitable habitat for fisher. This analysis included mature/old growth, northern spotted owl habitat, and habitat meeting other criteria as suitable fisher habitat. Because the remnant patches of mature forest are widely scattered and isolated, it is unlikely that there is sufficient habitat on non-federal lands to support resident fishers. However, if proposed fisher reintroduction efforts occur and are successful, private lands may be important to maintain habitat in key linkage areas across the Puget Trough lowlands to provide connectivity between the Olympic Peninsula and the Cascades.

The primary regulatory mechanism on non-federal forest lands in western Washington is the Washington State Forest Practice Rules, Title 222 of the WAC. These rules apply to all commercial timber growing, harvesting, or processing activities on non-federal lands, and give direction on how to implement the Forest Practice Act (Title 76.09 Revised Code of Washington), and Stewardship of Non-Industrial Forests and Woodlands (Title 76.13 RCW). The rules are administered by the WDNR, and related habitat assessments and surveys are coordinated with the WDFW.

Washington's forest practice rules are more protective of riparian and aquatic habitats, and require more trees to be left than Oregon's forest practice rules. Clearcuts are limited to 49 ha (120 ac) in size with exceptions given up to 97 ha (240 ac). In all cutting units, three wildlife reserve trees (over 30 cm (12 in) in diameter), two green recruitment trees (over 25 cm (10 in) diameter, 9 m (30 ft) in height, and 1/3 of height in live crown) and two logs (small end diameter over 30 cm (12 in), over 6 m (20 ft) in length) must be retained per acre of harvest. These trees may be counted from those left in the "riparian management zones," which range in size from 25 to 62 m (80 to 200 ft) for fish-bearing streams, depending on the size of the stream, the class of site characteristics, and whether the harvest activity is east or west of the Cascade crest (WAC 222-30). Riparian management zones for non fish-bearing streams are 15 m (50 ft), applied to specified areas along the streams. Twenty-eight ha (70 ac) of habitat must be protected around all known spotted owl activity centers during the nesting season, outside of which logging can occur. Washington's forest practices rules do not specifically preserve key components of fisher habitat.

Riparian buffers may provide some habitat for fishers, primarily along perennial fish-bearing streams where the riparian buffer requirements are widest. In western Washington - the majority of the State area addressed by the petition, the Forest Practice Rules require 90-200 foot buffers on fish-bearing streams, depending on site class (site potential for tree growth). The riparian buffer of fish-bearing streams is divided into three zones, including a 50-foot "core zone" where no timber cutting is permitted. The remainder of the buffer is divided into an "inner zone" where partial harvest is permitted consistent with achieving stand basal area requirements, and an outer zone where logging must generally leave at least 20 conifers per acre, of 12 inches DBH or greater.

For parcels of 20 contiguous acres or less, landowners with total parcel ownership of less than 80 forested acres are exempt from the riparian buffer requirements described above; less stringent rules apply to those parcels.

4.5.1.4 Regulations Providing Protections for Other Listed Species

Regulatory protections for habitat of the federally-listed northern spotted owl, marbled murrelet, and anadromous salmonids may benefit the fisher, but because these protections do not consider fisher habitat needs, the areas protected for these species may be of limited conservation value for fishers. For example, fishers are likely more sensitive to fragmentation of habitat than owls or murrelets and require larger habitat blocks (Lewis and Stinson 1998). In addition, a large part of the current and historical West Coast range of the fisher is outside the range of the listed owl, murrelet and salmonids.

In California private timberlands, when surveys find northern spotted owls present, no-take habitat protections implemented in conjunction with the FPRs generally require protection of an 18-ac nest core area, and maintenance of 72 ac near activity centers with at least 60 percent cover of conifer trees of 11 inches BH or greater. The FPRs also require retention, where present, of 500 ac of owl habitat within 0.7 miles of pair activity centers, and of 1336 ac of owl habitat within 1.3 miles of pair activity centers. For these measures, owl habitat is defined as a minimum of 40 percent canopy closure of trees at least 11 inches DBH. The 18-ac core area and 72-ac retention area may provide denning and/or foraging habitat for fishers. The larger retention areas would have limited value to fishers due to the low canopy closure and tree size requirements. These measures provide small patches relative to the home range of fishers. Another factor that limits the value is that an owl site can be logged if unoccupied for 3 consecutive years; this is done by many landowners and reduces the amount of late seral habitat. Also, the threshold for 'owl habitat' is substantially below that of the late seral forests considered to provide higher quality fisher habitat. The value of 'owl habitat' for fishers would depend in part on characteristics of the forest actually retained, and owl protections do not require retention of late seral elements, and harvest could remove habitat from all but the 18-ac core area.

In Washington's forest practice rules, there are 10 large Spotted Owl Emphasis Areas (SOSEA), totaling approximately 2,060,041 ac. The SOSEAs are designed to provide demographic support and linkage (dispersal) corridors between federal lands. Nine SOSEAs are along the Cascade crest from just north of Seattle to the Columbia River, and one is on the Olympic Peninsula. Suitable nesting habitat is protected around occupied owl sites within the demographic support areas. These areas may provide denning and/or foraging areas for the fisher as long as the sites remain occupied by owls. The owl dispersal areas do not provide denning and foraging opportunities for the fisher because the stands are young plantations (40 to 70 years), the average diameter of the dominant trees is 10 inches, and the closed canopy does not support much understory vegetation.

Provisions in Washington's forest practice rules require some protection of marbled murrelet habitat which may provide habitat for fishers on lower elevation private lands. In California, the area of non-federal timberlands protected for marbled murrelets under state forest practice rules is small and limited to a small portion of within the fisher's range in the state.

In summary, the northern spotted owl and marbled murrelet rules may provide some habitat protection for the fisher on commercial forest lands. However, the owl habitat areas are limited and protective measures for both the owl and murrelet apply only to occupied sites. Because habitat may be removed from owl sites that are no longer occupied, the benefits are transitory. While protections for listed anadromous salmonids provide some benefit, the measures, as discussed above, generally do not ensure protection of either late seral forest or of the late seral structural habitat elements used by fishers, e.g., for denning and resting sites.

4.5.2 Tribal

Information on the amount of fisher habitat or its status and management on tribal lands is limited or nonexistent.

In California, the Hupa Tribe's forest management plan (Tribal Forestry 1994) addresses the 360 km^2 (88,958 ac) Hoopa Valley Indian Reservation where fishers are known to be present, and which contains about 75,000 ac of commercial timberland. The forest management plan for the Hoopa Valley Tribe recognizes the fisher as a traditional and culturally important species and designates the fisher as a species of special concern, and forest management activities are not allowed to knowingly result in "take" of species of concern unless approved by the Tribal Council. The plan contains some protective measures for fisher such as setting aside three to seven habitat reserves (each 50 ac or less in size) for pileated woodpeckers, mink, and fishers. Intensive timber harvest will not occur within the reserves. The plan establishes 32 no-harvest reserves (minimum of 60 ac each) for late-seral, cultural, sensitive, and listed species.

The Yurok Tribe manages roughly 4,000 ac of collective tribal land holdings, held in trust by the Department of the Interior. Tribal lands include about 1,000 ac of late-seral redwood forest. The land management plan for the Yurok Tribe does not contain specific protective measures for fishers and do not require pre-project surveys. It is unclear to what extent these plans will help to maintain appropriate habitat elements for the fisher.

Tule River Reservation in the southern Sierra Nevada includes about 56,000 ac of lands, which includes more than 16,000 ac of mixed-conifer forest lands managed for timber and firewood. Fishers are known to be present Information is not available regarding regulatory mechanisms for these tribal lands.

The Warm Springs Reservation of Oregon encompasses almost 1,000 mi^2 on the western slope of the Cascade Range. The Integrated Resource Management Plan (IRMP) for forested areas of the Warm Springs Reservation of the Confederated Tribes includes guidelines that ensure buffers of 30 to 100 feet (depending on the size of the feature) for riparian features such as streams, wetlands, seeps, springs, or bogs. Standards to protect wildlife habitats and species include protection of at least four overstory trees per acre, retaining a minimum of ten class 1-3 logs per acre (12 inches diameter and 20 feet long), and a 60:40 forage to cover ratio in wildlife management zones. The IRMP identifies conditional use areas that are not part of the commercial forest base although these areas could be harvested at some point in the future. These areas typically have cultural value and comprise about five percent of the Reservation. There are 14 spotted owl activity centers on the reservation.

