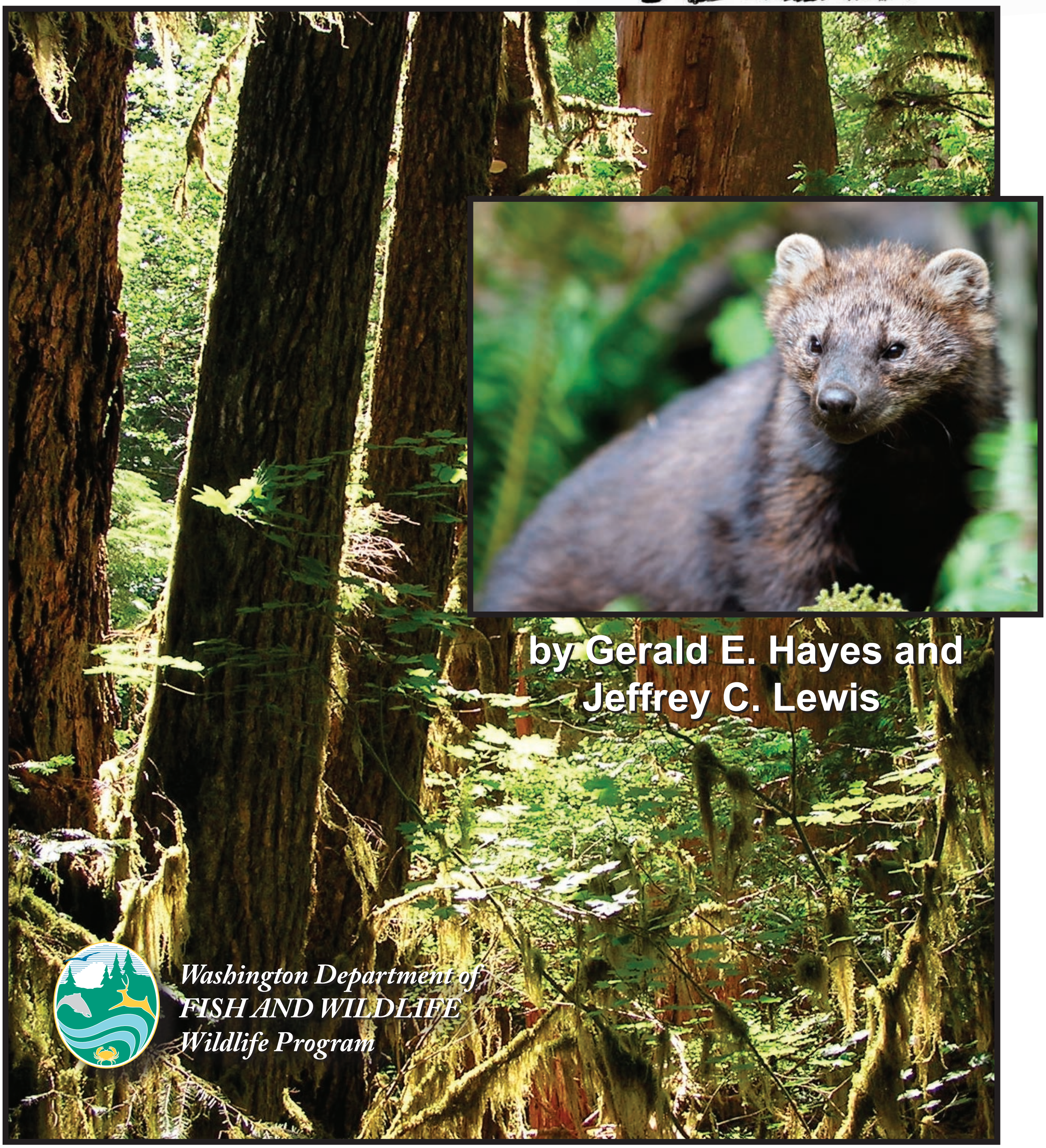
STATE OF WASHINGTON December 2006

Fisher Recovery Plan



by Gerald E. Hayes and Jeffrey C. Lewis

Washington Department of
FISH AND WILDLIFE
Wildlife Program

In 1990, the Washington Wildlife Commission adopted procedures for listing and de-listing species as endangered, threatened, or sensitive and for writing recovery and management plans for listed species (WAC 232-12-297, Appendix C). The procedures, developed by a group of citizens, interest groups, and state and federal agencies, require preparation of recovery plans for species listed as threatened or endangered.

Recovery, as defined by the U.S. Fish and Wildlife Service, is the process by which the decline of an endangered or threatened species is arrested or reversed, and threats to its survival are neutralized, so that its long-term survival in nature can be ensured.

This is the final Washington State Recovery Plan for the Fisher. It summarizes the historic and current distribution and abundance of fishers in Washington and describes factors affecting the population and its habitat. It prescribes strategies to recover the species, such as protecting the population and existing habitat, evaluating and restoring habitat, potential reintroduction of fishers into vacant habitat, and initiating research and cooperative programs. Interim recovery objectives and other criteria for reclassification are identified.

The draft state recovery plan for the fisher was reviewed by researchers and representatives from state, tribal, and federal agencies, regional experts, and non-governmental organizations. This review was followed by a 90-day public comment period. Responses to the public comments are included in Appendix B. All comments received were considered in preparation of the final recovery plan. For additional information about fishers or other state listed species, see the Washington Department of Fish and Wildlife web site (http://wdfw.wa.gov/wildlife.htm), or contact:

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WASHINGTON STATE RECOVERY PLAN FOR THE FISHER

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Wildlife Program
600 Capitol Way N
Olympia, Washington

December 2006

Approved:

Director, Washington Department of Fish and Wildlife

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Date

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ACKNOWLEDGEMENTS

This report contains material from the Washington State Status Report for the Fisher (Lewis and Stinson 1998) and Feasibility Assessment for Reintroducing Fishers to Washington (Lewis and Hayes 2004).

The recovery plan was improved by substantial comments from Harriet Allen, Keith Aubry, Scott Horton, Martha Jensen, Gary Koehler, Chuck Lennox, Bob Naney, Tom Paragi, Gilbert Proulx, Cathy Raley, Jeremy Sage, Mark Skatrud, Derek Stinson, Richard Weir, and William Zielinski. The fisher tracks illustration and range map were improved by Chris Sato. Derek Stinson provided assistance with document formatting and layout. Harriet Allen provided guidance and feedback throught development of the plan.

EXECUTIVE SUMMARY

The fisher is a large, stocky dark brown member of the weasel family. It has a long bushy tail, short, rounded ears, short legs, and a low-to-the-ground appearance. Historically, fishers were widely distributed in Washington in dense, mesic forests at low to mid-elevations. The geographic distribution of trapping reports and collected specimens confirms that fishers occurred throughout the Cascades, Olympic Peninsula, and parts of southwestern and northeastern Washington, although it does not appear that they were as abundant in Washington as in other parts of their range.

Fishers occur only in North America, and between the late 1800s and early 1900s populations were nearly extirpated over much of their former range in the United States and eastern Canada. The two most significant causes of the fisher's decline were over-trapping and loss and fragmentation of low- and mid-elevation late-successional forests. Trapping reduced populations quickly. Despite decades of protection from harvest, fisher populations never recovered in Washington. Fishers use forest structures associated with late-successional forests, such as large live trees, snags and logs, for giving birth and raising their young, as well as for rest sites. Travel among den sites, rest sites, and foraging areas occurs under a dense forest canopy; large openings in the forest are avoided. Commercial forestry removed the large trees, snags and logs that were important habitat features for fishers, and short harvest rotations (40-60 years) didn't allow for the replacement of these large tree structures. Clearcuts fragmented remaining fisher habitat and created impediments to dispersal, thus isolating fishers into smaller populations that increased their risk of extinction.

The fisher was listed as endangered in Washington in 1998 by the Washington Fish and Wildlife Commission and is now considered likely extirpated from the state. In 2004, the U.S. Fish and Wildlife Service concluded that the West Coast fisher population constitutes a distinct population segment and that a federal listing of endangered is warranted. However, the Service precluded listing the species because of pending proposals for other species of higher priority. The West Coast distinct population segment of the fisher population is now on the federal list of candidate species and was given a listing priority number of 6 (1-12 scale).

A self-sustaining fisher population is not likely to become re-established in the state without human intervention. Reintroductions are the only means of recovery in western Washington and have been successful in the recovery of fisher populations in other parts of the fisher's range. Federal lands (national parks and national forests) are important for fisher recovery in Washington. Federal lands have substantial areas of late-successional forest and additional fisher habitat is likely to become available in the future on the national forest land base as forests mature under guidelines established in the 1994 Northwest Forest Plan.

A reintroduction feasibility study was conducted for western Washington that identified three large areas of suitable habitat that may support fisher populations. These included the Olympic Peninsula, the southwestern Cascades, and the northwestern Cascades. Olympic National Park was identified as the most suitable for the first reintroduction, followed by the southwestern and northwestern Cascades. Results from research and monitoring of the Olympic Peninsula population will guide future translocations in the Cascade Mountains and, possibly, the Selkirk Mountains.

The recovery plan outlines strategies that, when implemented, will likely restore self-sustaining fisher populations to Washington. The recovery plan identifies three recovery areas in Washington: the Olympic, Cascade, and Selkirk.

The current state of knowledge of fisher ecology in Washington does not allow for the development of population numbers or specific geographic distribution goals as recovery criteria. The recovery strategies focus on re-establishing fishers at multiple locations in the state. Interim objectives will likely be modified as more is learned about the habitat needs and population dynamics of fishers in Washington.

The interim recovery objectives of the fisher recovery plan are:

Fishers will be considered for downlisting from State Endangered to State Threatened status when:

1. Self-sustaining populations of fishers are established in multiple locations in the Olympic Recovery Area and in the southern (south of Interstate 90) or northern (north of Interstate 90) portion of the Cascade Recovery Area.

Fishers will be considered for downlisting from State Threatened to State Sensitive status when:

1. Self-sustaining populations of fishers are established in multiple locations within the Olympic Recovery Area, and in the southern and northern portions of the Cascade Recovery Area, and

2. Agreements and/or forest management plans for managing habitats on federal and state forest lands within the Olympic and Cascade Recovery Areas are in place that will manage habitat to provide for the continued viability of fisher populations in Washington.

Fisher recovery strategies include assessing the feasibility of reintroductions in these three recovery areas (Olympic, Cascade, Selkirk), conducting reintroductions, monitoring populations, protecting established fisher populations, conducting research on the needs and limiting factors of fisher populations in Washington, and developing a conservation strategy for fisher habitat at multiple spatial scales. Long-term persistence of fishers in Washington will depend on federal land managers providing suitable habitat and habitat connectivity. Federal land managers are currently collaborating with scientists to develop a "Fisher Conservation Assessment and Conservation Strategy" for Washington, Oregon, and California. The assessment and strategy should provide guidance for management of forests on federal lands throughout the region to provide fisher habitat and maintain connectivity. Achieving recovery will require cooperation and partnerships among, state, federal, and local agencies, tribes, timber industry, non-governmental organizations, and private citizens.

PART ONE: BACKGROUND

INTRODUCTION

The fisher (*Martes pennanti*) is listed as a state endangered species (WAC 232-12-011) and has probably been extirpated from Washington. The two most significant causes of the fisher's decline were over-trapping by commercial trappers and loss and fragmentation of low to mid-elevation late-successional forests. Incidental poisoning from predator control programs and incidental capture were less significant factors (Powell and Zielinski 1994, Lewis and Stinson 1998). Once the species was protected from trapping, fishers did not recover. This was likely due to the loss and fragmentation of habitat, the isolation of remaining small subpopulations, and the lack of immigration from nearby portions of British Columbia, Idaho, and Oregon where fisher populations were also diminished or extirpated (Aubry and Lewis 2003, Weir 2003, Proulx et al. 2004). Mortality from incidental captures in traps set for other furbearers could have been frequent enough to prevent local recovery of populations or prevent reoccupation of suitable habitat (Lewis and Stinson 1998).

TAXONOMY

The fisher is a member of the order Carnivora, family Mustelidae, and subfamily Mustelinae. Its scientific name was given by Johann Erxleben in 1777 in honor of Welsh naturalist Thomas Pennant, one of the first people to describe the species in the scientific literature (Douglas and Strickland 1987). In 1765, Buffon provided the first scientific description of the species based on a specimen from a collection in Paris and gave the name *Pekan*. In 1771, Pennant provided a scientific description of what he described as the *Fisher*. Pennant was apparently unaware that his description and that of Buffon's *Pekan* were of the same specimen (Powell 1981, 1993). In the late 1800s, Allen, Baird, Coues, Rhoads, and Smith independently agreed upon the binomial *Martes pennanti* (Hagmeier 1956, Powell 1981). Three subspecies have been recognized: *M. p. pennanti* (Erxleben) of northeastern and northcentral North America; *M. p. columbiana* (Goldman) of central and western Canada and the northern Rocky Mountains of the United States; and *M. p. pacifica* (Rhoads) of southwestern British Columbia, Washington, Oregon, and California (Goldman 1935, Hall 1981). The validity of these subspecies has been questioned (Grinnell et al. 1937, Hagmeier 1959, Coulter 1966). Recent genetic analyses reveal genetic structuring in fisher populations in North America similar to current subspecies designations but also consistent with an isolation-by-distance pattern (Kyle et al. 2001, Drew et al. 2003).