For the Klamath Tribes in Oregon, the only activity identified that may impact the fisher is bobcat trapping. According to Rick Ward (Klamath Tribe biologist), trapping activity is currently very low due to presently low pelt prices (pers. comm. Ward 2003). However, as reported in the Klamath News, an official publication of the Klamath Tribe (2003), there is a current effort to return approximately 690,000 ac of the former reservation from the Fremont-Winema National Forest to the Klamath Tribes. This includes areas where fisher have been documented. If the land ownership changes, that would likely alter management of fisher habitat.

The Coquille Tribe manages their land according to the guidelines of the NWFP. The Coquille lands were formerly managed by the U.S. Bureau of Land Management (BLM). When the lands were transferred from the BLM to the Tribe, the Tribe agreed to manage their lands according to the guidelines in the NWFP and the Coos Bay BLM Resource Management Plan. Their land holdings in southwest Oregon are all in NWFP "matrix" designation which does not provide any benefits to fisher conservation.

There are 19 tribes that own forest lands within the range of the fisher in Washington State. The vast majority of the tribes do not have any suitable fisher habitat or do not have sufficient acreage. The tribal lands of the Makah, Quinault, and Yakama Indian Nations may have suitable fisher habitat, but only the Quinault and Yakama tribes have management plans that protect enough habitat for the northern spotted owl (a late-successional associate) that the plans may also provide habitat for fishers.

The Yakama Nation reservation is located in south central Washington State, east of the Cascade crest, and contains about 526,000 ac of forests. In 1998, 144,559 ac of reservation forest were typed as suitable habitat for spotted owls (Yakama Nation 2003). Of these, about 43 percent (62,266 ac) are currently not managed for commercial timber production, while the remaining 57 percent will receive some level of stand management. Timber harvest is generally conducted using uneven-aged management prescriptions (King et al. 1997), in which up to 30 percent of the volume may be removed during an entry. Based on the tribe's forest management practices and the distribution of spotted owl habitat, Yakama lands may widely provide suitable foraging habitat for fishers, and sufficient habitat elements including snags and downed logs to provide some denning/resting habitat, particularly in the areas reserved from harvest. Owl habitat may be a rough surrogate for fisher habitat, but indicates the availability of late successional forests.

The North Boundary Area of the Quinault Indian Nation is contiguous with U.S. Forest Service Late Successional Reserves to the north and southeast, and National Park Service lands to the east, and is the only area on the reservation that has potential habitat for the fisher. Negotiations are currently under way with the tribe to protect habitat around occupied owl and murrelet sites, which may incidentally protect potential fisher habitat.

4.5.3 Federal

4.5.3.1 Federal Regulations

National Forests

Federal activities on National Forest lands are subject to compliance with Federal environmental laws including the Multiple-Use Sustained-Yield Act of 1960 (16 U.S.C. 528 et seq.), National Environmental Policy Act of 1969 (42 U.S.C. 4321 et seq.), and Clean Water Act of 1948 as amended (33 U.S.C. 1251 et seq. 1323 et seq.), as well as the National Forest Management Act of 1976 (90 Stat. 2949 et seq.; 16 U.S.C. 1601– 1614) (NFMA).

The Forest and Rangeland Renewable Resources Planning Act of 1974 (88 Stat. 476 et seq.), as amended by the NFMA, requires the promulgation of rules that set out the process for the development and revision of land and resource management plans (16 U.S.C. 1604(g)). A new planning rule, the National Forest System Land and Resource Management Planning Rule (36 CFR §219) was adopted November 9, 2000, but suspended in May 2001 by the new administration.

The 1982 NFMA planning rules currently in effect require the Forest Service to maintain habitat and conditions to "maintain viable populations of existing native and desired non-native vertebrates in the planning area [National Forests System lands]" (30 CFR §219.19). The 2000 planning rule shifted the emphasis from maintaining viable populations of individual vertebrate species to providing ecological conditions that provide a high likelihood of supporting the viability of native and desired non-native species well distributed throughout their ranges within the plan area (§219.20). The viable population mandate, with associated monitoring requirements, could serve as the basis for forest management consistent with maintaining fishers. The viability requirement was integral in guiding the protection and management of late successional forest through the Northwest Forest Plan process, and through the Sierra Nevada Forest Plan Amendment process; the regulatory contribution of both plans to fisher conservation are discussed below.

The Forest Service's Sensitive Species Policy (Forest Service Manual 2670.32) calls National Forests to assist and coordinate with states, the Service, and NOAA Fisheries in conserving species with viability concerns. The Forest Service defines Sensitive Species as "those plant and animal species identified by a Regional Forester for which population viability is a concern as evidenced by significant current or predicted downward trend in numbers or density."

On December 6, 2002, the Forest Service published a proposed rule to revise the 2000 rule. It is uncertain how proposed rule, if and when implemented, will affect the interpretation of viability and the implementation of management for species viability.

The planning process proposed in the December 2002 proposed rule departs from an approach of ensuring individual species viability to one of sustaining social, economic and ecological sustainability (§219.13b). Neither of two options proposed for ecological sustainability explicitly state that individual species viability will be maintained in perpetuity. Option 1 provides for the needs of most species of plants and animals. It is unclear which species those may be or how the species are to be determined. Option 2 states that the Responsible Official should consider and assess biological diversity at two levels, ecosystem and species but it is unclear when or how this is accomplished.

In reviewing the proposed 2002 rule, Christensen et al. (2003) found the proposed changes often shift consideration of biological diversity from mandatory [must] to optional [should]. The changes from "must" to "should" assume the Responsible Official fully understands the value of biological diversity and will act responsibly to evaluate the effects of management practices on plant an animal diversity. The proposed rules also allows many forest management planning actions to be categorically exempted from NEPA.

National Environmental Policy Act

The National Environmental Policy Act of 1969, as amended (NEPA), requires all Federal agencies to formally document, consider, and publicly disclose the environmental impacts of proposed actions and management decisions. As such, the resulting documents are primarily disclosure documents, and NEPA does not require or guide mitigation for impacts.

Projects that are covered by certain "categorical exclusions" are exempt from NEPA biological evaluation. The implementing procedures describing categorical exclusions under NEPA have recently been revised. The first revision (68 FR 33813) adds two categories of actions to the list of categorical exclusions: 1) hazardous fuels reduction activities; and 2) rehabilitation activities for lands and infrastructure impacted by fires or fire suppression. Mechanical hazardous fuels reduction projects up to 1,000 ac in size can be exempt, and hazardous fuels reduction projects using fire can be exempt if less than 4,500 ac. Exempt post-fire rehabilitation activities may affect up to 4,200 ac. As stated in section 4.1, fuels reduction activities can reduce key fisher habitat elements such as large down logs and woody debris, large snags, multi-layered vegetation, and branches near the ground.

The second revision adds three categories of small timber harvesting actions to the agency's list of NEPA categorical exemptions: 1) the harvest of up to 70 ac of live trees with no more than 0.5 mi of temporary road construction; 2) the salvage of dead and/or dying trees not to exceed 250 ac with no more than 0.5 mi of temporary road construction; and 3) felling and removal of any trees necessary to control the spread of insects and disease on not more than 250 ac with no more than 0.5 mi of temporary road construction. Again, as stated in section 4.1, timber harvest and road construction can reduce key habitat elements such as dense canopy cover and large trees, and results in at least temporary habitat fragmentation.

Northwest Forest Plan

The Northwest Forest Plan (NWFP) was adopted in 1994 to guide the management of 97,125 km^2 (24 million ac) of Federal lands in portions of western Washington, Oregon, and northwestern California. The NWFP represents a 100-year strategy intended to provide the basis for conservation of the northern spotted owl (spotted owl) and other late-successional and old-growth forest-associated species on Federal lands (FEMAT 1993). The conservation strategy emphasizes protection of large reserves to provide space for breeding, interconnected by habitat in the intervening matrix to support movement across the landscape between reserves. In applying this reserve/connectivity concept throughout the range of the spotted owl, the NWFP includes standards and guidelines for managing all agency actions, and provided for an annual timber harvest program in the matrix that would be consistent with the conservation principles of the NWFP (USDA Forest Service and USDI BLM 1994a, 1994b).

The reserve/connectivity functions upon which the NWFP is based are expected to be achieved through a variety of land-use allocations which include Late-Successional Reserves (LSRs), Congressionally Reserved Areas, Adaptive Management Areas, Riparian Reserves, Administratively Withdrawn Areas, Matrix, and others. Each land-use allocation has standards and guidelines that direct management to be consistent with providing large blocks of late-successional and old-growth forest and connectivity between reserves.

The NWFP established LSRs to maintain a functional, interactive late-successional forest ecosystem. Thinning in stands up to 80-years of age and other silvicultural treatments are allowed in LSRs if they are neutral or beneficial to the creation and maintenance of late-successional conditions. In the Eastern Cascades or Klamath Provinces, additional management activities are allowed to reduce risks of large-scale disturbances such as fire. Other activities in LSRs (e.g., fuelwood gathering, range management, recreational uses) may be permitted if neutral or beneficial to creating and maintaining late-successional habitat.

Within areas intended to provide for habitat connectivity, particularly within Matrix, the NWFP contains provisions for some coarse woody debris, green-tree and snag retention in harvest units, retention of old-growth fragments in watershed with 15 percent or less late-successional forest, and protection of 100 ac around some northern spotted owl nest sites. The plan’s riparian reserves and green-tree retention provisions help to provide connectivity between the reserves.

Fisher and NWFP

The Final Supplemental Environmental Impact Statement (FSEIS) for the NWFP described the range of the fisher in western Washington, Oregon, and northern California as approximately 21 million ac (85,100 km^2), of which 66 percent is on Federal lands (page J2-469, USDA Forest Service and USDI Bureau of Land Management 1994 a). Of the fisher range on Federal lands, about 62 percent (8,600,000 ac; 34,840 km^2) occurs in areas designated to protect late-successional habitat (i.e., Late Successional Reserves and Congressionally Reserved Areas) (page J2-469, USDA Forest Service and USDI Bureau of Land Management 1994a). The remainder is in areas intended for timber harvest, but which are expected to provide for habitat connectivity (e.g., Matrix and Adaptive Management Areas).

The petitioners state that the NWFP allows logging of late-successional forests, claiming that it relies on the liquidation of roughly 17 percent of remaining late-successional forests to meet timber volume targets. Matrix areas contain about 13 percent (1,147,000 ac) of the total late successional forest (stands generally characterized by trees 21 inches DBH and greater) on federal lands in the plan area (page 3&4-41, USDA Forest Service and USDI Bureau of Land Management 1994a), although an earlier document provides statistics that represent 17 percent (FEMAT 1993; page IV-64). While the NWFP did not map or quantify impacts to fisher habitat, the plan did evaluate impacts on spotted owl habitat, which provides an indication of impacts to the late successional forests important to fishers. The Record of Decision for the FSEIS (page 46, USDA Forest Service and USDI Bureau of Land Management 1994b) projects that about 2.5 percent (about 200,000 ac) of spotted owl habitat will likely be harvested per decade under the plan. This harvest would occur principally in Matrix areas, although Adaptive Management Areas are also expected to produce timber, and contain about 540,000 ac of late successional forest (USDA Forest Service and USDI Bureau of Land Management 1994a).

The value of some NWFP late successional reserves to fishers may be limited by their elevation. Of the area in large reserves, about 11 percent is at elevations less than 2,000 feet, and about 57 percent is at elevations of 4,000 feet and greater (page IV-73, FEMAT 1993); most fisher records west of the Cascade crest in Washington are from less than 4,000 feet elevation, indicating that the lower elevations are the primary habitat in that area (page J2-468, USDA Forest Service and USDI Bureau of Land Management 1994a; Aubry and Houston 1992).

The NWFP data cited above address the fisher's historical geographic range, but not current habitat conditions within that area. In 2003, the Service assessed the distribution of potential fisher habitat in western Washington, Oregon, and northern California, using available geographic databases with information on current forest conditions and simple models of potential fisher habitat. Based on this assessment, approximately 56 percent of potential fisher habitat on Federal lands within the NWFP boundaries are within areas intended to function as reserves for late-successional forest-dependent species. An estimated 38 percent of potential fisher habitat on Federal lands overlaps areas expected to provide for habitat connectivity and where timber harvest is permitted. For the remaining 6 percent of potential fisher habitat, it was not possible to determine the proposed land use.

The Forest Ecosystem Management Assessment Team (FEMAT) assessed the potential effect of NWFP implementation on fisher habitat and viability, and projected a 63 percent likelihood of achieving an outcome in which habitat for the fisher is of sufficient quality, distribution, and abundance to allow the species population to stabilize and be well distributed across Federal lands. This rating reflects a general uncertainty about the future welfare of the species, as well the species' rareness, disjunct distribution, and the lack of information on the species in the Pacific Northwest (FEMAT 1993). Fisher viability rated relatively low largely because of concerns about regional-scale forest fragmentation in the short-term, and that the plan would not provide sufficient snags and decadent trees for natal den sites or downed woody debris for foraging habitat within the Matrix.

Although the NWFP may provide well-distributed suitable habitat on Federal lands, fisher populations may not respond and expand numerically and become well-distributed because of the species' apparent low rates of recolonization of restored habitats after their local extirpation; smaller amounts of Federal land at lower elevations; and their natural rareness (USDA Forest Service and USDI Bureau of Land Management 1994a). Also, a considerable amount of the species' range is on non-Federal lands (about 34 percent of the species' range in the NWFP area, based on FEMAT estimates; Appendix J2-469; USDA Forest Service and USDI Bureau of Land Management 1994a).

Parts of the NWFP (e.g., Aquatic Conservation Strategy, and "survey and manage" guidelines) are presently undergoing changes due to clarifications or revisions (USDA Forest Service 2002; *Douglas Timber Operators vs. Secretaries of Agriculture and Interior* Civ. No. 01-6378-AA, D. OR. Filed Dec. 2001). Proposed changes to the plan may change protections for fisher habitat.

As a result of the settlement agreement for a lawsuit (*American Forest Resource Council vs. BLM*), the BLM is required to revise their Resource Management Plans for the Coos Bay, Eugene, Lakeview, Medford, Roseburg, and Salem districts by December 31, 2008, and to include in these revisions at least one alternative that will not allow any reserves on Oregon and California Railroad (O&C) lands except as required to avoid jeopardy under the Endangered Species Act. The area affected by the agreement includes about 1.3 million ac of O&C lands on BLM and USFS lands in Oregon and includes fisher habitat. Based on the Service's 2003 assessment of potential fisher habitat, the O&C lands include an estimated 27 percent of the potential fisher habitat within NWFP LSRs in Oregon, and about 13 percent of potential fisher habitat on all NWFP lands in Oregon. The O&C lands have been under the NWFP, but could be affected by the settlement, and thus the settlement agreement could have negative implications for implementation of the NWFP reserve strategy and for wildlife viability standards for O&C lands. Because the proposed changes to management direction are not yet formally established, the potential effects are uncertain. When or if such changes are implemented, review of the potential effects to the fisher and other listed entities may be necessary.

In summary, implementation of the NWFP, at least in its current form (November 2003), would over time provide a network of connected reserves of late successional forest habitat surrounded by younger forest. However, this design, as for most of the enforceable conservation measures of the NWFP, was established for the protection of listed species, and it is uncertain if the plan will be a sufficient regulatory mechanism to sustain or recover the fisher over the area of the NWFP. It remains unknown whether individual reserves are large enough to sustain viable fisher populations, or the links are adequate to provide for dispersal and movement between reserves. Other factors which affect the plan's effectiveness for fishers include: 1) surveys for fishers are not required before timber harvest and other activities, 2) the plan lacks specific provisions to protect fisher den and rest sites, and 3) the plan lacks specific provisions to establish corridors connecting fisher habitat. We note, however, that the NWFP embodies ecosystem objectives which are expected to contribute substantially to the restoration and protection of suitable habitat for fishers on Federal lands in the plan area (USDA Forest Service and USDI Bureau of Land Management 1994a), a large part of the land area under consideration in this finding. In spite of this, because extant fisher sub-populations are small and isolated, combined with current habitat conditions within the historical range, the ability of sub-populations to persist and recolonize unoccupied areas within their historical range is uncertain (Aubry and Lewis 2003).