DESCRIPTION

The fisher is a large, stocky, dark brown member of the weasel family, and the largest member of the genus *Martes*. It is about the size of a large house cat. It has a long, bushy tail, short rounded ears, short legs, and a low-to-the-ground appearance. It is commonly confused with the smaller American marten (*M. americana*), which is lighter in color (cinnamon to milk chocolate color), has an irregular cream to bright amber throat patch, and has more pointed ears and a proportionately shorter tail. The fisher's pelage is dark brown on the snout, belly, legs, rump, and tail. The top of its head, neck and shoulders are a lighter, grizzled brown (cinnamon to milk-chocolate) color. Fishers often have white markings on their chest, underarm region and abdomen (Powell 1993). Although the configuration of these markings remains the same on individual fishers, the color is known to vary from white to amber-yellow and back again over a period of a year. Females have finer, silkier fur than males, making females' pelts more valuable than those of males (Douglas and Strickland 1987). Fishers have a single molt that begins in late summer or early fall and ends by November or December (Powell 1993). Fishers exhibit dramatic sexual dimorphism. Females usually weigh 2.0 to 2.5 kg (4.4-5.5 lb) and measure 70 to 95 cm (28-37 in) in total length;

males usually weigh 3.5 to 5.5 kg (7.7-12.1 lb) and measure 90-120 cm (36-47 in) total length (Powell 1993). The tail is slightly more than one third of the total body length in both sexes.

The fisher has partially retractable claws that allow it to climb and maneuver in trees; it can descend trees in a head-first position (Grinnell et al. 1937; Powell 1980, 1993). It has large feet with 5 toes and walks using its whole foot (plantigrade posture; Powell 1993) or just its toes (digitigrade posture; Strickland et al. 1982). The fisher runs with the undulating or bounding gait typical of weasels.

The fisher's dentition consists of 3 incisors, 1 canine, 4 premolars, and 1 molar bilaterally in the upper jaw; and 3 incisors, 1 canine, 4 premolars and 2 molars bilaterally in the lower jaw (Powell 1993). Males have a baculum, which becomes heavier and changes shape with age, and its characteristics can be used to distinguish juveniles from adults (Strickland et al. 1982, Frost et al. 1997). The skulls of both males and females have a sagittal crest, but the crest is much larger on adult males (Strickland et al. 1982).

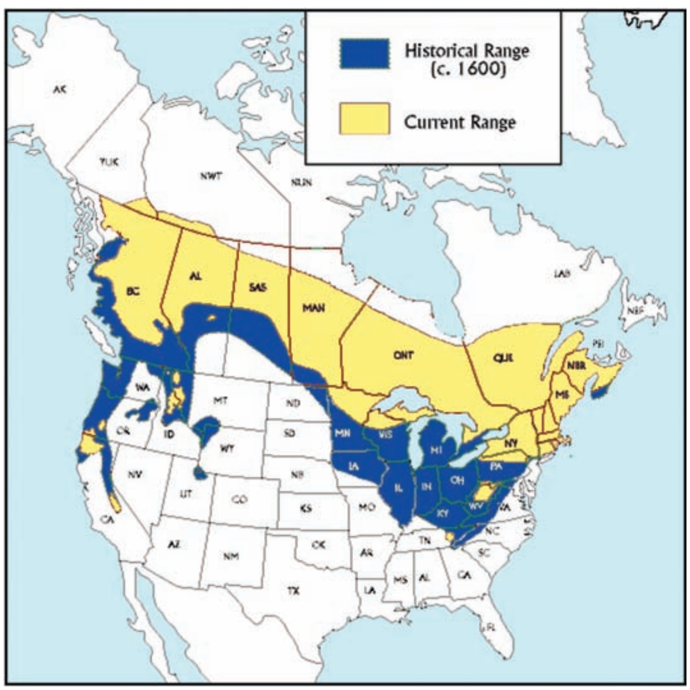

Figure 1. Historical and current range of the fisher in North America (based on Powell 1993, Gibilisco 1994, and Proulx et al. 2004).

DISTRIBUTION

North America

Fishers are found only in North America. Historically, the northern limit of its range coincided with tree line and extended from 60° north latitude in the West to just south of the southern tip of James Bay in the East (Powell 1993). Its range extended as far south as the Appalachians of Tennessee and North Carolina (Fig. 1; Hagmeier 1956, Powell 1993, Gibilisco 1994, Proulx et al. 2004). Prehistoric remains have been found as far south as Georgia, Arkansas, and possibly Alabama (Graham and Graham 1994). In the western United States, continuous peninsular extensions occurred historically from Canada south through the Rocky Mountains to Central Idaho, and south through the Cascade Range, Coast Ranges, and the Sierra Nevada (Gibilisco 1994).

Most of the fisher's range contraction within the United States has occurred since European settlement of the continent, particularly south of the Great Lakes region. Between the late 1800s and early 1900s, fisher populations declined dramatically. Populations were nearly extirpated over much of their former range in the United States and eastern Canada (Powell 1993, Powell and Zielinski 1994). Over-trapping and alterations of forested habitats by logging, fire, and farming were the primary reasons for this dramatic population decline and range contraction (Douglas and Strickland 1987, Powell 1993, Powell and Zielinski 1994). Prior to the 1920s, unregulated trapping of fishers and high prices for their pelts, especially the silky, glossy pelts of females, resulted in heavy exploitation of fisher populations (Powell 1993, Powell and Zielinski 1994). During the same period that fishers were heavily trapped, their habitat was being destroyed. By the mid-1800s, clearing of forests from logging, agriculture and fires resulted in extensive loss of forest cover over much of the northeastern United States (Powell and Zielinski 1994). Fires, particularly in the northern Rockies, resulted in the loss of well over 1 million acres of potential fisher habitat (Pyne 1982). Consequently, in the 1920s, 1930s and 1940s, many states and provinces closed trapping seasons for fishers to protect remaining populations and facilitate recovery (Powell 1993). During the 1930s, remnant fisher populations in the United States were known to occur only in the Moosehead Plateau region of Maine, in the White Mountains of New Hampshire, in the Adirondack Mountains of New York, in the "Big Bog" region of Minnesota, and in scattered locations in the Pacific coastal mountains. In Idaho and Montana, reliable reports of native fishers were last reported in the 1920s.

Concurrent with legal protection during the 1930s, extensive logging came to an end in eastern North America and abandoned farms reverted to forest, allowing remnant fisher populations to begin to recover and reinvade their former range. Fishers were reintroduced in areas where trapping closures alone were unsuccessful in recovering fisher populations (Berg 1982, Powell 1993). During the 1950s and 1960s many states and provinces reintroduced fisher populations to control porcupines (*Erethizon dorsatum*), to re-establish a valuable furbearer, and re-establish an extirpated species (Powell and Zielinski 1994, Lewis 2006). As a result, fishers expanded their distribution in eastern North America into areas where they had been extirpated during the early part of the century (Powell and Zielinski 1994). The current distribution of fishers includes much of the forested region of Canada, New England, New York, northern and southern Pennsylvania, West Virginia, northern Minnesota, northern Wisconsin, and the Upper Peninsula of Michigan (Gibilisco 1994, Proulx et al. 2004). Fisher populations are unlikely to return to Illinois, Indiana, or Ohio because of extensive loss of forests.

The fisher's range in the western states is now more fragmented and discontinuous than it was historically (Gibilisco 1994, Aubry and Lewis 2003, Proulx et al. 2004). Despite decades of protection from trapping and poisoning, fisher populations in the Pacific states did not recover and their geographical distribution is limited to several relatively small, disjunct populations. These populations include a reintroduced population in the southern Cascade Range in Oregon, an indigenous population in the Klamath-Siskiyou region of southwestern Oregon and northwestern California, and an indigenous population in the southern Sierra Nevada (Zielinski et al. 1995, Aubry and Lewis 2003, Aubry et al. 2004). The small fisher population in the southern Oregon Cascade Range is separated from the nearest extant population in southern British Columbia by a distance of over 650 km (M. Badry, pers. comm. *in* Aubry and Lewis 2003). The fisher's range in British Columbia has also contracted to the north. In southern British Columbia, fisher populations appear to have disappeared from the lower mainland, parts of the Okanogan and Cascade Mountain ranges of the southern interior, and the southeastern portion of the province. These areas have been identified as having low habitat suitability and support low fisher harvests (Weir 2003, Proulx et al. 2004). Translocations have re-established fishers in central Idaho and northwestern Montana, although fishers remain uncommon in this region (Proulx et al. 2004, Vinkey et al. 2006). Fisher populations in central Idaho are probably not large enough or close enough to provide dispersers to recolonize eastern Washington. A small number of fishers have been detected in the northern part of the Idaho panhandle and may represent a small, isolated population (S. Cushman, pers. comm.).

Washington

Early records. Archaeological deposits from sites in King, Okanogan, and Ferry counties suggest that the fisher has been present in Washington for at least 4,000 years (Lyman 1995, R. L. Lyman, pers. comm.). Based on habitat, the historical range of fishers in Washington probably included all wet and mesic forest habitats at low- to mid-elevations (Fig. 2). 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 (Suckley and Cooper 1860, Taylor and Shaw 1927, Scheffer 1938, 1957, 1995; Booth 1947, Dalquest 1948, B. Adamire, pers. comm; Appendix A). The species' historical occurrence in northeastern and southwestern Washington and the Blue Mountains is uncertain.

Booth (1947) included all these areas as fisher range. Taylor and Shaw (1927) and Dalquest (1948) excluded these areas as historical fisher range but Dalquest stated, "a few may occur in northeastern Washington, the Blue Mountains, and the Willapa Hills." Suckley and Cooper (1860:92,114) mention fishers in the Blue Mountains and two fishers were reportedly trapped in the Blue Mountains in Oregon (Bailey 1936). Fur returns reported by the Hudson's Bay Company for the years 1836-1852 list 284 fishers from Fort Nez Perces at Walla Walla (Hudson's Bay Company Archives, Winnipeg). The origin of these fishers is unknown. In northeastern Washington a large number of trapping records of fishers were reported from Fort Colville, which was near Kettle Falls. However, Fort Colville received furs from part of southeastern British Columbia, northern Idaho, and western Montana, as well as northeastern Washington (Mackie 1997:250). For southwest Washington, Booth (1947) listed a specimen from Bay Center, Pacific County. Johnson and Cassidy (1997) excluded southwestern Washington because the Bay Center specimen listed by Booth (1947) is not among the other specimens of the Biological Survey Collection at the Smithsonian. The specimen either has been lost or never existed (R. Johnson, pers. comm.). Historical accounts indicate fishers were trapped in southwestern Washington near the Palix River, Pacific County in 1903, 1910, and 1913 (B. Adamire, pers. comm.), and 3 fishers were reportedly trapped near Seaview in 1930 (Scheffer 1957).

Fishers probably did not occur historically on islands in Puget Sound. A bone found during excavation of a village site on Whidbey Island is the only known fisher record, and it may have been caught elsewhere (Bryan 1963). San Juan County was not included in the historical range, though Booth (1947) listed a specimen in the personal collection of Walter Dalquest from Blakely Island. However, Walter Dalquest has no recollection of such a specimen

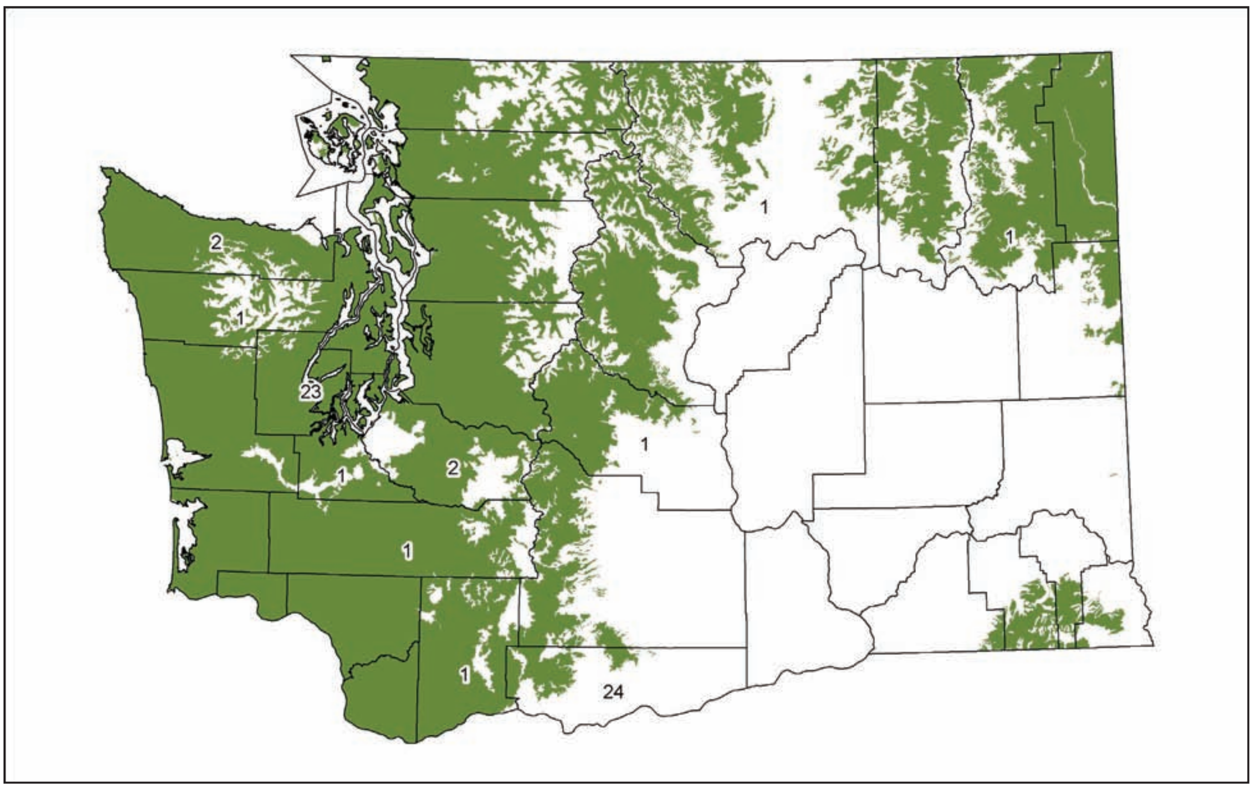

Figure 2. Probable historical distribution (circa 1800) of the fisher in Washington based on specimens (numbers indicated by county), trapping records, and forest zones associated with fisher records (Aubry and Houston 1992) (Forest zones [Cassidy 1997] shaded include: Western Hemlock types, Douglas-fir types, Grand Fir, Cowlitz River (zone), Willamette Valley (zone), Sitka Spruce, Interior Redcedar, Silver Fir, and Subalpine Fir).

and did not believe fishers were ever found on the islands (F. Stangle, pers. comm.). Dalquest (1948), and Johnson and Cassidy (1997) did not include San Juan County within the historical fisher range.

Scheffer (1938, 1957, 1995) reported that fishers were trapped in low-elevation forests of the Olympic Peninsula in the early 1900s, but by the 1930s the fisher was "... concentrated chiefly in the wild and roadless portions of the Olympic Mountains, but has been reported along the Cascades and as far east as the Okanogan Valley" (1938:8). Aubry and Houston (1992) summarized sighting and trapping records of fishers and evaluated their occurrence in relation to major vegetation zones within Washington. Among 46 records for the years 1955-1991 for western Washington, 54% were from the western hemlock (*Tsuga heterophylla*) zone, 20% from the Sitka spruce (*Picea sitchensis*) zone, and 26% from the Pacific silver fir (*Abies amabilis*) zone. Among 19 records from the east side of the Cascades, 53% were from the subalpine fir (*Abies lasiocarpa*) zone, 37% were from the grand fir (*Abies grandis*) / Douglas-fir (*Pseudotsuga menziesii*) zone, and 10% were from the timberline / alpine zone.

Recent records. Aubry and Houston (1992) compiled fisher records and sighting reports from 1955-1991 for Washington. Fisher sightings and track reports must be interpreted with caution, because other species, including martens and river otters (*Lontra canadensis*), can be mistaken for fishers, and large marten tracks are similar to female fisher tracks (Zielinski and Truex 1995). Aubry and Houston (1992) evaluated all fisher records and reports and assigned them to categories of reliability. Their summary suggested that the fisher is no longer found in the southern Coast Range, the Kitsap Peninsula, along the eastern edge of Puget Sound, the southernmost Cascades, and the Blue Mountains (Aubry and Houston 1992). The only verifiable records (specimens or photos) in recent years include: a female found dead in a trap near Orting, Pierce County, in 1990; a fisher trapped, photographed, and released on Fort Lewis, Pierce County in 1992; and a radio-collared fisher from Montana that was recovered in Stevens County in 1994 (Appendix A). However, the recent records from Orting (M. Schwartz, pers. comm.) and Fort Lewis were likely escapees from captive wildlife facilities. From the mid-1980s through 1990s the National Park Service, U.S. Forest Service and Washington Department of Fish and Wildlife (WDFW) conducted extensive surveys using standard survey protocols but failed to detect any fishers (Lewis and Stinson 1998, Aubry and Lewis 2003). During the winters of 2001-04 the National Park Service conducted forest carnivore surveys, using standardized survey protocols, in Mount Rainier (2001-02), Olympic (2002-03) and North Cascades (2003-04) national parks. No fishers were detected (Happe et al. 2005, Christopherson et al. 2005, J. Schaberl, pers. comm.). The absence of reliable observations of fishers in recent years, and lack of detection on federal lands based on standardized surveys implemented over several years, suggests that fishers are extremely rare or have been extirpated from the state.

NATURAL HISTORY

Reproduction

Fishers have a relatively low reproductive capacity. Although females attain sexually maturity and can breed for the first time at 12 months, they don't give birth for the first time until age 2 because of delayed implantation of the fertilized ovum (Powell 1993, Frost et al. 1997). Moreover, not all adult females produce litters every year. In a heavily trapped population in Maine, Paragi et al. (1994*b*) reported an average of 63% (range = 0.33-1.00) of females raised litters to weaning each year. Factors that may influence reproductive success include age, physical condition during fall and winter, and prey availability (Paragi 1990, Arthur and Krohn 1991, Mead 1994). Productivity of females appears to peak at 4-5 years of age (Douglas and Strickland 1987, Paragi 1990). Like females, males are sexually mature at 12 months of age (Wright and Coulter 1967, Leonard 1986, Frost et al. 1997) but are not effective breeders until age 2 (Douglas and Strickland 1987). The baculum in yearling males may not be sufficiently developed to induce ovulation in receptive females (Douglas and Strickland 1987).

Fishers, like all other *Martes* species, exhibit delayed implantation. Following fertilization of the egg, cleavage of the embryo proceeds to the "blastocyst" stage, after which further development is suspended (Mead 1994). For fishers, embryos remain dormant in the blastocyst stage for 10-11 months before implantation occurs in the spring (February-March). Implantation of blastocysts is under hormonal control and is triggered by increasing photoperiod (Frost et al. 1997). After an active gestation period of about 36 days, between 1-4 kits are born sometime in late March or early April (Powell 1993, Mead 1994). Females mate 3-10 days after parturition (Hall 1942). Mating may occur during several hours on one day, or a similar amount of time on several days (Powell 1993).

Wright and Coulter (1967) reported that trapped females typically had 3 or 4 embryos in their uteri. However, Mead (1994) found that litter size was typically 2-3 and Paragi et al. (1994*a*) reported a mean litter size of 2.2. These data suggest that fetus reabsorption, abortion, or post-partum mortality commonly occur (Powell 1993). Frost et al. (1997) reported a decline in average litter size from 2.7 at birth to 2.0 seven days postpartum. Kits open their eyes at about day 45-50 and attempt to walk at 6-8 weeks (Powell 1993). Kits are weaned at about this time and the mother begins provisioning them with prey. At age 10 weeks they can walk and climb awkwardly (Paragi 1990, Powell 1993), and will roam around outside the den entrance (K. Aubry, pers. comm.). Females raise the kits with no help from males (Coulter 1966, Powell 1993). Kits become independent of their mother in late summer and early fall (Arthur and Krohn 1991, Aubry and Raley 2002).

Males make extensive forays from established home ranges during the breeding season in March and April (Leonard 1986, Arthur et al. 1989*a*). Males apparently attempt to mate with as many females as possible. Fighting and other aggressive interactions between males may be common at this time (Leonard 1986, Arthur et al. 1989*a*). Breeding season forays outside their home range could provide males with additional breeding opportunities (Powell 1993).

Mortality and Survival

Maximum life span of wild fishers is approximately 10 years (Kohn et al. 1993, Powell 1993). Where trapping of fishers is permitted, it is typically the largest source of fisher mortality (Douglas and Strickland 1987, Krohn et al. 1994). In Maine, Krohn et al. (1994) found that human-related causes accounted for 94% of the 50 deaths of radio-collared fishers with trapping accounting for 80%. During the trapping season in Maine, juveniles had the lowest survival rate (0.38), whereas adult survival rates differed by sex with males having a significantly lower survival rate (0.57) than females (0.79). During the non-trapping season survival was higher for both adults (0.89) and juveniles (0.72) (Krohn et al. 1994). Paragi et al. (1994*b*) reported a mean annual survival rate of 0.65 for adult females (≥1 year old), and 0.27 for juveniles of either sex for Maine fishers. Other sources of mortality include vehicle collisions, predation, fighting, disease, infections, starvation, poisoning, accidents, and debilitation from porcupine quills (Douglas and Strickland 1987, Proulx et al. 1994). Male fisher pelts commonly (40-50%) show scarring from intraspecific fighting (Douglas and Strickland 1987). Among males, fighting may account for a significant percentage of natural mortality. There are few data on fisher mortality from predation. Douglas and Strickland (1987) stated that hawks, great horned owls (*Bubo virginianus*), red foxes (*Vulpes vulpes*), bobcats (*Lynx rufus*), lynx (*L. canadensis*), and black bears (*Ursus americanus*) are potential predators, especially of kits. They also reported a fisher killed by dogs (*C. familiaris*). In Montana, Roy (1991) documented predation by mountain lions (*Puma concolor*), coyotes, wolverines (*Gulo gulo*), golden eagles (*Aquila chrysaetos*), and lynx on fishers recently translocated from Minnesota.

Population Cycles

Fisher populations that rely heavily upon snowshoe hares (*Lepus americanus*) for food reflect the cyclic abundance of this prey species. Total fisher harvests (and presumably the fisher population) for all of Canada exhibit a cycle that lags 3 years behind the snowshoe hare cycle (Bulmer 1974, 1975). This cycle is not evident in all parts of Canada; Keith

(1963) reported that the fisher population in British Columbia does not cycle, and Leonard (1986) found no evidence of a cycle in southern Manitoba. In Washington and other areas in the southern part of the hare's range, hare populations do not have a pronounced cycle (see Koehler 1990, Koehler and Aubry 1994). In Minnesota, fishers consumed more small mammals (e.g., voles, mice, and shrews) and deer carrion in response to a decline in hare abundance, and showed no decline in reproductive success or condition (Kuehn 1989).

Behavioral Characteristics

Fishers are solitary except when rearing young, breeding, or fighting. During the non-breeding period, adult fishers maintain intrasexual territories (Leonard 1986, Arthur et al. 1989*a*, Weir 1995). During the breeding period (generally March-April), males may remain in established home ranges that overlap one or more females, abandon their non-breeding home ranges in search of mating opportunities, or employ both strategies (Leonard 1986, Arthur et al. 1989*a,* Aubry et al. 2004). Males and females apparently locate each other by investigating other fisher tracks and marking elevated scent posts with urine, musk and scats (Coulter 1966, Leonard 1986). Male-female interactions, other than breeding and detecting scent marks, are probably incidental to other activities. Defending territories using confrontation may be relatively rare (Powell 1993).

Scent-marking with urine, feces, and glandular secretions on logs, stumps, and snow piles is used presumably as a means of communication. Plantar glands on the hind feet become larger during the breeding season and may deposit scent during normal locomotion (Frost et al. 1997). Leonard (1986) documented fishers investigating tracks of the opposite sex during the breeding period, as well as scent marking rocks and stumps with urine, musk and scats. Fishers have been observed marking deer carcasses by dragging their abdomens over the carcass and marking with urine (Pittaway 1984). Rest sites are also scent marked with feces and urine (Powell 1993). An abdominal scent gland is present in American martens and wolverines, but has not been described for fishers (Pittaway 1984).

Diet and Foraging

While a number of fisher food habit studies have been conducted in New England (Arthur et al. 1989*b*, Giuliano et al. 1989, Powell et al. 1997*a*), Minnesota (Kuehn 1989) and southeastern Manitoba (Raine 1987), there have been few studies in western North America. Initial studies were from California (Grenfell and Fasenfest 1979) and the Pacific coastal states (Ingles 1965), with later studies from California (Zielinski et al. 1999), Idaho (Jones 1991), Montana (Roy 1991), British Columbia (Weir et al. 2005), and Oregon (Aubry and Raley 2006) (Table 1). In the early 1900s, trappers on the Olympic Peninsula found mountain beaver and squirrel remains in fisher stomachs. Scats collected along trails in summer contained huckleberries (*Vaccinium* sp.) and salal berries (*Gaultheria shallon*) (Scheffer 1995). This is the only information on food habits for fishers in Washington. Most food habits studies conducted in western North America provide information on the winter diet (Table 1). This is due to the readily available source of carcasses provided by trappers during the legal trapping season, or collection of scats during winter reintroductions. A single study conducted in the Sierra Nevada of California provides information on seasonal food habits of fishers in western North America (Zielinski et al. 1999).

Winter diet. The most important prey in the winter diet of fishers from British Columbia (Weir 2005), Idaho (Jones 1991), and Montana (Roy 1991) were snowshoe hares, red squirrels (*Tamiasciurus hudsonicus*) and small mammals (Table 1), based on frequency of occurrence of food items in scats or stomachs. Weir et al. (2005) aggregated prey species found in fisher stomachs (n = 215) into 7 food groups based on similarity in niches and body sizes. The top 3 food groups were small mammals (mice, voles, shrews and squirrels; 41.2%), followed by snowshoe hares (15.2%), and aquatic mammals (beavers [*Castor canadensis*] and muskrats [*Ondatra zibethicus*]; 14.0%). Porcupines occurred with greater frequency in prey remains in British Columbia (19.5%, Weir et al. 2005) than in Montana (6%, Roy 1991) or Idaho (6%, Jones 1991). Ungulate carrion is also an important winter

Table 1. Occurrence (%) of food items in fisher scats and gastrointestinal tracts from western North America.