Sierra Nevada Forest Plan Amendment

The SNFPA was adopted in January 2001 as a guidance and policy document for managing 11 national forests and about 11 million ac (44,516 km^2) of California's National Forest lands in the Sierra Nevada and Modoc Plateau. The SNFPA included measures expected to lead to an increase over time of late-successional forest; these measures include requirements to retain conifers greater than 30 inch (in) DBH and hardwoods greater than 12 in DBH in westside forests, retention of important wildlife structures such as large diameter snags and coarse downed wood, and managing about 40 percent of the plan area as old forest emphasis areas (USDA Forest Service 2001). The SNFPA also established a Southern Sierra Fisher Conservation Area with additional guidelines intended to maintain and expand the fisher population of the southern Sierra Nevada. Conservation measures for the fisher conservation area include maintaining at least 60 percent of each watershed in mid-to-late successional forest (11 to 24 in dbh and greater) with forest canopy closure of 50 percent or more. The plan also includes protections for den sites; as discussed elsewhere, this tends to provide limited conservation value. Implementation of the 2001 plan was expected to maintain and restore fisher habitat in Southern Sierra Fisher Conservation Area, and encourage recovery to its historical range (USDA Forest Service 2001).

Appeals to the adoption of the SNFPA led to the Regional Forester assembling a review team to evaluate specific plan elements, including the fuels treatment strategy, consistency with the National Fire Plan, and agreement with the Herger-Feinstein Quincy Library Group Recovery Act. The review was completed in March 2003 (USDA Forest Service 2003b), and in June 2003 the Forest Service issued a Draft Supplemental Environmental Impact Statement (DSEIS) for proposed changes to the SNFPA (USDA Forest Service 2003a). The Final Supplemental Environmental Impact Statement (FSEIS) was issued in January 2004 and the new Record of Decision was issued on January 21, 2004 (USDA Forest Service 2004).

The preferred alternative in the FSEIS, Alternative S2, was chosen in the final Record of Decision. This alternative includes an objective to retain 30 in and larger trees (with exceptions allowed to meet needs for equipment operability, and a desired condition for the Southern Sierra Conservation Area which states that outside of any Wildland Urban Interface areas, a minimum of 50 percent of the forested area has at least 60 percent canopy cover for known or estimated female fisher home ranges (USDA Forest Service 2004, Record of Decision p. 41). Furthermore, it directs that where home range information is lacking, use the watershed mapped at the Hydrologic Unit Code 6 level as the analysis area for this desired condition. The Record of Decision also states that if fishers are detected outside of the Southern Fisher Conservation Area, habitat conditions should be evaluated and appropriate mitigation measures implemented to retain suitable habitat within the estimated home range (p. 54).

While the review was being conducted, the Forest Service applied the SNFPA decision to forest projects and programs on the ground, providing program and project guidance to forests in aggressively treating fuels and protecting old forests, wildlife habitat and watersheds. In addition, clarification and guidance in the form of Implementation Guidelines were developed to ensure consistent and effective implementation of management direction contained in the Record of Decision.

The FSEIS preferred alternative includes standards and guidelines which apply to fishers, and provide protections for verified fisher den sites, including a 700-ac buffer around confirmed fisher birthing and rearing dens during March 1 through June 30. The proposed guidelines would provide little protection to fishers or their habitat, because: 1) den sites are difficult to detect even in studies using radio-collared fishers (fewer than 10 den sites have been found to date) and project-level surveys are unlikely to locate dens (USDA Forest Service 2000); 2) there is little evidence that den sites are reused over time (Campbell et al. 2000), limiting the value of protecting past den sites; 3) some restrictions can be waived, including the limited operating period for vegetation treatments; and 4) it is unclear how and to what extent the impacts of roads, off highway vehicles, and recreation would be minimized.

The FSEIS directs the National Forests to maintain 30 to 40 percent of the landscape outside defense zones in a condition that meets fuels management objectives. Fuels management objectives will include treating conifer forest types by prescribed fire and/or mechanical thinning so that the resulting conditions would only allow an average flame length of 4 ft under 90th percentile fire weather conditions (only 12 days out the 120-day burning period would experience equal or higher conditions). Surface and ladder fuels may be removed as needed to meet design criteria of less than 20 percent mortality in dominant and codominant trees under 90th percentile weather and fire behavior conditions. Tree crowns would be thinned to meet design criteria of less than 20 percent probability of initiation of crown fire under 90th percentile weather conditions (FSEIS, Appendix A, p. 360).

The FSEIS includes forest wide standards and guidelines for tree retention during mechanical fuels reduction treatments (within CWHR types 4M, 4D, 5M, 5D, and 6 in all but eastside pine forest types) on National Forests within the Sierra Nevada and Modoc Plateau as follows: (1) Retain all live trees over 76 cm (30 inches) dbh (exceptions allowed for operability); (2) Retain 40 percent of pre-treatment basal area, consisting of the largest trees, in each treatment unit; (3) Retain 40 percent canopy cover (there is general direction to retain 50 percent canopy cover, but reduction to 40 percent is permitted to meet fuels reduction, operability, or economic goals); (4) Do not reduce pre-treatment canopy cover by more than 30 percent (ex: If a treatment unit has 80 percent canopy cover, do not reduce the area below 50 percent canopy cover) (USDA Forest Service 2004).

The FSEIS forest wide standards and guidelines do not apply to the defense zone. The defense zone is a land allocation that is designated around populated areas, to be treated to reduce fuels, so as to prevent loss of life and property due to wildland fire (USDA Forest Service 2001). The extent of the defense zone is determined by each National Forest locally, but generally extends as a .4 kilometer (.25 mi) buffer around populated areas (USDA Forest Service 2001). Within this land allocation, the only retention requirement for fuels treatments is that no live trees over 76 cm (30 inches) dbh be removed, with exceptions to be allowed for operability (USDA Forest Service 2004). Modeling indicates that approximately 330,000 ac will be treated to these standards and guidelines within the Sierra Nevada and Modoc Plateau National Forests (USDA Forest Service, 2003 unpublished data).

The FSEIS advises that no more than 5 percent per year and 10 percent per decade of the total acreage of California spotted owl protected activity centers (PACs, 300 ac of the best habitat surrounding spotted owl nests or territories) be treated for fuels reduction, which should provide some protection for patches of fisher habitat where the two species overlap.

For a complete discussion of fisher habitat, see section 2.5, Habitat, above. The following is a discussion of the adequacy of the FSEIS as a regulatory mechanism to protect some key attributes of habitat selected by fishers:

Dense canopy closure: Fisher select resting and denning habitat with greater than 80 percent canopy cover in the northern and central Sierra Nevada, and greater than 90 percent in the southern Sierra Nevada (Campbell et al 2000). The FSEIS forest wide standards and guidelines do not require retention of forest patches with dense canopy closure. They would allow the average canopy closure over entire treated areas (generally 100-300 ac) to be reduced either to 40 percent, or reduced by up to 30 percent from pre-treatment conditions (USDA Forest Service 2004).

Presence of large diameter snags: The FSEIS does not require retention of snags during fuels treatments. The FSEIS gives general guidelines to retain 3-6 large snags per acre, however actual retention levels are determined on a site specific basis (USDA Forest Service 2004, Appendix A, p. 357).

Presence of large diameter down logs: The FSEIS does not require retention of logs during fuels treatments. The FSEIS gives general guidelines to emphasize retention of wood in the largest size classes and in decay classes 1,2, and 3, and to consider the effects of follow-up prescribed fire in achieving desired down wood retention levels (USDA Forest Service 2004, Appendix A, p. 354).

Presence of large diameter live conifer and oak trees with decadence such as broken tops or cavities: The FSEIS would allow removal of conifers up to 30 inches DBH and montane hardwoods up to 12 inches DBH for fuels reduction needs. Larger trees will be generally be retained unless they are deemed a hazard to life and property or they are killed by prescribed fires (USDA Forest Service 2004, Appendix A, p. 364).

Complex structure near the ground (e.g., down logs, large down branches, root masses, live branches): Fuels reduction treatments would remove fuels to meet the height to live crown and small surface fuel load goals, above. Treatment to meet these goals will reduce forest complexity. There is direction in the FSEIS to follow the following guidelines within the Southern Sierra Fisher Conservation Area (a land allocation that includes most of the occupied habitat on the Sierra and Sequoia National Forests):

> Prior to vegetation treatments, design measures to protect important habitat structures as identified by the wildlife biologist, such as large diameter snags and oaks, patches of dense large trees typically ¼ to 2 acres, large trees with cavities for nesting, clumps of small understory trees, and coarse woody material. For example, use firing patterns, place fire lines around snags and large logs, and implement other prescribed burning techniques to minimize effects to these attributes. Use mechanical treatments when appropriate to minimize effects on preferred fisher habitat elements (FSEIS, Appendix A, p. 386).