	Season									
	All	Winter						Spring	Summer	Fall
Prey	OR[1]	BC[2]	MT[3]	ID[4]	ID[5]	CA[6]	CA[7]	CA[7]	CA[7]	CA[7]
Mammals										
Neurotrichus gibbsii	2									
Rodentia unknown	4									
Peromyscus maniculatus		16								
Peromyscus leucopus				14						
Peromyscus spp.	<1		14			25	8	6	16	
Clethrionomys gapperi		23		29	6					
Clethrionomys spp.	<1									
Unident. voles					28					
Microtus spp.	<1	8	3				13	6	5	
Reithrodontomys megalotis						13				
Neotoma cinerea		2	7							4
Neotoma spp.	<1									
Zapus princeps					6					
Zapus spp.	<1									
Marmota flaviventris				14	6					
Tamiasciurus hudsonicus		34		14	22					
Tamiasciurus douglasii	3						4	11	6	4
Tamius spp.	3		3		6				1	8
Glaucomys sabrinus	2	8							1	
Sciurus griseus	<1					13	8	2	4	4
Sciuridae, unk. spp.	6									
Spermophylus beecheyi	11							6	4	4
Spermophylus lateralis	3									
Spermophylus spp.	2				6					
Thomomys bottae								6	6	4
Thomomys spp.	<1				6					
Castor canadensis				29	6					
Ondatra zibethicus	2									
Erethizon dorsatum	2	20	6	6						
Unident. rodents			6							
Sorex spp.	<1	15						1	3	4
Scapanus latimanus						13		4	2	
Lepus americana		39	49	29	50					
Sylvilagus bachmani						13				
Lagomorpha; unknown	<1									
Leporidae, unk. spp.	23									
Ochotona princeps	<1									
Martes pennanti		10								
Martes americana		11	7							
Martes spp.			6				8	28	15	35
Unident. Mustelids	3				6			2		
Spilogale putorius										4
Odocoileus spp.		10	3	14	11	25				
Cervus elaphus				29	6		25	4		
Alces alces		15		14	11					
Unident. ungulate	9			29	22					
Mammalia, unknown	15									
Birds										
Galliformes		9								
Unident. birds	28			14	17		25	32	51	27
Reptiles	6							38	20	4
Insects	25				22	25	42	53	62	50
Fruit[8]		tr					tr		tr	tr
Seeds					17					
Plants	14									

[1]Aubry and Raley (2006), n = 387 scats for males and females combined; [2]Weir et al. (2005), n = 215 stomachs; [3]Roy (1991), n = 80 scats; [4]Jones (1991), n =7 gastrointestinal tracts; [5]Jones (1991), n = 18 scats; [6]Grenfell & Fasenfest (1979), n = 8 gastrointestinal tracts; [7]Zielinski et al. (1999), n = 201 scats; [8]*Vaccinium* spp. or *Ribes* spp. berries

food item (Table 1). In the southern Sierra Nevada of California, the most commonly occurring winter foods were mice and voles, insects, ungulate carrion, squirrels, and birds (Zielinski et al. 1999). Analysis of eight fisher carcasses collected in the Trinity National Forest in northern California, included remains of ungulate carrion (25%), small mammals (50%), western gray squirrels (*Sciurus griseus*; 12.5%), leporids (12.5%), and beetles (25%) (Grenfell and Fasenfest (1979).

Spring, summer, and autumn diet. In the only published study of seasonal food habits in the Pacific states, Zielinski et al. (1999) found little seasonal variation in the diet of fishers in the southern Sierra Nevada. The most common prey in scats during spring, summer and autumn periods were sciurids (15.4-24.5%), including California ground squirrel (*Spermophilus beecheyi)*, western gray squirrel, and Douglas' squirrel (*Tamiasciurus douglasii*); murids (7.7-26.5%) (*Peromyscus* spp. and *Microtus* spp.); birds (26.9-51%); and reptiles (3.8-37.7%). Reptiles were important during spring (37.7%) and summer (20.4%), especially the alligator lizard (*Elgaria* sp.). Insects were consistently common foods during spring (52.8%), summer (62.2%), and autumn (50.0%), with beetles (Coleoptera) and social wasps (Vesidae/Eumenidae) most prevalent. Predictably, fruit became more important in the diet during fall and winter. The fact that no single family of plant or animal group occurred in more than 22% of feces attests to the diversity of the fisher diet in California.

A study in the southern Oregon Cascade Range also indicates that the fisher is a dietary generalist. Prey remains collected at den, rest, and active sites while radio-tracking fishers in southern Oregon included hares, rabbits, squirrels (California ground squirrel, Douglas' squirrel, northern flying squirrel [*Glaucomys sabrinus*]), Virginia opossum (*Didelphis virginiana*), striped skunk (*Mephitis mephitis*), porcupine, bobcat, ungulate carrion (deer [*Odocoileus* spp.], and elk [*Cervus elaphus*]), birds (Stellar's jay [*Cyanocitta stelleri*], pileated woodpecker [*Dryocopus pileatus*], hairy woodpecker [*Picoides villosus*], northern flicker [*Colaptes auratus*], western screech owl [*Megascops kennicottii*], ruffed grouse [*Bonasa umbellus*], blue grouse [*Dendragapus obscurus*], mountain quail [*Oreotyx pictus*], turkey [*Meleagris gallopavo*]), reptiles (*Thamnophis* spp.), and insects (Aubry and Raley 2006). Scats were also collected year-round from 8 males and 11 females, but 89% of the female scats and 62% of the male scats were collected between March and September (Aubry and Raley 2006). Mammal prey were the dominant prey items (83%), followed by birds (28%), arthropods (26%), plants (14%), and reptiles (7%)(Table 1). These 5 taxa were equally represented in scats of males and females. However, there were differences between the sexes in the frequency of occurrence of prey items among mammal taxa. Female scats contained a greater percentage of Sciurids (35%) and Leporids (27%) than male scats (10% and 7%, respectively). Male scats contained a greater percentage of skunk (10%) and porcupine (8%) than did female scats (1% and 0%, respectively). These results suggest that female fishers captured smaller-bodied prey more frequently than larger-bodied prey, and male fishers were capturing larger-bodied prey more frequently.

While there is little information available on the food habits of fishers in Washington (Scheffer 1995), an evaluation of bobcat food habits in western Washington could provide insight into fisher diet. In regions of North America where bobcats and fishers are sympatric, their diets are similar (Litvaitis 1984, Litvaitis et al. 1986, Arthur et al. 1989*b*, Giuliano et al. 1989). Schwartz and Mitchell (1945) identified food items in 6 stomachs and 99 scats of bobcats collected during 1935-38 from the Elwha, Hoh, Queets, and Quinault drainages. The most common prey items were snowshoe hares (44%) and Douglas' squirrels (18%). These data on bobcat food habits apparently were collected in old-growth forests, presumably within Olympic National Park (Sweeney 1978:19). Young (1958) reported mountain beavers to be the dominant prey of bobcats in Washington during spring and summer periods. In western Washington, the most common prey items in bobcat scats during winter months were mountain beaver (56.6%), followed by snowshoe hare (39.5%), small mammals (15.7%), and squirrels (Douglas' squirrel and northern flying squirrel; 9.2%) (Sweeney 1978). Black-tailed deer (*Odocoileus hemionus*) and possibly elk were less important in the diet (6.6%)(Sweeney 1978). Knick et al. (1984) also reported mountain beavers and snowshoe hares to be the primary prey of bobcats during fall through winter in western Washington (42% and 26%, respectively). Mountain beavers and snowshoe hares combined occurred in 68% of stomachs and accounted for 83% of the weight of all food items. Knick et al. (1984) speculated that the greater importance of mountain beavers in recent studies, compared to Schwartz' and Mitchell's study may be attributed to changes in availability of mountain beaver habitat. Logging and burning in western Washington increased the proportion of early successional forests, the preferred habitat of mountain beavers (Knick et al. 1984). Data on bobcat food habits from the Oregon Cascades and Coast Ranges may provide additional insight into fisher food habits. Snowshoe hares were the most frequently reported bobcat prey in the Cascades (Nussbaum and Maser 1975, Toweill and Anthony 1988). Leporids and mountain beavers were important bobcat prey in the Coast Range. Nussbaum and Maser (1975) reported Leporids (52.5%) and small mammals (56.7%) as the most frequently encountered bobcat prey in scats, whereas Witmer and deCalesta (1986) reported mountain beaver as the most frequently encountered bobcat prey in scats during spring (84.0%, $n = 100$), summer-fall (73.7%, $n = 57$), and winter (62.2%, $n = 90$) periods. Mountain beavers are most abundant in early to mid-successional forests with a dense understory of trees, shrubs and forbs (Carraway and Verts 1993). On the west slope of the Cascades within the Willamette National Forest, mountain beavers were found in bobcat scats during Jan-Mar (8%), Apr-Jun (16%), and July-Sep (17%). Farther to the south in a mixed landownership of public and private lands, no mountain beavers were detected in prey remains at den, rest and active sites or scats ($n = 387$) of fishers (Aubry and Raley 2006). Bobcats forage in early and mid-successional forest types, but no studies have been conducted on fisher foraging habitat in the western United States.

Reintroduced fishers are likely to consume a diversity of prey species from a variety of habitat types. Some prey species, such as Douglas' squirrels, northern flying squirrels and red-backed voles, are likely to be more common in mature forests, whereas snowshoe hares, mountain beavers and some small mammals are likely to be more common in early successional forests that occur in canopy gaps, burns, riparian areas, and recently logged areas. As a habitat specialist in late-seral forests of the western United States, it may be adaptive for the fisher to be a dietary generalist and prey on an array of species that it encounters in and near mature conifer forests. This appears to be the foraging strategy of fishers in the southern Sierra Nevada (Zielinski et al. 1999).

Territoriality and Home Range

Home range size of fishers varies widely for individuals and by region (Table 2). Powell and Zielinski (1994) reported that there is no clear pattern in home range sizes, although the largest have been recorded in western states and provinces. Typically, male home ranges are two to three times the size of female home ranges. Sex-specific differences in home range size may be a result of differential resource use (i.e., males seek access to females, while females seek access to food)(Arthur et al. 1989*a*, Powell and Zielinski 1994). The home ranges of males often overlap more than one female home range. There appears to be very little intrasexual overlap of adult home ranges, with the exception of males during the breeding season (Powell 1993). Data on home range size that includes breeding season data often include extra-territorial excursions by males (Powell and Zielinski 1994).

Activity Patterns, Movement and Dispersal

Fishers are primarily terrestrial, but climb trees to reach den and resting sites or to reach prey. Fishers can travel from tree to tree, but their arboreal activities have been exaggerated in the popular literature (Grinnell et al. 1937, Powell 1980). Female fishers, due to their smaller size, seem to be more adept at climbing (Powell 1977, Pittaway 1978).

Activity patterns of fishers vary with time of day, season, and reproductive status. During all seasons, periods of greatest activity occur shortly before sunrise and after sunset and the least activity

Table 2. Estimated home range sizes (km^2) for fishers in nine studies in western North America.

	Male		Female				
Location	*n*	Mean ± SE	*n*	Mean ± SE	Season	Method	Source
Alberta	6	24.3 ± 11.1	10	14.9 ± 3.5		MCP[1]	Badry et al. 1997
British Columbia	1	46.5	5	26.4 ± 9.2	annual	90% AK[2]	Weir 1995
" "	3	122.1 ± 66.5	8	33.0 ± 10.7	summer	90% AK	Weir 1995
" "	-		3	32.3 ± 18.3	autumn	90% AK	Weir 1995
" "	1	73.9	6	25.0 ± 2.6	winter	90% AK	Weir 1995
" "	1	59.1	2	27 ± 3.1	annual	90% AK	Fontana et al. 1999
Idaho	6	79 ± 14.3	4	32 ± 11.5		90% HM[3]	Jones 1991
Oregon	1		7	~25	annual	95% MCP	Aubry and Raley 2006
" "	4	~62		-	non-breeding	95% MCP	Aubry and Raley 2006
" "	3	~147		-	breeding	95% MCP	Aubry and Raley 2006
California	2	58.1 ± 29.6	7	15.0 ± 2.2	annual	100% MCP, Coastal Mtns.	Zielinski et al. 2004*b*
" "	4	30.0 ± 7.8	8	5.3 ± 0.6	annual	100% MCP, Sierra Mtns.	Zielinski et al. 2004*b*

[1]MCP = minimum convex polygon, [2] AK = adaptive kernel, [3]HM = harmonic mean.

occurs during midday when fishers are typically resting (Kelly 1977, Arthur and Krohn 1991). Peak activity periods may reflect the times when they are hungry and when their prey is more available (Powell 1993). Fishers generally have 1-3 activity periods per day lasting 2-5 hours each (Powell 1993). Amount of activity is not different between sexes during any season (Arthur and Krohn 1991) but both sexes are more active during summer than winter (Kelly 1977, Arthur and Krohn 1991). Cold temperatures or greater snow depths may explain reduced winter activity (Arthur and Krohn 1991). During spring, denning females are more active than females without young, but overall activity is not different between these two groups during summer and winter; however, during summer, denning females are more active during the day (Arthur and Krohn 1991, Paragi et al. 1994*a*).

Age and sex of fishers affects movement of individuals seasonally. During autumn, juvenile females travel shorter distances than juvenile males (Arthur and Krohn 1991). During spring, both juvenile and adult males move greater distances than non-denning adult females (Arthur and Krohn 1991). Greater movement by adult males during this season is probably a result of their attempts to locate receptive females (Arthur et al. 1989*a*). Adult males and non-denning adult females move similar distances during summer, and juvenile and adult males and adult females move similar distances during winter (Arthur and Krohn 1991). Juvenile males move similar distances during autumn, winter and spring periods (Arthur and Krohn 1991).

Based on snow tracking, fishers in Michigan typically travel about 5 km each day (Powell 1993). In Wisconsin, Kohn et al. (1993) found average minimum daily movements of 2.25 and 1.25 km (1.4 and 0.8 mi) to be typical of males and females, respectively (straight line distance using telemetry). Fishers occasionally make long-distance movements in short periods, especially males during the breeding season. Reintroduced fishers typically travel >50 km after being released (Weckwerth and Wright 1968, Pack and Cromer

1981, Roy 1991, Heinemeyer and Jones 1994, Proulx et al. 1994, Weir 1995).

Rivers and roads may create barriers to movement. Kelly (1977) and Coulter (1966) reported that large rivers restricted movements and dispersal, but Weir (1995) and Fontana et al. (1999) reported fishers crossing large rivers and lakes in British Columbia. In Massachusetts, two fishers crossed and re-crossed a large river, but may have used bridges (York 1996). Seton (1929), and deVos (1952, cited in Heinemeyer and Jones 1994) indicate that fishers do not hesitate to swim when it is advantageous. In Oregon, fishers established home ranges on either side of a major highway and large river, indicating possible barriers to movement. However, adult males regularly crossed these features during the breeding season, adult females occasionally, and dispersing juveniles were not impeded by these features (Aubry and Raley 2006). In Maine, fisher home ranges spanned both sides of paved roads where forest was intact to the road edge (Arthur et al. 1989*a*). In areas where human development (i.e., non-forest, such as farms) was adjacent to major roads, the roads corresponded to home range boundaries (T. Paragi, pers. comm.). In Massachusetts, a fisher that maintained a home range on both sides of a highway was killed by a vehicle (York 1996).

In most mammals, males disperse from their mother's home range, but females remain nearby (Greenwood 1980). Male-biased dispersal is consistent with predictions of a polygynous mating system and intrasexual territoriality in fishers. Consistent with these predictions, Aubry and Raley (2006) reported average dispersal distances for juvenile males and females to be 29 km and 6 km, respectively. Two females did not disperse and established home ranges adjacent to their mothers. Moreover, adult females were more closely related to each other in the study area than were adult males, which is consistent with a social structure established by male-biased juvenile dispersal and female philopatry (Aubry et al. 2004). In contrast, two studies in New England found juvenile dispersal distances that did not support these predictions. In a heavily trapped fisher population in Maine, Arthur et al. (1993) found no significant difference in juvenile dispersal between males (n = 8, mean = 10.8, range = 4.1-19.5 km) and females (n = 5, mean = 11.3, range = 5.0-18.9 km). Similarly, York (1996) found no significant difference in juvenile dispersal distances between males and females in a central Massachusetts population that had a greater density but lower trapping mortality. Mean dispersal distance for males and females combined was 33 km. Trapping mortality is likely to disrupt spacing patterns and dispersal in fisher populations and therefore may explain the similar dispersal distances in New England. In Idaho, two 1-year-old males moved 26 and 42 km before establishing home ranges (Jones 1991).

Ecological Function

The ecological functions of fishers in western coniferous forests are poorly understood, but are likely to include roles of predator, prey, competitor, seed disperser, and as a host to parasites and pathogens. Fishers prey on a broad array of species and appear to take prey opportunistically. Thus, fisher predation is likely to have minimal impact on the population dynamics or community structure of their prey in western coniferous forests (Aubry et al. 2003). While its role may be limited, the fisher can be prey to larger carnivores including mountain lions, wolverine, lynx, coyotes, and raptors (Roy 1991, Heinemeyer 1993, Aubrey and Raley 2006). Competitive interactions between fishers and martens do not appear to have an important influence on their populations; the two species appear to co-exist at the regional scale by partitioning habitat based on elevation and snow depth and may co-exist at local scales by partitioning food resources (Aubry et al. 2003). Fishers may be important agents for long distance dispersal of propagules and may serve as hosts for a variety of parasites in western coniferous forests (Aubry et al. 2003). Fishers use witches' brooms, caused by dwarf mistletoes (*Arceuthobium douglasii*), as rest sites and maternal dens. Fishers use these structures during the summer period when mistletoe seeds are forcibly ejected from their fruits. Large spatial requirements and use of a variety of forest structures within their large home ranges may therefore facilitate long distance dispersal of dwarf mistletoe seeds and other propagules (Aubry et al. 2003). Fishers may also harbor host-specific parasites and may serve a role in completing or disrupting life cycles of parasites. For example, the cestode *Taenia martis americana* is host-specific in the American marten and cannot complete its life cycle in the absence of martens (Hoberg et al. 1990). By providing forest structural elements of fisher habitat, managers may also contribute to the functional role that fishers play in western coniferous forests.

HABITAT REQUIREMENTS

General

Fishers use forests with a high percentage of canopy closure, abundant large woody debris, large snags and cavity trees, and understory vegetation (Buck et al. 1983, Arthur et al. 1989*b*, Jones 1991, Powell 1993, Seglund 1995). Coues (1877) and Seton (1929) noted that fishers seem to prefer forest near swamps, especially swamps with large overstory trees. Riparian habitats are used extensively by fishers, especially as travel corridors and rest sites (Buck et al. 1983, Jones and Garton 1994, Seglund 1995).

Structure-level Characteristics

Den sites. In western North America, fishers appear to be highly selective of large, live, decadent or dead trees for natal den sites, where females give birth to their young and nurse them until weaning at about 8 weeks of age (Seglund 1995, Aubry and Raley 2006, Weir and Harestad 2003). In British Columbia, natal dens occur in branch-hole cavities in decadent cottonwood trees (*Populus* spp.) that average 103 cm dbh (range = 89.2-122 cm) and 25.9 m in height (range 17.7-30.0 m)(Weir and Harestad 2003). Den trees are the largest diameter trees in the immediate area and occur infrequently in fishers' home ranges. In California, Seglund (1995) located 2 natal dens belonging to the same female; 1 was located in a cavity of a 78-cm dbh ponderosa pine (*Pinus ponderosa*) snag and the other was in a hollow lateral limb of an 88-cm dbh live black oak (*Quercus kelloggi*). In southern Oregon, females use cavities in snags ($n = 6$) or live trees ($n = 8$) that average 93 cm in dbh (range = 61-138 cm) and 16 m in height (range = 4 - 46.5 m) above the ground (Aubry and Raley 2002). Access to hollows created by heartwood decay is mostly (57%) provided by holes excavated by pileated woodpeckers. In Montana, Roy (1991) found a natal den in a hollow log 11 m long with a 30-cm diameter cavity. Although Weir's findings of fisher use of deciduous trees as natal dens are consistent with studies in eastern North America (Arthur 1987, Paragi 1990, Powell et al. 1997*b*), recent data from the Pacific states indicates that a variety of large conifer tree species meet this denning requirement (Aubry and Raley 2006). Availability of large den trees is likely a limiting factor for fishers in landscapes dominated by short-rotation (<50-60 years) forestry in which large snags are removed and forest succession is truncated.

Maternal dens are used by adult females and kits after weaning and during the period in which kits remain dependent on their mother for food (Aubry and Raley 2006). Kits are moved from natal dens to maternal dens at about 8-10 weeks of age and utilize these structures until about 5 months of age (late August or early September) (Paragi 1990, Seglund 1995). Maternal den structures are more variable than natal dens, and are typically closer to the ground. Adult females and kits used cavities in lower parts of live and dead trees, large (>50 cm dbh) hollow logs, mistletoe brooms, and rodent nests (Aubry and Raley 2006).

Rest sites. Fishers use rest sites between periods of activity. Rest sites are typically used for only a single resting or sleeping bout, but the same site may be used for many days when weather is severe or a large food item has been cached nearby (Powell and Zielinski 1994). Rest structures used by fishers in western North America include mistletoe and rust brooms, large lateral limbs and limb clusters in the canopies of live trees, rodent or raptor nests, cavities in snags or logs, ground burrows, or beneath piles of cull logs (Buck et al. 1983, Jones 1991, Seglund 1995, Aubry and Raley 2006, Weir and Harestad 2003, Weir et al. 2004, Zielinski et al. 2004*a*).

Fishers typically rest in live trees (Table 3) and the most common resting platforms are bird stick nests, large lateral limbs (Seglund 1995) and brooms (Jones 1991, Weir 1995, Aubry and Raley 2002, Weir 2003, Weir et al. 2004). In the Coast Range of northwestern California, rest sites are typically located in stick nests (30%) or on large lateral limbs or limb clusters (30%), but mistletoe brooms are used infrequently (9%) (Seglund 1995). In the same area, Zielinski et al. (2004*a*) found fishers resting most frequently in cavities and broken tops of live trees (50%), followed by snags (26%), platforms (mistletoe brooms, and nests; 18%), and logs (5%). Fishers use mistletoe or rust brooms more frequently than any other type of rest site in British Columbia (Weir 1995, 2003; Weir et al. 2004), Idaho (Jones 1991), and Oregon (Aubry and Raley 2002). Females use witches' brooms more frequently than males (Seglund 1995).

Fishers appear to require rest sites in large-diameter trees that are usually the largest and tallest trees within the immediate area (Buck et al. 1983, Seglund 1995, Weir 1995, Zielinski et al. 2004*a*). In British Columbia, the most common rest sites are in trees that average 46.3 cm (18.5 in) in diameter (Weir 1995). In Idaho, fishers rest in trees that average 56.1 cm (22.4 in) in diameter and 16.4 m (54 ft) in height (Jones 1991). Snags and logs used for resting average 86.4 cm (34.5 in) and 53.3 cm (21.3 in) in diameter, respectively. In the Coast Range of California, rest structures in live hardwood trees, live conifer trees, snags, and trees with platform structures average 87.6 cm (35.1 in), 124.7 (49.9 in), 119.0 (47.6 in), and 68.1(27.2 in) in diameter, respectively (Zielinski et al. 2004*a*). Logs average 95.1 cm (38.0 in) in diameter. In earlier studies in the same area, Buck et al. (1983) found rest sites in trees that averaged 114.3 cm (45.7 in) in diameter, and Seglund (1995) reported rest sites in trees and snags that averaged 105 cm (42 in) and 119 cm (47.6 in) in diameter, respectively. Most rest sites were in live or decadent trees (Seglund 1995).

Rest sites are typically in conifer trees. In Idaho, fishers rest primarily in Engelmann spruce (*Picea engelmannii*) where witches' brooms are most common (Jones 1991), and in British Columbia they use hybrid white spruce (*P. engelmannii x glauca*) with rust brooms (Weir 1995). In southern Oregon, female fishers rest primarily in large, live Douglas-fir trees, and secondarily in Douglas-fir or White fir (*Abies concolor*) / grand fir snags. Males also rest in live trees, but use western hemlock, Douglas-fir and white/grand fir about equally. Douglas-fir snags are used secondarily (Aubry and Raley 2006). Fishers in northwestern California rest predominantly in Douglas-fir trees (Seglund 1995, Zielinski et al. 2004*a*).

Type of rest sites used varies seasonally. In the West, fishers rest predominantly in the canopies of live trees in both winter and summer (Jones 1991, Buck et al. 1994, Seglund 1995). The greater vertical layering of vegetation and greater conifer canopy cover in mature and old-growth forests provide a range of cooler and moister microclimates below the forest canopy. During hot weather, fishers often use rest sites in the upper canopy (Zielinski et al. 2004*a*). During periods of colder temperatures,

Table 3. Structures used by male and female fishers for denning and resting in western North America (adapted from Lewis and Stinson 1998).

	Trees		Snags		Ground			
Location	*n*	%	*n*	%	*n*	%	Total	Source
California	6	67	2	22	1	11	9	Buck 1982
California	80	63	34	27	13	10	127	Zielinski et al. 1995
California	76	67	23	20	15	13	114	Seglund 1995
Idaho	134	78	13	8	25	15	172	Jones 1991
Oregon	414	63	90	14	149	23	653	Aubry and Raley 2002
Total	710	66	162	15	203	19	1075	

fishers typically seek out large pieces of coarse woody debris or burrows. Fishers rest more frequently in logs during winter in Idaho (Jones 1991). Similarly, fishers in British Columbia rest in large pieces of coarse woody debris during colder temperatures compared to when they use branch and cavity structures (Weir et al. 2004). Ground dens are used more frequently during periods of extreme cold (Arthur et al. 1989*b*, Weir 1995). Female fishers in the Coast Range of northwestern California use snags more frequently in winter, whereas males primarily rest in the canopy of live trees during both summer and winter (Seglund 1995). Because of their smaller body size, females may require warmer micro-sites than males. Moreover, rest site selection may be influenced by proximity to areas of high prey availability. These findings suggest that fishers select rest sites with suitable microclimate to reduce thermal stress (Jones 1991, Weir et al. 2004, Zielinski et al. 2004*a*).

Individual resting structures are infrequently reused (Jones 1991, Kilpatrick and Rego 1994, Seglund 1995, Zielinski et al. 2004*a*, Aubry and Raley 2006). Zielinski et al. (2004*a*) suggested that infrequent reuse of resting structures indicated that fishers do not limit use of their home range to a few central locations, and instead require multiple resting structures distributed throughout their home range. Martens forage sequentially over their home range, using rest sites in snags in close proximity to foraging areas and recent kill sites (Marshall 1951). The pattern of rest site use by fishers indicates that they do the same. Zielinski et al. (2004*a*) suggested that the low reuse of rest sites could be a strategy to minimize travel time between resting locations and kill sites, which are distributed throughout the home range.