However, there are no specific levels of snags and logs that must be retained. Meeting the height to live crown goals would remove structure near the ground, including live branches.

Multi-layered vegetation (vertical within-stand diversity): Treatment to meet the height to live crown goals would remove lower canopy layers. The FSEIS includes general direction to "Where available, design projects to retain 5 percent or more of the total treatment area in lower layers composed of trees 6 to 24 inches DBH within the treatment unit." However, retaining 5 percent of the total treatment area in lower layers is not sufficient to constitute a 2nd lower canopy layer, and "where available" does not guarantee that even 5 percent will be retained.

The FSEIS includes the following objectives or guidelines intended to benefit fishers during planning efforts: 1) Minimize old forest habitat fragmentation. 2) Assess potential impacts of fragmentation on old forest associated species (particularly fisher and marten) in biological evaluations. 3) Evaluate locations of new landings, staging areas, and recreational developments, including trails and other disturbances. 4) Assess the potential impact of projects on the connectivity of habitat for old forest associated species. 5) Consider forested linkages (with canopy cover greater than 40 percent) that are interconnected via riparian areas and ridgetop saddles during landscape-level and project-level analysis. 6) During landscape analysis, identify areas for acquisition, exchange, or conservation easements to enhance connectivity of habitat for old forest associated species. 7) If fishers are detected outside the southern Sierra fisher conservation area, evaluate habitat conditions and implement appropriate mitigation measures to retain suitable habitat within the estimated home range. 8) Institute project-level surveys over the appropriate landscape area. 9) Develop a conservation assessment for the fisher to further the goal of protecting and recovering fisher populations in the Sierra Nevada. These measures direct consideration, evaluation, and surveys that may be beneficial to the fisher. However, no specific requirements to maintain or enhance the habitat attributes fishers select for (as discussed above) are included.

National Forest Land and Resource Management Plans

Each National Forest is operated under a Land and Resource Management Plan (LRMP). The NWFP standards and guidelines apply for National Forests within the range of the northern spotted owl except when the standards and guidelines of LRMPs are more restrictive or provide greater benefits to late-successional forest species. Most National Forests within the range of the fisher in its West Coast range have LRMPs that incorporate the provisions of the NWFP or are amended by the SNFPA, and therefore implement the standards and guidelines of the applicable plan. Most individual Forest LRMPs do not provide any additional protections to fisher or fisher habitat, therefore the above discussion regarding the Northwest Forest Plan and Sierra Nevada Forest Planning Amendment summarizes the primary regulatory mechanisms in place on National Forest lands within the DPS area.

In California, the Six Rivers National Forest LRMP contains the following limited protections for fishers: restrictions on noise during an identified limited operating period within 0.25 mi of active dens, and maintenance of moderate-high quality fisher habitat within 500 feet of known den sites. To be effective at all, both of these measures require knowledge of den locations; however, the LRMP does not require pre-project surveys for fishers or den sites.

Approximately 1,680,000 ac (6800 km^2) of public lands are managed by the Klamath National Forest in California (USDA Forest Service 1994). Interspersed among these public lands are approximately 200,000 ac(810 km^2) of private land that originated as railroad land grants and homestead and mining patents. In addition to implementing the provisions of the Northwest Forest Plan, the Klamath National Forest manages 6,600 ac (2,673 ha) for late-successional habitat-dependent species, including the fisher, near the town of Happy Camp, California. Standards and guidelines for this area include: improving habitat conditions for fishers, surveys, disturbance restrictions around known den sites, road density limits, use of silvicultural practices that will improve or accelerate late-successional habitat, and providing a density of large snags and logs consistent with moderate- or high-quality fisher habitat. However, at this time there is no management plan to implement these standards and guidelines, so there is no specific information, for example, on the methods that may be used to improve habitat conditions or to conduct fisher surveys (pers. comm. Stresser 2003). In general, the management goals for Management Area 6 may maintain existing fisher habitat in the near future, but without a management plan, the extent to which habitat will be maintained or enhanced for fishers farther into the future is unknown.

In California, the Humboldt-Toiyabe, Modoc, Lassen, Plumas, Tahoe, Eldorado, Stanislaus, Sierra, Inyo, and Sequoia National Forests and the Lake Tahoe Basin Management Unit are within the area covered by the Sierra Nevada Forest Plan Amendment.

In Oregon, National Forests located on the west side of the Cascade Mountains (Mt. Hood, Willamette, Umpqua, Rogue, Siuslaw, Siskiyou National Forests) are within the boundaries of the NWFP.

Forests on the east side of the Cascade Mountains (Deschutes and Fremont-Winema National Forests) only partially overlap the NWFP area. Outside of the NWFP boundaries, the Inland Native Fish Strategy (INFISH) and Interim Management Direction Establishing Riparian, Ecosystem, and Wildlife Standards for Timber Sales (Eastside Screens) amend the LRMPs for the eastern portion of the Fremont-Winema National Forest. The guidelines, developed to protect fish habitat, may also provide benefits to fisher by protecting riparian corridors; establishing large woody debris requirements (>20 pieces per mi; >12 inches diameter; >35 feet long); and delineating Riparian Habitat Conservation Areas (RHCAs), which would prohibit timber harvests within them in most situations. Minimum widths for RHCAs range from a minimum of 300 feet slope distance on either side of fish-bearing streams to 150 feet on either side of perennial non-fish-bearing streams and around most lakes, ponds, reservoirs and wetlands. Seasonally flowing or intermittent streams, wetlands less than an acre, landslides, and landslide-prone areas would have protections ranging from about 50 to 100 feet or one site-potential tree height, depending on watershed priority.

The Eastside Screens provide interim direction for timber harvest associated with forest health and prohibit the harvest of large diameter trees (21 inches DBH or larger) and protect snags and large woody debris for wildlife. Both INFISH and the Eastside Screens were expected to be short-term strategies to be replaced once LRMPs are amended by other guidance, such as the Interior Columbia Basin Ecosystem Management Project (ICBEMP).

At this time, a decision notice for ICBEMP has not been issue, although a Memorandum of Understanding (MOU) has been signed which implements the associated Interior Columbia Basin Strategy (Strategy). The purpose of the MOU is to cooperatively implement the Interior Columbia Basin Strategy guiding the amendment and revision of Forest Service National Forest and Bureau of Land Management LRMPs and project implementation on public lands. The plans and MOU currently being implemented could maintain or enhance fisher habitat by preventing the loss of old-growth forests and promoting long-term sustainability of old forest habitat, although short-term adverse impacts may occur as a result of activities including thinning and silvicultural treatments. Maintaining wildlife movement corridors primarily associated with deer and elk are usually included as part of project designs and may also benefit fishers.

Potential fisher habitat in Washington State is located on the Olympic, Mount Baker-Snoqualmie, Gifford Pinchot, Wenatchee, and Okanogan National Forests. There are approximately 1,479,749 ac of fisher habitat on federal lands in Washington State, of which 1,108,994 ac (75 percent) are on National Forests and the remainder is in National Parks.

Most of the potential fisher habitat in Washington state is within the range of the northern spotted owl and thus also within the Northwest Forest Plan Area. Over 80 percent of the habitat is in areas that are designated as reserves (Congressionally withdrawn, LSRs, or natural areas). Logging within these areas is restricted and limited to thinning or individual tree removal. The WDFW recently conducted a feasibility analysis to determine areas for potential reintroduction of the fisher. Based on this analysis, the largest blocks of suitable habitat are located on the Olympic NF, areas around the Goat Rocks and Indian Heaven Wilderness on the Gifford Pinchot NF, portions of the Wenatchee NF east of Mount Rainier National Park, and the foothills to the west of the Alpine Lakes and Glacier Peak Wilderness Areas on the Mount Baker-Snoqualmie NF.

Approximately 81 percent of the Olympic, 75 percent of the Gifford Pinchot, 63 percent of the Mount Baker-Snoqualmie, 40 percent of the Wenatchee, and 22 percent of the Okanogan National Forests are below 4000 feet in elevation. Although most of the remaining fisher habitat will be protected as long as the Northwest Forest Plan remains in effect, the landscape is fragmented and the amount of old growth has been significantly reduced from historical levels.

Bureau of Land Management Lands

The NWFP standards and guidelines apply to BLM lands within the range of the northern spotted owl except when the standards and guidelines of Resource Management Plans (RMPs) are more restrictive or provide greater benefits to late-successional forest species.

The BLM’s Alturas District is currently in the process of rewriting its Resource Management Plan (RMP). However, the District has very little land with potential fisher habitat. Neither fishers nor their potential habitat is mentioned in the RMP, and the RMP is not affected by the SNFPA or NWFP. The RMPs for the Arcata, Redding, and Ukiah Field Office also do not contain any protective measures for fisher or require pre-project surveys.

In Oregon, BLM Resource Management Plans were amended by the NWFP in the Cascades, and by INFISH and Eastside Screen interim guidance east of the NWFP boundaries. Therefore, management would be similar to that described above for the National Forests. The BLM and

U.S. Timberlands (private landowner) are working together, where their land ownerships are checkerboarded, to reduce wildlife impacts by restricting access and closing roads.

BLM lands are limited in Washington state and do not contribute to fisher habitat.

National Park Lands

The land management plans for Redwood, Lassen, Yosemite, Sequoia, Kings' Canyon National Parks do not contain any protective measures for fishers and do not require pre-project surveys. The Giant Sequoia National Monument plans to release a new LRMP in early 2004.

Undeveloped areas of Crater Lake National Park are managed toward natural processes and are expected to maintain fisher habitat. Hunting and trapping are not allowed in the park, and park facilities are currently confined to certain areas, primarily in the higher elevations above fisher habitat. Studies are planned to evaluate snowmobile use in the park.

The Columbia River Gorge National Scenic Area in Oregon and Washington encompasses about 292,500 ac and is operated under a land use management plan that provides protection to all lands in the gorge. About half of the land in the Gorge is state or federally owned and has special management area guidelines dedicated to scenic and natural values. The remainder of the Gorge is private lands managed under general guidelines that are currently being revised. The fisher is a protected species within the area covered by the Columbia River Gorge management plan. On federal lands, the restriction against removal of old growth forests and clearcut logging would protect fisher habitat. After the Gorge forest practices guidelines are revised it is expected that habitat conditions will be retained for fisher because of the priority concept of retaining old growth, scenic, and natural values in the Gorge.

Fisher habitat occurs on the Olympic, North Cascades and Mount Rainier National Parks. However, the interior of all three parks are classified as alpine and are too steep and rugged to be suitable for fishers. Approximately 33 percent of the 1 million-acre Olympic National Park, 30 percent of the North Cascades NP and Ross Lake National Recreation Area (just over 500,000 ac, combined), and less than 15 percent of Mount Rainier National Park (235,500 ac) is typed as fisher habitat. The largest blocks of habitat occur in a ring around the mountainous interior of the Olympic Peninsula, in areas to the south and east of Mount Rainier National Park, in the Ross Lake National Recreation Area, and in river valleys on the west side of the North Cascades National Park.

Because the interior of the Cascades and Olympic Peninsula are alpine, fisher habitat is limited to a relatively narrow band along the foothills. In addition, most of the low elevation passes are bisected by major transportation corridors. Efforts are currently under way to provide wildlife corridors (under or overpasses) along Interstate 90 to facilitate north-south movement of wildlife through the Washington Cascades.

National Resource Conservation Service

The National Resource Conservation Service does not manage lands, and has not been involved with forest related work, but plans to develop forest-related projects in the near future. Initial projects will likely be east of the NWFP boundary, along the Sprague River in Oregon and elsewhere. Focus would be on thinning projects to enhance wildlife habitat and could enhance potential fisher habitat where it exists. The National Resource Conservation Service would be subject to NEPA and other existing regulatory mechanisms discussed elsewhere.

Habitat Conservation Plans (HCPs)

Some non-Federal lands are managed under HCPs which contain strategies that conserve habitat which provides some benefit to fishers and/or have fisher-specific protection measures.

In California, the **Simpson Timber Company Northern Spotted Owl HCP** covers the owl on about 450,000 ac of commercial forested lands, and expires in 2022. The HCP initially protects from harvest 39 areas of owl habitat totaling about 13,243 ac, or about 3 percent of the HCP area. Because of the small and fragmented nature of these protected areas, their value to fishers is uncertain. The HCP also encourages retention of habitat structure such snags and “wildlife” trees which would enhance habitat values for fishers, but does not require specific densities, and thus the magnitude of benefits from these measures is also uncertain. Based on HCP implementation reports, an average of about one structure tree per acre is retained after harvest, a low number compared to conservation recommendations for fisher (e.g., Freel 1991). Fishers currently occur on the Simpson ownership, as part of the northwestern California population. However, absent information on the viability of the fisher in the HCP area, and without a fisher conservation plan, the adequacy of Simpson’s owl HCP as regulatory mechanism to conserve the fisher is doubtful.

A second HCP is under development for the most of the same Simpson lands in California, to cover aquatic species. This HCP as currently drafted would primarily include measures for riparian zones and sediment sources including roads and geologically-unstable areas, thus incidental conservation value to the fisher would likely be very limited.

The Pacific Lumber Company HCP covers about 200,000 ac of forested lands, expires in 2049, and includes the fisher as a covered species. Conservation measures for the fisher include the retention of 10 percent of the ownership in late seral forest, and requirements to retain specific densities of snags, downed wood, large hardwoods and ‘live cull’ trees with wildlife value. The HCP also protects for the permit term about 8,000 ac of forest in 12 reserves; these reserves, established primarily for marbled murrelet conservation, protect about 4,700 ac of old-growth forest and forest with residual old-growth trees. The fisher conservation plan in this HCP has not achieved the full benefits expected by the Service because very few ‘live culls’ are retained on the landscape after harvest, compared to what we anticipated. The result is a low density in upland forest of decadent and other large trees with cavities, platforms, large limbs, basal hollows, and other features used by fishers as resting and denning sites.

An **Oregon Department of Forestry Western Forests HCP** is being developed for all State forest lands west of the Cascades in Oregon, except the Elliot State Forest. The proposed covered area includes about 630,000 ac of habitat potentially occupied by fisher. The proposed permit term is 50 to 80 years. The draft HCP anticipates coverage for the fisher, and anticipates improving the distribution and quality of habitat conditions for the species, including an increase in complex, older forests. The conservation plan for the fisher is not completed, and the conservation benefits of this HCP for the fisher are speculative until the plan is finalized.

The Elliott State Forest in southwestern Oregon operates under the **Elliott State Forest HCP**. The plan does not provide any benefits for fisher, but about 19 percent of the land within the Elliott State Forest is managed in reserve areas as late-successional habitat. These areas are dispersed across the landscape; some are interconnected by riparian zones with 200 foot buffers along streams, but most are in highly fragmented forests which do not provide interconnected areas of fisher habitat.

Washington Habitat Conservation Plans

There are currently 6 multi-species habitat conservation plans in Washington State that together affect about 1.4 million ac, and that may provide some habitat for the fisher (Table 1). Two additional HCPs (Port Blakely and Boise Cascade) have been completed in Washington, but have very little habitat and thus only provide limited recovery potential for the fisher. These multi-species HCPs all rely on the riparian buffer strategies and conservation measures for listed species to provide habitat for other covered species, including the fisher. The conservation measures that protect mature and late-successional forests for each HCP are discussed below.

Table 1. Current habitat conservation plans in Washington, within the fisher's historical range. Acres of current and projected (by end of HCP term) late successional forest are approximate.