Fishers select resting structures in patches of forest characterized by greater structural complexity. In the Coast Range of northwestern California, rest sites are more structurally diverse than random sites. Rest sites are characterized by a greater number of vegetation layers, higher percentage of dead and down woody material, and a greater percentage of shrub cover than random sites (Seglund 1995). Zielinski et al. (2004*a*) characterized forest structure around rest sites in the same area. A univariate analysis revealed that rest sites contained significantly greater maximum tree dbh, greater standard deviation of dbh, small standard deviation of canopy closure, and a greater number of large conifer snags than random sites. A resource selection function included greater canopy closure, larger maximum tree size, steeper slopes, and at least one large conifer snag as significant variables in the model for the Coast Range. Resting sites not only are characterized by a large resting structure, but are also in close proximity to other large trees and occur in areas with denser canopies. In addition, topographic position is an important factor, with rest sites located on steep slopes. Resting sites have greater structural variability (i.e., a diversity of sizes and types of structural elements) but less-variable canopy cover than random sites (Zielinski et al. 2004*a*). Fishers in British Columbia also demonstrate selection for greater forest structural complexity at rest sites, particularly in stands characterized by more simplified structure (Weir and Harestad 2003). During summer months, fishers in Idaho use sites characterized by greater densities of trees >47 cm dbh, snags 14-52 cm dbh, and logs 14-54 cm diameter than sites 50 m distant (Jones 1991). Fishers also select more decadent patches of forest during winter, choosing sites that have greater densities of large trees (>47 cm dbh), snags (24-34 cm dbh and >52 cm dbh), and logs (≥47 cm diameter). These findings suggest that fisher rest sites are located in more structurally complex forest, typical of mature and old-growth forest conditions.

Stand-Level Characteristics

Fisher selectivity for continuous overhead cover and structural complexity at the patch level is also evident at the stand level for resting and foraging activities. In Idaho, fishers use the 61-80% canopy class significantly more for resting, whereas more open (21-40%) and denser (≥81%) canopy classes are used for hunting (Jones 1991). Fishers in California occur more frequently in stands with high canopy closure. Buck (1982) reported that fisher locations were most common in forest stands with 40-70% canopy closure. In the southern Sierra Nevada, stands of high canopy closure (60-100%) comprise the greatest proportional area (66%) of fisher home ranges (Zielinski et al. 2004*b*). Weir (1995) reported fisher selectivity for stands with a mean coniferous canopy closure between 21-60% in winter, and no selectivity for coniferous canopy closure during summer or autumn months. During summer, fishers avoid stands with no deciduous canopy component, but prefer stands with 21-40% deciduous canopy cover.

Fishers demonstrate selection for structurally complex forest stands. They may select mature closed-canopy forest because the microclimate provides warmth in winter and prevents overheating during summer (Buck 1982, Seglund 1995), and the greater structural complexity of the forest floor provides habitat for prey and winter resting structures (Weir 1995). In the Coast Range of northwestern California, fishers prefer mature and old-growth conifer forests, especially multi-species stands (Buck 1982). Fishers in British Columbia also demonstrate selectivity for stands with greater structural diversity, particularly stands with high volumes of coarse woody debris, during summer and winter months (Weir 1995, Weir and Harestad 2003). During summer, fishers in Idaho prefer mature and old-growth stands and avoid non-forest, pole-sapling, and young forest stands (Jones 1991, Jones and Garton 1994). Forest stands used in summer have greater densities of large-diameter (≥34 cm) trees, snags and logs compared to available habitat. During winter, fishers prefer young forest, use mature and old-growth stands in proportion to availability, and avoid nonforest and pole-sapling stands. Fishers select stands with greater densities of 11.4-34.3 cm and >62.2 cm dbh trees, greater densities of all size classes of snags, and a dense understory of Pacific yew (*Taxus brevifolia*). Availability of snags is also an important factor in winter site selection. Buck (1982) also found fishers using young regenerating stands in winter that had high overhead canopy cover (>80%) and vegetation between 1.5 and 3.0 m in height. Although fishers demonstrated selection for younger forests in winter, these stands were naturally regenerated following fire and contained large live trees, snags and logs characteristic of older forests (Jones 1991).

Fishers may prefer to forage in more structurally complex forest stands because they encounter a greater abundance and diversity of prey. Douglas' squirrels are more abundant in older, more structurally complex forest stands compared to younger, managed forests (Buchanan et al. 1990). Squirrels may prefer older forest stands because these habitats provide a more abundant, perennial, and diverse source of food (e.g., conifer seed and hypogeous fungi). Older forests have a greater diversity of older trees and hence greater cone production, and greater amounts of coarse woody debris in later stages of decomposition that are associated with greater abundance and diversity of hypogeous fungi (Buchanan et al. 1990, Carey 1991, Luoma et al. 2003). The cool, mesic conditions in older forests preserve cone caches and facilitate growth of truffles beneath well-decayed coarse woody debris that retains water during the prolonged dry summer months (Luoma et al. 2003). Small mammals may be associated with coarse woody debris for cover, nesting sites, or associations with food (McComb 2003), such as hypogeous fungi (Rhoades 1986). Southern red-backed vole (*Clethrionomys gapperi*) abundance and activity is positively correlated with coarse woody debris (Ucitel et al. 2003). While small mammal communities are structurally similar in naturally regenerated Douglas-fir forests in the southern Washington Cascade Range, abundance is greater in old-growth than in young forests, and is likely attributed to the greater structure and productivity of the forest-floor environment (West 1991). In the Western Hemlock Zone of the Olympic Peninsula, composition of small mammal communities in naturally regenerated and clearcut-regenerated young forests is similar to those found in old growth. However, old-growth forests support a greater abundance and biomass of small mammals than managed forests (Carey and Johnson 1995). Many of these small mammal species exhibit numerical responses to the amount of coarse woody debris and shrub cover in the forest-floor environment. Mountain beavers are also found on sites with greater availability of sword fern (*Polystichum munitum*), and other ferns, shrubs, greater volumes of coarse woody debris, and mesic conditions (Hacker 1991, Carraway and Verts 1993, McComb 2003). Fishers may encounter snowshoe hares in old-growth forests with a well-developed vegetative understory. Fishers may also encounter greater numbers of cavity-nesting birds (e.g., woodpeckers, sapsuckers) in older forests while exploring snags as possible rest and den sites.

Landscape-Level Characteristics

Fishers appear to be sensitive to fragmentation of their preferred habitat. In Douglas-fir forests in northwestern California, fishers are less likely to occur in stands of increasing insularity and decreasing stand area (Rosenberg and Raphael 1986). Fishers also avoid nonforest cover types (Jones 1991, Roy 1991, Weir 1995). Jones (1991) suggested that management of fisher habitat at the landscape level should include a mosaic of early- and mid-successional forest seral stages to provide a diversity of prey species, and mature and old-growth forest to provide resting habitat. Patches of resting habitat should be connected by closed-canopy forest to facilitate travel between patches. The proportion of each of these seral stages necessary to support fishers in a landscape is not known.

Riparian areas. Fishers are primarily associated with cool, mesic forests (Buskirk and Powell 1994) and this may explain their disproportionate use of riparian areas in some western states where habitats are hotter and drier (e.g., Jones 1991, Seglund 1995). Proximity to water does not appear to influence rest site selection in the cooler and moister forests in the Coast Range of the Pacific Northwest (Zielinski et al. 2004*a*).

POPULATION STATUS

Past

No reliable estimates of historical fisher populations in Washington exist, and there are only a few statements specifically about fisher abundance in the early literature. The fur trade began in the Pacific Northwest soon after 1779, when it was discovered that sea otter (*Enhydra lutris*) pelts obtained during the last voyage of Captain James Cook commanded a high price in China (Gibson 1992:22). American Indians used fisher pelts for quivers and were already involved in trading furs to white fur traders in 1804 (Suckley and Cooper 1860, Gibson 1992). Hudson's Bay Company (HBC) records indicate that for the period 1836-1852 a total of 6,551 (average 385/yr) fishers were obtained at forts in present-day Washington (HBC Archives, Winnepeg)(Table 4). Most of these (88%) were collected at Fort Colville, the most convenient post for an area that included the southeast corner of British Columbia, northern Idaho, and Montana west of the Continental Divide, as well as northeastern Washington. Additional fishers were probably also obtained at Neah Bay on the Olympic Peninsula by the S.S. *Beaver* during this same period (Gibson 1992, Mackie 1997).

Trapping reduced fishers, and furbearers in general, quickly. As early as the 1820s the Hudson Bay Company was disappointed with the lower Columbia River fur trade (Mackie 1997). Fort Vancouver fur returns declined steadily from 1833-1843 (Mackie 1997). Fort Vancouver averaged only 7.6 fishers/year, and Fort Nez Perces averaged only 19.5 fishers/year, for 1836-1852. The Puget Sound fur trade was also very modest, and in 1840 George Simpson, who managed the Hudson Bay Company's affairs west of the Rockies, stated: "fur trade almost extinct in that quarter" (Mackie 1997). Though interior districts were generally more productive, in 1841, Simpson noted of Fort Okanogan: "few or no furbearing animals in the surrounding country" (Mackie 1997:88). The fur trade further north, and especially inland, was more productive for the Hudson Bay Company.

Fisher populations were probably greatly reduced in some parts of Washington by 1900. C.H. Merriam reported that fishers were rare in the Nisqually Valley in 1897, but that a few were caught each year (Taylor and Shaw 1927). Only 6 fishers were caught in 30 years near Bumping Lake, Yakima County, with tracks last seen in 1915 (Scheffer 1938). The last reports of significant numbers of fishers are from the Olympic Peninsula and the Cascades (Scheffer 1957,1995; Dalquest 1948). Scheffer (1938, 1957, 1995) provided a number of accounts of fishers being captured before trapping was prohibited in 1934, as well as well as accounts of fishers being incidentally captured in traps set for other species in the Cascades, the Olympic Peninsula, and southwestern Washington. For the Olympic Peninsula, he reported accounts of 2 trappers taking 37 fishers in 1920 near the Queets River, and 2 other trappers capturing 20 fishers in 1921 near the Quinault River (Scheffer 1995). By 1938, fishers on the Olympic Peninsula were largely restricted to the "wild and roadless portions of the Olympic Mountains" (Scheffer 1938). Scheffer (1938) included a Forest Service game estimate for the fisher on the national forests in 1937: Chelan 4, Columbia 20, Mount Baker 30, Olympic 100, Snoqualmie 40, and Wenatchee 40. These estimates were probably only guesses, but they are indicative of the fisher's rarity at that time.

Table 4. Number of fisher obtained in trade at Hudson's Bay Company posts in Washington, 1836-1852 (HBC Archives).

Year	Fort Vancouver	Fort Nisqually	Fort Nez Perces[a]	Fort Colville[b]	Total
1836	1	29	23	197	250
1837	8	21	-	395	424
1838	14	20	16	514	564
1839	16	44	16	615	691
1840	23	35	9	302	369
1841	4	28	10	237	279
1842	10	14	27	206	257
1843	11	19	30	229	289
1844	15	10	24	295	344
1845	-	21	30	263	314
1846	4	10	38	261	313
1847	8	9	31	328	376
1848	1	14	7	508	530
1849	1	6	4	411	422
1850	2	17	3	351	373
1851	1	23	2	345	371
1852	10	12	14	349	385
Total	129	332	284	5,806	6,551

[a]Fort Nez Perces received furs from an area that included northeastern Oregon
[b]Fort Colville received furs from an area that included parts of present-day British Columbia, Idaho, and Montana, as well as northeastern Washington.

Sighting and trapping reports give no indication of recovery in recent decades. Most information on furbearing mammal populations is obtained through trapping data; but fisher seasons were closed in most of the western states before harvest records were kept. Trapping was prohibited in Washington in 1934, and seasons were closed in Oregon and Wyoming in 1936, Idaho and Montana sometime in the 1930s, and California in 1946. Yocum and McCollum (1973) obtained only 9 anecdotal records of fishers in Washington from the National Park Service and the Forest Service for the years 1955-73; 7 from the Olympics, 2 from the northern Cascades. These were among the total of 41 highly reliable fisher records that Aubry and Houston (1992) compiled for Washington for the years 1955-79.

Present

The lack of incidental captures, sighting reports, and results of systematic surveys from 1980 to the present, indicate that fisher populations have not recovered in Washington.

Incidental captures. Fishers are relatively easy to trap, and where they are present, they occasionally get caught in traps set for other species, especially bobcats, martens, and coyotes (Lewis and Zielinski 1996). Incidental capture data depends on trappers reporting the capture, which, though required by law, may impose serious inconvenience in remote areas, so compliance may vary widely. These 'incidental captures' are, therefore, not a reliable method to estimate populations, but they may be useful as an indicator of the presence and relative abundance of fishers. There are 3 reports of incidental capture of fishers in Washington since 1980 (1 each in 1987, 1990, and 1992; Appendices A, B). WDFW obtained a photo or carcass for 2 of these records.

Sighting reports. Aubry and Houston (1992) compiled a list of sighting reports for Washington and ranked them by reliability. From 1980 to 1991, only 46 sightings of fishers were judged to be highly reliable (Aubry and Houston 1992). However, the majority of these sightings were not verifiable based on a photograph, track, or specimen. Countless individuals hunt, trap, hike, and work in Washington forests, yet fewer than 4 reliable fisher sightings per year were compiled from 1980-1992 (Aubry and Houston 1992).

Fishers are susceptible to collisions with vehicles (Proulx et al. 1994, Zielinski et al. 1997), but no road kills have ever been reported in Washington.

Systematic surveys. Several different survey methods have been investigated for detecting forest carnivores. Camera stations consist of remotely triggered cameras that are activated by an animal pulling a string or breaking an infrared beam when it investigates the bait. Track plates are sooted sheets that record animal tracks at bait stations. Both track plates and camera stations are effective at detecting fishers (Zielinski and Kucera 1995, Foresman and Pearson 1995, Zielinski et al. 1997). In 1984, Keith Aubry of the USDA Forest Service conducted sooted track-plate surveys in 45 late-seral forest stands in the southern Washington Cascades (K. Aubry, pers. comm.). The same year, Olympic National Park and Forest Service biologists attempted to detect fishers in the Elwha River drainage by using six line-triggered cameras, track plates, and live traps (Aubry and Houston 1989). No fishers were detected in 241 trap-nights and 130 plate-nights. In 1986, the Park Service and Forest Service conducted live-trapping (252 trap nights) and snow tracking in the Skokomish and Hamma Hamma River drainages (Aubry and Houston 1989). No fishers were detected.

In 1990 and 1991, Aubry (with the help of Roger Powell in 1991) used live traps and remotely triggered cameras in several attempts to detect fishers where they had been reported on the east side of the Olympic Peninsula. This included using urine of estrous female fishers, among other lures and strong-smelling bait (Powell 1991). No fishers were detected during these efforts; it appears that fishers were either absent or extremely rare in the areas sampled. On 1 August 1990, Forest Service personnel obtained what was believed to be a fisher track on a sooted track plate in the Leavenworth Ranger District, Wenatchee National Forest, Chelan County. However, it is uncertain whether it was a fisher or marten track. Male marten tracks are extremely similar to small female fisher tracks, and techniques for distinguishing the two species were only recently developed (Zielinski and Truex 1995).

In 1991, the Forest Service conducted extensive camera surveys in 4 study areas (Central Cascades, North Cascades, Olympic Peninsula, and Puget Trough), as part of a marten research project (Fig. 3). More than 1,000 line-triggered camera stations were operated for a total of over 9,000 camera nights. Twenty-eight species were detected, including the American marten (on 39 occasions), but no fishers were detected (Jones and Raphael 1991).

In 1992, WDFW and the U.S. Forest Service conducted camera station surveys (Fig. 3) to determine the current distribution of martens in the state (Sheets 1993). The surveys sampled 15 areas in the Olympic, Mt. Baker-Snoqulamie, and Gifford Pinchot National Forests using 197 line-triggered camera stations (110 mm) for a total of over 3,000 camera nights. Stations were located in patches of at least 780 ha of contiguous mature timber, near riparian areas, at elevations above 720 m. Seven species were detected, including the American marten (on 4 occasions), but no fishers were detected.

In 1994, camera surveys were conducted on the Mineral Tree Farm, Lewis County, for Murray Pacific Corporation (Beak Consultants, Inc. 1995). Infrared and line-triggered cameras at 27 stations were placed in mature timber for a total of 260 camera nights (Fig. 3). Seven species were detected, but no martens or fishers.

From 1995-97, WDFW conducted carnivore surveys using camera stations in potential fisher habitat throughout the state (Fig. 3). Zielinski and Kucera (1995) developed a standard survey protocol to detect carnivores, which uses two camera stations or enclosed track-plate stations in each survey "sample unit" (4-square-mile block or 4 sections). The 1995-97 WDFW surveys varied from this protocol in order to cover a larger area with the available staff and cameras. Most of the sampling (90.5%) was done in winter (Nov-Mar), when bears are inactive and bait may be more effective for attracting fishers (Kucera et al. 1995). The stations were operated an average of 31.0 (±12.4) sample nights; surveys

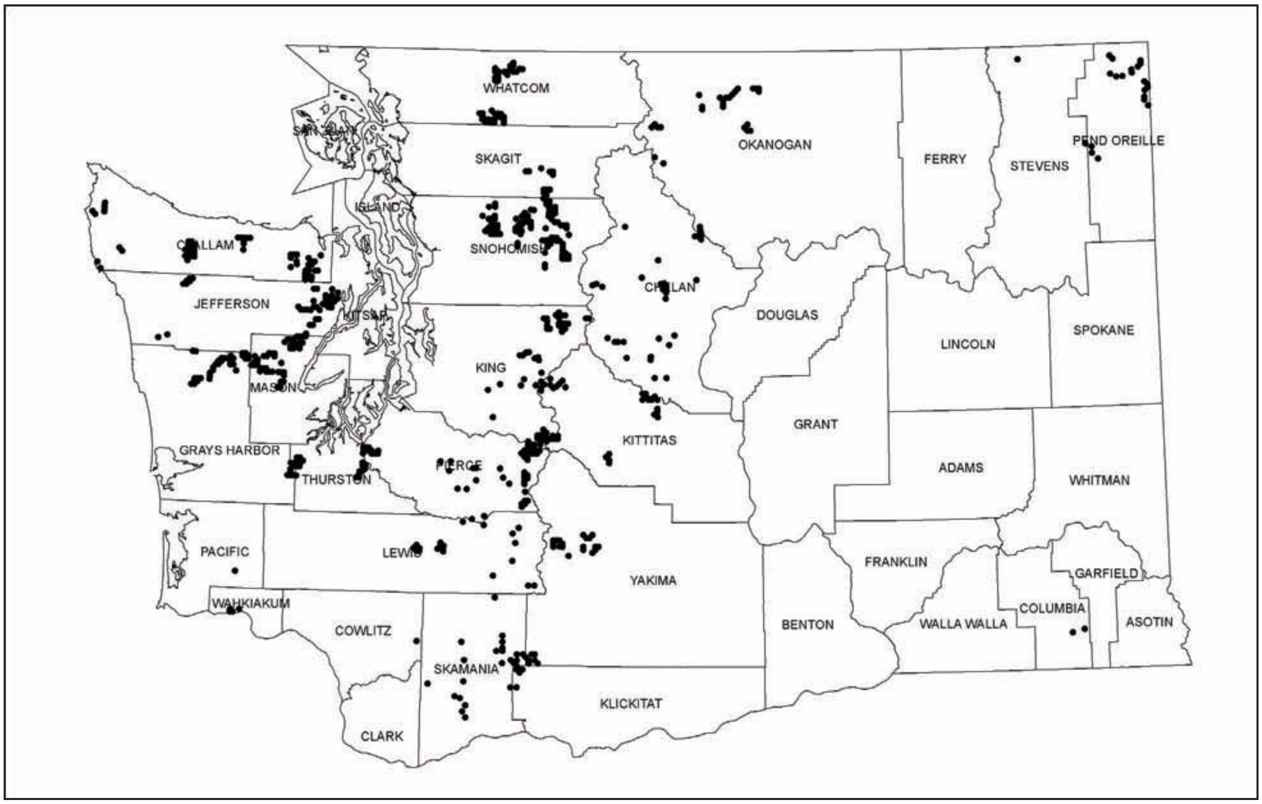

Figure 3. Locations of camera and track-plate stations in Washington, 1990-97. The 647 plotted locations represent 1088 of the survey stations during surveys conducted by WDFW, USFS and Beak Consultants, Inc. (1995).

totaled approximately 5,000 operational camera nights. No fishers were detected.

During the winters of 2001-04, the National Park Service conducted forest carnivore surveys, using standard survey protocols, in Mount Rainier (2001-02), Olympic (2002-03, 2,193 camera nights), and North Cascades (2003-04, 2,178 camera nights) National Parks. Fishers were not detected in any of the parks, however martens were detected in North Cascades and Mount Rainier National Parks (Christophersen et al. 2005, Happe et al. 2005, J. Schaberl, pers. comm.). On the Okanogan-Wenatchee National Forest, martens were detected during sooted track plate surveys in wet and dry forests within LSRs in 2003-04 (Munzing 2005). Again, no fishers were detected.

Camera and track-plate stations have been effective at detecting fishers in California, Montana, and Oregon (Foresman and Pearson 1995, K. Aubry, pers. comm., Zielinski et al. 1997). Zielinski and Stauffer (1996) reported that fishers were detected at 67.5% of 40 track-plate sample units in the Klamath eco-province of northwestern California. Fishers were detected after a mean of only 3.4 days at 23% of 221 stations using track plates or line-triggered cameras in the historical range of the fisher in California (Zielinski et al. 1997). The number of days (latency) to detection was about 12 in a smaller survey on commercial timberlands in California (Zielinski et al. 1997), and 9 days in Montana (Foresman and Pearson 1995). During the WDFW carnivore surveys, approximately 92% of stations were operated for more than 12 sample days.

Survey effort expended in Washington from 1990 to 2004 to detect fishers and other forest carnivores was extensive. Combined surveys included ~1500 sample stations and totaled over 17,000 camera/track plate nights between 1990-97. The lack of detections of fishers given these and previous efforts indicates that fishers are extremely rare if not extirpated from the state (Aubry and Lewis 2003).

Future

Despite substantial effort to detect fishers over an extensive area of federal landownership over the last 20 years, not a single fisher has been detected during these surveys. This suggests that fishers are extremely rare or have been extirpated from the state. In British Columbia, fisher populations have become extirpated from the Cascade and Okanogan mountain ranges of the southern interior and the Columbia and Rocky mountain ranges in the last 15 years (Weir 2003). Fisher populations are also low in adjacent parts of Idaho, and the number of dispersing individuals is probably very low (Heinemeyer 1995). Immigration of fishers into Washington from British Columbia, Idaho, or Montana has not successfully re-established fishers in Washington and does not seem likely to in the near future. A viable fisher population is not likely to become re-established in the state without human intervention.

HABITAT STATUS

Past

Prior to European settlement, natural disturbance processes resulted in extensive areas of homogeneous forest that was mostly comprised of old trees (Bolsinger and Waddell 1993). These old forests had abundant large woody structures as potential den and rest sites for fishers and downed logs that provided habitat for their prey. The amount of old-growth forest that existed prior to the arrival of Europeans in Washington is unknown. The first systematic surveys of forests in the state were conducted between 1933 and 1936. At that time, there was a total of 3.7 million ha (9.1 million ac) of old-growth forest that comprised 40% of productive forestland in Washington (Bolsinger and Waddell 1993). Washington's forests were heavily exploited between the 1800s and early 1900s. It's estimated that the volume of sawtimber in the Douglas-fir region was being depleted at four times the growth rate (Bolsinger et al. 1997). Therefore, the amount of old-growth and its relative composition was greater before the 1933-36 forest inventories because human activities that altered the landscape, such as logging, clearing of forests for agriculture and pastures, and the building of cities, occurred before the first forest inventory (Bolsinger and Waddell 1993).

Intensive forest harvest continued to change the species composition and age classes of forests after the first forest inventory in the early 1930s. Between 1933 and 1992 the estimated volume of sawtimber in western Washington declined 67% (244 to 80 billion board feet) (Bolsinger et al. 1997). Extensive areas of high-volume timber were converted to urban areas, agriculture, and "stump-pastures" after cutting, especially near Puget Sound. Between 1933-36 and 1992, the area of old-growth forest declined by 70%, from >3.7 to 1.1 million ha. Loss of old-growth forest was similar between western (72%; 2.9 to 0.8 million ha) and eastern (68%; 0.77 to 0.24 million ha) Washington (Bolsinger et al. 1997). Forest composition also changed during this period. In western Washington between 1933 and 1992, the proportional volume (trees ≥16 inches dbh.) of Douglas-fir increased from 41% to 51%, while western hemlock, Sitka spruce, western redcedar (*Thuja plicata*), and true firs (*Abies* spp.) decreased. In eastern Washington, the proportional sawtimber volume of Douglas-fir increased from 27 to 42%, true firs increased from 10 to 15%, while ponderosa pine decreased from 41 to 22% (Bolsinger et al. 1997). Between 1967 and 1991 forest inventories in the Puget Sound and Olympic Peninsula areas demonstrated changes in forest species composition. Western hemlock comprised the highest percentage of growing-stock volume in 1967, but declined across all ownerships by 1991. The percent growing-stock volume of Douglas-fir increased from 24 to 33% on industry lands and 20.7 to 44.4% on public lands other than national forests during that period (Bolsinger et al. 1997).

The distribution of old-growth forests has changed with land ownership. Between 1933 and 1993 private ownership of old-growth forest declined from 95% to 5% while federal and state ownership increased to 95% in western Washington (Bolsinger et al. 1997). The extensive areas of old-growth forests that early European settlers found in the low hills and valleys have been replaced by young forests managed by the private timber industry, housing tracts, roads and industrial complexes. Remaining old-growth forest stands occur in the less productive sites at higher elevation and occur primarily in federal ownership (Bolsinger et al. 1997).

Present

Of the 1.1 million ha of old-growth remaining in 1992, most is above 600 m in elevation in national forests and national parks and on steep or poorer sites (Table 5) (Bolsinger and Waddell 1993, Bolsinger et al. 1997). Most of the low elevation, late-successional forest that was suitable fisher habitat has been converted to short-rotation tree plantations or non-forest uses. Outside national forests, late-seral stands (100+ years old) comprise only 3% of the forest in western Washington, and 15% in eastern Washington (Bolsinger et al. 1997:19). As a result of human activities, Washington's forest landscapes today are much more fragmented than in the past, comprised of small patches of different ages, interspersed with recently logged areas (Bolsinger and Waddell 1993). Highways, railroads, canals, power lines, and residential development further fragment forests (Bolsinger and Waddell 1993).

Industrial forest accounts for 29% of the state's timberland and is dominated by short-rotation Douglas-fir less than 50 years old (Bolsinger et al. 1997). Outside of national forests, stands less than 50 years old comprise 51% of the timberland in western Washington and 15% in eastern Washington (Bolsinger et al. 1997:19). Intensive timber management has resulted in forests that have few large snags and downed logs compared to historical levels, and those that remain are in the later stages of decay (Cline et al. 1980, Spies and Cline 1988, Spies et al. 1988, Hansen et al. 1991). Short rotations can prevent the formation of large-diameter trees needed to produce cavity trees, snags, and logs that fishers use for den sites (Cline et al. 1980, Mannan et al. 1980). Although young stands may support relatively high numbers of snowshoe hares, young managed forests support lower numbers of some fisher prey, including squirrels and forest-floor small mammals (Buchanan et al. 1990, Carey 1995, Carey and Johnson 1995). Lyon et al. (1994:132) wrote that a landscape of mostly early successional stands and small patches of mature forest is unlikely to provide suitable habitat for fishers. Western hemlock and Pacific silver fir in managed forests have decreased (Bolsinger et al. 1997). Douglas-fir, which dominates most managed forest stands, may not provide as reliable a seed source for seed-eating mammals (Douglas' squirrels, deer mice, and shrews) as western hemlock, which produces some seed every year (Buchanan et al. 1990, Carey and Johnson 1995).