HCP Name	**Covered Acres (ac)**	**Fisher is Covered Species?**	**Current Acres of Late Successional Forest**	**Projected Acres of Late Successional Forest (Approx)**	**Permit Expires**
City of Seattle (Cedar River)	90,546 ac	Yes	14,000 ac	38,000 ac	2050
Plum Creek	285,000 ac	Yes	35,000 ac	15,000 ac	2096
Simpson Timber NW Operations (WA)	261,575 ac	No	1,138 ac	3,000 ac	2050
City of Tacoma Public Utilities	14,888 ac	Yes	268 ac	2,900+ ac	2051
Washington DNR	1,600,000 ac	Yes	< 100,000 ac in Cascades, ca. 48,000 ac on the Olympic Peninsula; 26,000 ac in other reserves	> 100,000 ac in Cascades, 50,000 ac on the Olympic Peninsula, > 26,000 ac in riparian buffers/ other reserves	2067
West Fork/Murray	53,527 ac	Yes	1,144 ac	10,000 ac	2093

Note: "Late Successional Habitat" refers, for most HCPs, to Northern Spotted Owl habitat

The **Washington State Department of Natural Resources (WDNR)** multi-species HCP covers forest management activities for 70 years, with potential to extend the term to 100 years. The key terrestrial species for this HCP are the northern spotted owl and the marbled murrelet. Management of spotted owls on WDNR lands is based on development of a 400,000-ac network of owl habitat, of which 202,000 ac are to be owl nesting, roosting and foraging areas. The remaining WDNR-managed lands will not be managed for species associated with late-successional forest and thus will not provide for the maintenance and recovery of fishers in Washington. Of the 202,000 ac, WDNR is required to maintain only 50 percent in a suitable condition at any given time, and currently all planning units west of the Cascade crest are below this 50 percent threshold, thus habitat must be recruited to meet the HCP terms (USDI 1997).

Nesting, roosting and foraging habitat provided for the owl under this HCP is probably capable of providing denning and foraging conditions for fisher. Most of the NRF areas are adjacent to federal lands. Occupied murrelet stands are also protected under the HCP, as they would be without an incidental take permit; these stands provide scatted patches of late-successional habitat. Although salmon protection was emphasized for riparian management, terrestrial species, including the fisher, may benefit from these buffer areas, which under interim measures are generally 100-foot no-harvest buffers on fish-bearing streams. When the riparian procedures are eventually finalized, there will likely be some tree harvest within the buffer zones. The HCP riparian conservation strategy applies only to the Olympics and the west side of the Cascades; on the east side of the Cascades, the WDNR follows general forest practice rules.

The **Plum Creek Timber Company** covers two 50-year terms. Because habitat protection measures are limited to occupied spotted owl sites and only 8 percent of the mature and late-successional forest habitat will be maintained on the landscape, the Plum Creek HCP is not expected to provide adequate amounts of habitat to support resident fisher populations. However, the area covered by the Plum Creek HCP is located within the Interstate 90 highway corridor, and the HCP provides a critical linkage along the crest of the Cascades, between federal lands on either side of the I-90 corridor. The HCP proposes a network of Riparian Habitat Areas, harvest deferrals, and owl dispersal corridors to adjacent federal lands. The HCP requires Plum Creek to maintain a minimum of 6 to 8 percent of the HCP area in suitable spotted owl habitat and an additional 3,200 ac of owl NRF and dispersal habitat in the I-90 corridor. Plum Creek will also defer harvest on 2,600 ac of current NRF habitat around key owl sites for 20 years and will protect and maintain 7,200-8,500 ac of riparian buffers. Although these measures are not adequate to support resident fishers, it provides some habitat in this fragmented checkerboard landscape. Riparian buffers may also benefit fishers as a primary management objective within designated Riparian Habitat Areas is to provide an adequate number of large-diameter conifers to maintain natural functioning of the stream ecosystem.

The **Cedar River HCP** is also along the I-90 corridor in the central Washington Cascades. The Cedar River watershed, the covered area, is surrounded on three sides by USFS lands and is adjacent to the WDNR, Plum Creek and Tacoma Public Utilities HCPs. The overall goal of the HCP is to implement conservation strategies designed to protect and restore habitats of all species, including the fisher. Because the watershed is being managed as a reserve, the Cedar River HCP will provide habitat for the fisher, particularly in the future. Most of the forested area is currently in younger seral stages, but about 13,889 ac of old-growth, 23,918 ac of late-successional forest, and 34,932 ac of mature forest are projected to exist in the HCP area by year 2050 under the HCP.

The **West Fork Timber Company** (formerly Murray Pacific Corporation) plan area is adjacent to the Mt. Baker-Snoqualmie National Forest and is bordered on the east and west by federal reserves, and by WDNR lands in part to the north. The majority of the plan area is intended to be managed for timber production, and is currently a mosaic of coniferous forest stands of varying ages (Murray Pacific 1993). Most of the plan area has been clearcut or partially harvested at least once since 1913; of approximately 1,144 ac (2 percent) that is classified as old-growth, 479 ac have never been entered for logging. West Fork Timber plans to harvest 2,369 ac of suitable owl habitat during the first 10 years (1993 to 2003) of the permit term, and up to 80 percent of forest over the HCP life. The remaining 18 to 20 percent (10,000 ac) will be protected in reserve areas, which are primarily wetlands, riparian corridors, and upland areas where logging is not feasible; forest in these areas will range from 100 to 250 years in age by the end of the 100-year permit term. Riparian buffer widths are narrower than required under current State Forest Practice Rules, but harvest is not allowed in these areas under the HCP, older trees should be protected and allowed to develop. Because of the relatively small percentage of late successional habitat present and protected, and its fragmented nature, conservation value for fishers is likely low at present and into the future, with some future value as linkage or dispersal habitat between habitat on federal lands as forest matures in protected areas.

The **City of Tacoma's Green River HCP** covers about 10 percent of the Green River watershed between Seattle and Tacoma, and currently includes 268 ac in mature coniferous forest (2 percent of covered lands) (USDI Fish and Wildlife Service 2001). Over the 50-year HCP life, this is expected to increase to 4,027 ac in the HCP area. The HCP's primary management objective is to protect water quality. About 2,856 ac (19 percent of HCP area) is coniferous forest in Natural Zones off-limits to harvest, and includes riparian buffers and roughly 1,000 ac of mid-successional forests (80 to 90 years old) with old growth remnants. Remaining lands will be managed under a variety of timber management regimes, except coniferous forest over 100 years, which will not be harvested during the HCP term. Of this, 3,000 to 4,000 ac will be managed under an uneven-aged harvest regime to accelerate or enhance old-growth conditions. Current habitat conditions in the HCP area are generally unsuitable for fishers, and under HCP terms may develop value as linkage or dispersal habitat by the end of the HCP term.

The **Simpson Timber Company HCP (Washington)** was designed to address forest management and timber harvest across 261,000 ac of industrial forest lands on the Olympic Peninsula. A total of 1,138 ac of late-successional forest was present during a 1995 stand inventory. The habitat areas were scattered in 52 separate patches, with an average stand size of 19 ac and an average age of 226 years old. A majority of these areas remained on the landscape in 1999, and all but 50 ac are occupied by marbled murrelets and will be protected from harvest. Because habitat conservation for this HCP is based on a riparian reserve network, interior forest habitat will be limited and it is unlikely that fishers could persist on these Simpson lands. It is estimated that approximately 1,991 ac of young stands may develop into mature forest during the 50-year HCP term. Because the HCP is located in a key linkage corridor at the southern end of the Olympic Peninsula, it may provide some connectivity across the Puget Trough if fishers become established in the Cascades and the Peninsula in the future.

In summary, habitat conservation plans include large areas within the historical range of the fisher, particularly in western Washington and northwestern California. Although the fisher is a covered species in most Washington HCPs and in one California plan, the species is currently known to be present only on lands under the 2 California HCPs. In most HCPs, the areas where late successional habitat will be protected and/or allowed to develop are mostly in riparian buffers and smaller blocks of remnant old forest. The HCP conservation strategies are generally focused on the conservation needs of northern spotted owls, marbled murrelets, and/or anadromous salmonids, and generally do not provide the large blocks of forest with late seral structure that appear to be important for sustaining resident fisher populations, particularly for providing denning and resting sites.

In Washington, should fishers become established in the future, lands covered by current HCPs may provide linkage or dispersal corridors between populations on federal lands, however current habitat value is very low due to a history of intensive logging. Lands covered by HCPs include large areas in the low-elevation range thought to be optimal for fishers in western Washington, and thus could represent future opportunities to develop habitat that could sustain fishers. The likelihood of existing HCPs to accomplish this appears to be fairly low.

The two HCPs for commercial forestlands in northwestern California overlap one extant fisher population. The fisher's persistence on Simpson timberlands suggests some compatibility with past practices, but Simpson's owl HCP is not designed to provide for fisher conservation. The Pacific Lumber Company HCP includes conservation measures for the fisher, but the covered lands appear to currently support very low fisher densities, and it is not known what limits fishers in this area, or if the HCP as being implemented will improve habitat conditions for fishers.

Conclusion – Inadequacy of Regulatory Mechanisms

The primary threats are the loss and fragmentation of habitat and further decline and isolation of the remaining small populations. Any of the key elements of fisher habitat (see section 2.5 Habitat) may be affected by Federal and State management activities. Reduction of any of these elements could pose a risk to the fishers. Activities under Federal regulatory control that result in fisher habitat fragmentation or population isolation pose a risk to the persistence of fishers. A large proportion of forest within the range of the petitioned fisher DPS are managed under the Northwest Forest Plan or Sierra Nevada Forest Plan Amendment. These regional planning efforts provide for retention and recruitment of older forests, and include for spatial distribution of these forest that is intended to benefit late successional forest species such as the fisher. However, the adequacy of these plans is uncertain, as evidenced in the FEMAT's own assessment of fisher viability under the NWFP.

Proposed changes to both the NWFP are in progress, which could weaken habitat measures which benefit the fisher. Even with this plan and the SNFPA in place, timber harvest, fuels reduction treatments, and road construction may continue to result in the loss of habitat and habitat connectivity in areas, resulting in a negative impact on fisher distribution, abundance and recovery/recolonization potential.

The same potential risks apply to non-Federal forested lands as discussed for lands under Federal regulatory control. Protections provided under state regulation of forest practices are less than provided on Federal lands, where the Northwest Forest Plan and Sierra Nevada Forest Plan Amendment provide greater consideration of late-successional forest and dependent species, and of forest management at larger geographic scales. Existing regulatory processes for non-federal, non-tribal timberlands in California, Oregon, and Washington do not include specific measures for management and conservation of fishers or fisher habitat. Regulations regarding late successional forest rarely provide protection of these forests on commercial timberlands. This is largely because the regulations lack specific and enforceable conservation measures for these forests, and for most unlisted wildlife species, including the fisher. While the State regulatory process for these lands incidentally protect some fisher habitat via the Forest Practice Rules, the benefits are limited and do not include strategies which target either the fisher or key fisher habitat requirements. Existing habitat conservation plans for non-federal timberlands provide some additional benefits to the fisher. These plans are focused on providing some level of protection for the habitat of spotted owls, marbled murrelets, and listed salmonids, which can protect important habitat elements for the fisher where habitat overlaps. However, many of these plans only protect occupied habitat, and harvest deferrals may be lifted if the mature stands no longer support listed species. Thus, benefits to the fisher from these HCPs may be ephemeral, especially in the case of listed species decline, like that of the spotted owl population occurring in Washington. Habitat conservation plans only apply to a small part of the fisher's currently occupied range on non-federal lands in California and Oregon, and the adequacy of the measures in these plans is uncertain. Because of the loss and fragmentation of low-elevation habitat, large geographic areas that were once occupied have become unsuitable which poses a significant challenge for fisher genetic exchange across isolated patches of habitat.

In addition to the inadequacy of regulations to address fisher habitat requirements, current trapping regulations in Washington, Oregon, and California, while prohibiting intentional trapping of fishers, do not provide accurate reporting of the numbers of incidental captures of fishers, and appear inadequate to control such incidental trapping where fishers are present. Any source of additional mortality in small fisher populations could prevent recovery or reoccupation of suitable habitat (Lewis and Stinson 1998, Lewis and Zielinski 1996).

It is uncertain whether current regulations will be effective in reducing the level of threat to the fisher. We therefore find that existing regulatory mechanisms are not sufficient to protect the DPS as a whole from the acknowledged habitat pressures discussed in sections 4.1 and 4.5.

However, we want to encourage the continued proactive efforts of the State, Federal and non-governmental organizations to develop and implement conservation measures that could improve the status of fisher in its west coast range. The Service will consider such conservation efforts in its future management decisions concerning the fisher.

The Pacific Region (Region 5) of the U.S. Forest Service is due to complete in this fiscal year a Conservation Assessment for the fisher in the Sierra Nevada Mountains. This is a collaborative effort including scientists from the State and Federal agencies, and may form the basis of a Conservation Strategy for the Sierra Nevada fisher populations in California. This effort is part of the Sierra Nevada Framework planning document and may include some effort to evaluate the potential to relocate fisher to parts of their historic range.

The timber industry and their representatives, including Sierra Pacific Industries, Simpson Timber Company and the California Forestry Association have indicated willingness develop a conservation strategy to, if appropriate, conduct a reintroduction and/or relocation strategy in California. Their participation could include funding, staffing, and assistance with analysis and planning.

The State of Washington has completed a reintroduction feasibility study and has identified several sites in the Washington Cascades and the Olympic peninsula where sufficient potential habitat exists to support a fisher population. Reintroduction efforts and evaluation by the State are ongoing and would potentially compliment efforts to establish additional populations throughout the range of the fisher.

5. PETITION FINDING

We have carefully assessed the best scientific and commercial information available regarding the past, present, and future threats faced by this species. We reviewed the petition, available published and unpublished scientific and commercial information, and information submitted to us during the public comment period following our 90-day petition finding, and consulted with recognized fisher experts and Federal and State resource agencies. On the basis of this review, we find that the West Coast population of the fisher constitutes a valid DPS, which is both discrete and significant under our DPS policy, and that listing the fisher in its West Coast range is warranted but precluded by pending proposals for other species with higher listing priorities.

In making this finding, we recognize that there have been declines in the distribution and abundance of the fisher in its West Coast range, primarily attributed to historical overtrapping and habitat alteration. Much of the fisher’s historical habitat and range has been lost to past timber harvest, stand-replacing fire, forest insect and disease outbreaks, development, recreation, hydroelectric projects, and roads. There is substantial information indicating that the habitat of fishers continues to be threatened with further loss and fragmentation resulting in a negative impact on fisher distribution and abundance. Mortalities and injuries from incidental captures of fishers may be frequent enough to prevent local recovery of populations, or prevent the re-occupation of suitable habitat. Removing important habitat elements such as cover could allow predation to become a significant threat. Other factors considered to be threats to the fisher include barriers to dispersal, increased mortality from vehicle collisions, incidental poisoning, a decrease in the prey base, and increased human disturbance. The greatest long-term risk to the fisher in its West Coast range is due to isolation of few, small populations. Fisher populations are at low numbers or are absent throughout most of their historical range in Washington, Oregon, and California. Because of small population sizes and isolation, fisher populations on the West Coast may be in danger of extirpation from inbreeding depression and demographic and environmental stochasticity.

Federal, State, and private land management activities may affect key elements of fisher habitat; reduction of any of these elements could pose a risk to the fisher. Current regulations provide insufficient certainty that conservation efforts will be implemented or that they will be effective in reducing the level of threat to the fisher. We therefore believe that existing regulatory mechanisms are not sufficient to protect the DPS as a whole from habitat pressures.

We conclude that the overall magnitude of threats to the West Coast DPS of the fisher is high, and that the overall immediacy of these threats is imminent. Pursuant to our Listing Priority System (64 FR 7114), a DPS of a species for which threats are high and imminent is assigned a Listing Priority Number of 3. While we conclude that listing the West Coast DPS of the fisher is warranted, an immediate proposal to list is precluded by other higher priority listing actions. During Fiscal Year 2004 we must spend nearly all of our Listing Program funding to comply with court orders and judicially approved settlement agreements, which are now our highest priority actions. To the extent that we have discretionary funds, we will give priority to using them to address emergency listings and listing actions for other species with a higher priority. Due to litigation pertaining to various listing actions, our planned work with listing funds in Fiscal Year 2004 consists primarily of addressing court-ordered actions, court-approved settlement agreements, and listing actions that are in litigation. (Also, some litigation-related listing actions already are scheduled for Fiscal Year 2004.) We expect that our discretionary listing activity in Fiscal Year 2004 will focus on addressing our highest priority listing actions.

The West Coast DPS of the fisher will be added to the list of candidate species upon publication of this notice of 12-month finding. We will continue to monitor the status of this species and other candidate species. Should an emergency situation develop with one or more of the species, we will act to provide immediate protection, if warranted.

We intend that any proposed listing action for the West Coast DPS of the fisher will be as accurate as possible. Therefore, we will continue to accept additional information and comments from all concerned governmental agencies, the scientific community, industry, or any other interested party concerning this finding.

A draft notice of our finding is attached for your review and prompt publication in the *Federal Register*. The petitioner will be notified of our finding upon its publication.

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