Fishers may readily use mid-successional forests that contain sufficient canopy closure and structural elements, such as large trees and snags for den and rest sites, and structural complexity on the forest floor in the form of woody debris and a shrub understory. Excluding ponderosa pine and west-side high elevation types (mountain hemlock, Engelmann spruce, subalpine fir), there is <3 million ha of timberland with sawtimber-sized (>23 cm or 9 in dbh) trees (Bolsinger et al. 1997:78-79). The amount of forest that contains contiguous canopy cover, and sufficient structure for den and rest sites is not known, but would likely be far below this total.

Habitat assessment. The association of fishers in the western United States with late-successional forests, and the concentration of these forests on federal lands in the state (Table 5), suggests that federal lands may contain the most suitable habitat for fisher recovery. An assessment of the amount and distribution of suitable fisher habitat in western Washington and the eastern Cascades was conducted in 2004 (Lewis and Hayes 2004). A simple model of fisher habitat was developed using four variables: (1) % vegetative cover, (2) % conifer cover, (3) quadratic mean diameter, and (4) elevation. Using this model, 901,107 ha of suitable fisher habitat was identified on the Olympic Peninsula, western Cascades and eastern Cascades (Fig. 4). Based on assumptions of how fishers may move through forest landscapes to access blocks of suitable habitat (Fig. 5), a connectivity analysis identified the three largest blocks of interconnected fisher habitat: one on the Olympic Peninsula, one in the northwestern Cascades, and one in the southwestern Cascades (Fig. 6). The Olympic Peninsula had the greatest amount of suitable habitat, followed by the southwestern Cascades, and northwestern Cascades (Table 6). Suitable fisher habitat occurs primarily on public lands (U.S. Forest Service, National Park Service and the Washington Department of Natural Resources) (Table 6). On the Olympic Peninsula, 93% of the suitable habitat is on public land (85% federal, 8% state), with 88% of federal lands occurring in the Olympic National Park and the Olympic National Forest. Eighty-seven percent of the suitable habitat in the northwestern Cascades is on public land (74% federal, 13% state), and 91% of the suitable habitat in the southwestern Cascades is on public land (85% federal, 6% state). Suitable habitat is more concentrated on the west side of the Olympic Peninsula, and more fragmented in the Cascades (Fig. 7).

Future

In 1992, about 0.76 million ha (1.9 million ac) of Washington forests (excluding ponderosa pine) were in reserves, such as parks and wilderness areas (Bolsinger et al. 1997). Where fire and other natural disturbances are infrequent, these areas would be expected to maintain or produce, late-successional forest.

Trends toward landscape management across large ownerships (national forests, Washington Department of Natural Resources land, large timber companies) may help reduce fragmentation of suitable habitat and increase forest structure in future forests, improving the value of these lands for wide-ranging

Table 5. Area (ha) of old-growth forests in Washington on reserved and unreserved lands by ownership, 1992[a] (Bolsinger and Waddell 1993).

Owner/Administrator	Reserved	Unreserved	Total	Percent
National forests	250,787	540,629	791,416	68.9
National parks	280,453	0	280,453	24.4
State forests	9,308	18,363	27,671	2.4
Tribal	12,017	13,598	25,615	2.2
State parks	3,591	0	3,591	0.3
U.S. Fish & Wildlife Service	121	0	121	0.01
Private	0	19,830	19,830	1.7
Total	556,277	592,420	1,148,698	100%

[a]Date of compilation. Actual dates of classification range from the early 1980s to 1992.

Table 6. Land ownership (ha (%)) of the suitable fisher habitat in three potential reintroduction areas in Washington (Lewis and Hayes 2004).

Ownership/administrator	Olympic Peninsula	Northwestern Cascades	Southwestern Cascades
U.S. Forest Service	74,662 (33)	96,570 (74)	169,270 (80)
National Park Service	120,284 (52)		11,265 (5)
WDNR	19,208 (8)	16,727 (13)	13,559 (6)
Private	11,160 (5)	14,496 (11)	11,748 (6)
Tribal	3,830 (2)		6,321 (3)
Other	232 (<1)	1,929 (1)	333 (<1)
Total (ha)	229,376	129,722	212, 496

[a]WDNR = Washington Department of Natural Resources. Other lands owned by the Bureau of Land Management, the U.S. Department of Defense, U.S. Fish and Wildlife Service, Washington State Parks, Washington Department of Fish and Wildlife, counties, or cities.

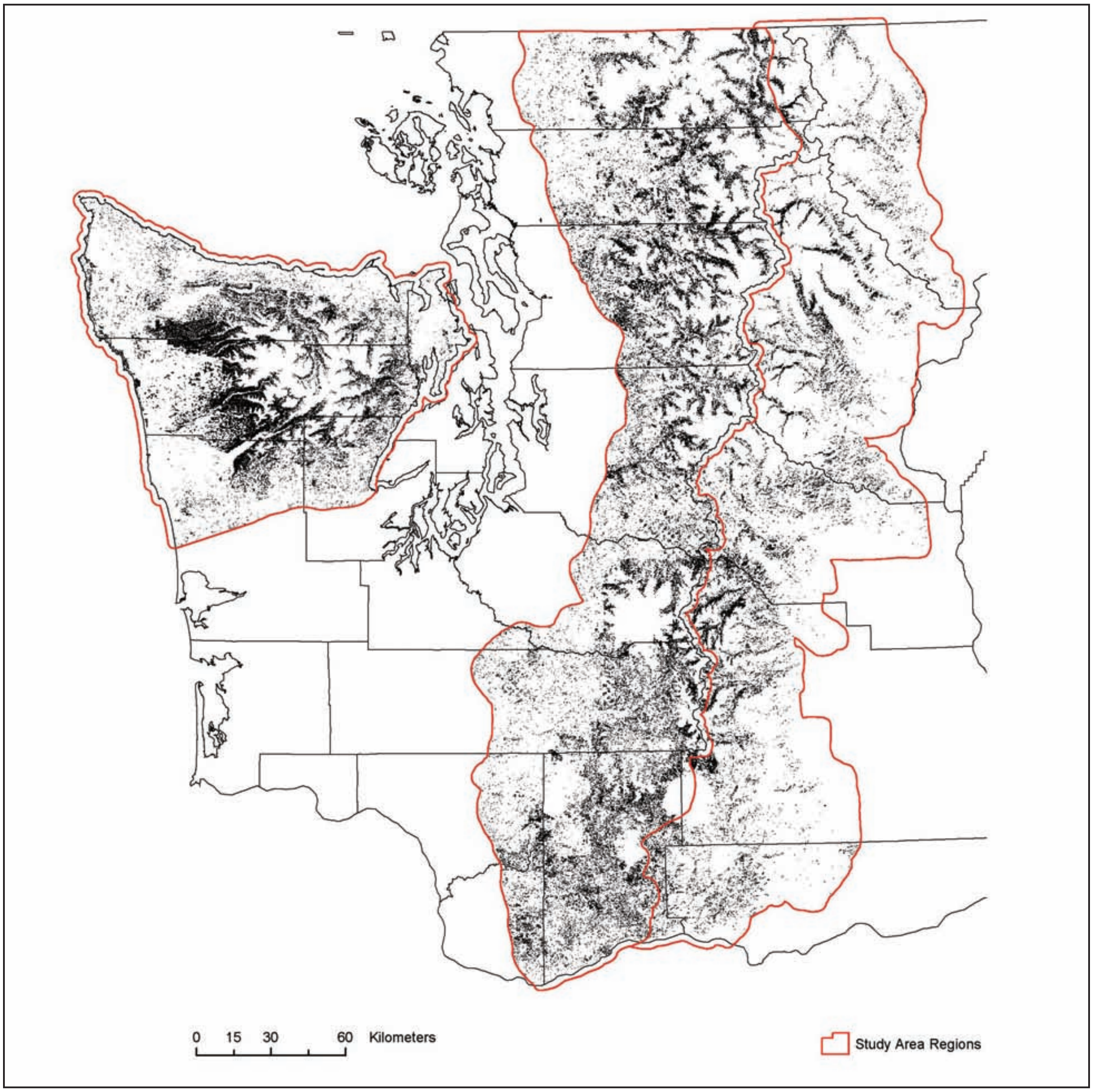

Figure 4. Suitable fisher habitat (in black) identified by a fisher habitat model in the Cascade Mountains and Olympic Peninsula of western Washington.

carnivores such as fishers (Holthausen et al. 1994). The ecosystem management approach embodied in the Northwest Forest Plan (USDA Forest Service and USDI Bureau of Land Management 1994a, 1994b) should provide substantial benefits to fisher recovery on U.S. Forest Service and Bureau of Land Management lands in western Washington. The proportion of late-successional forests is expected to increase over time as young, even-aged forests in reserves mature. The frequency of large, severe disturbances, such as catastrophic wildfires, will also determine future amounts of old forest on the landscape.

Forests in short-rotation, even-aged management are unlikely to support fisher populations without specific steps to retain and recruit large live trees, snags and logs. Most of the large (>100 cm) woody debris that remains in managed forests are legacies of original old-growth stands. The number of large

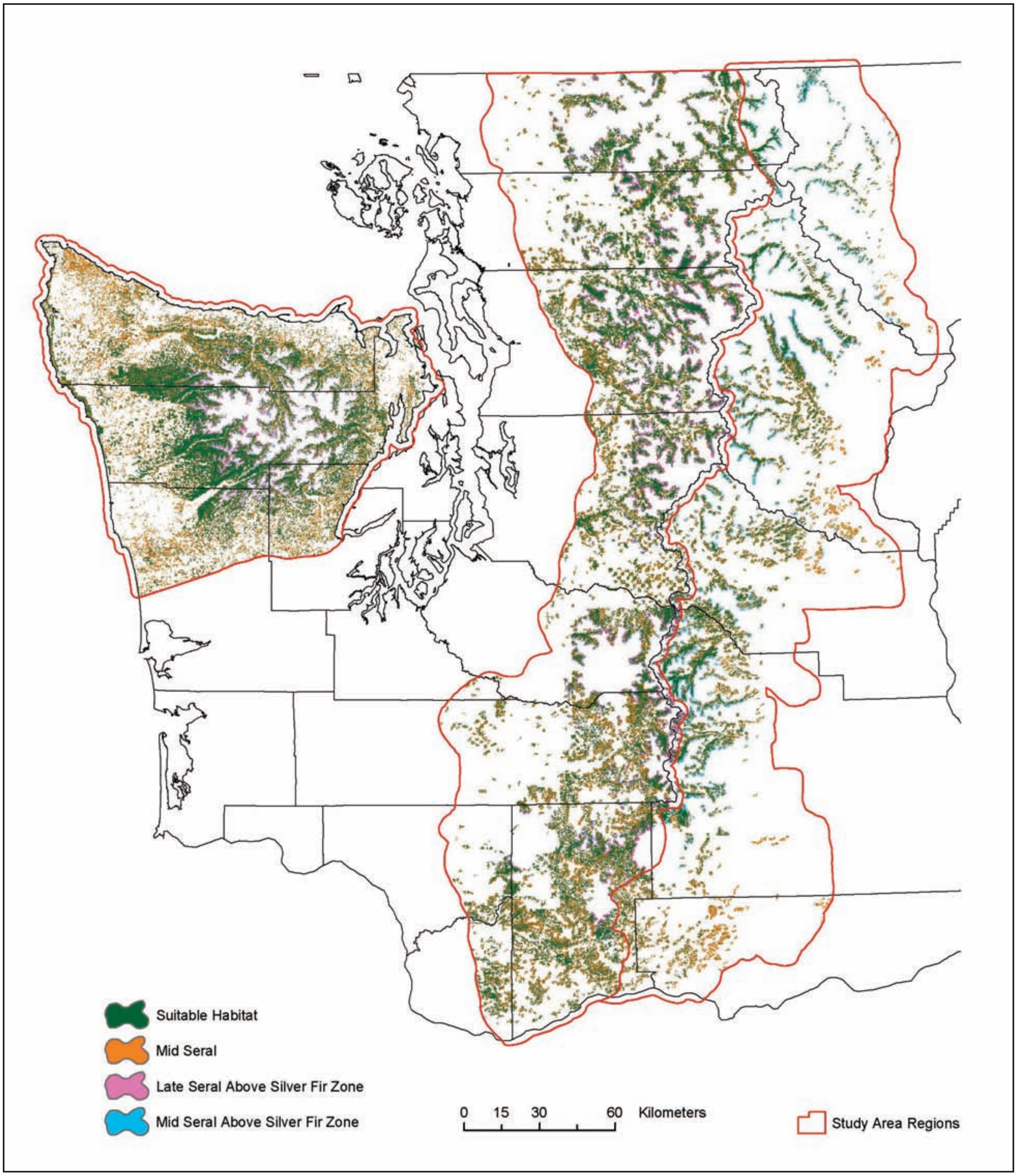

Figure 5. Potential fisher travel and foraging habitat (mid-seral, and late and mid-seral above Pacific silver fir zone) within 500 m of large patches of suitable habitat in western Washington.

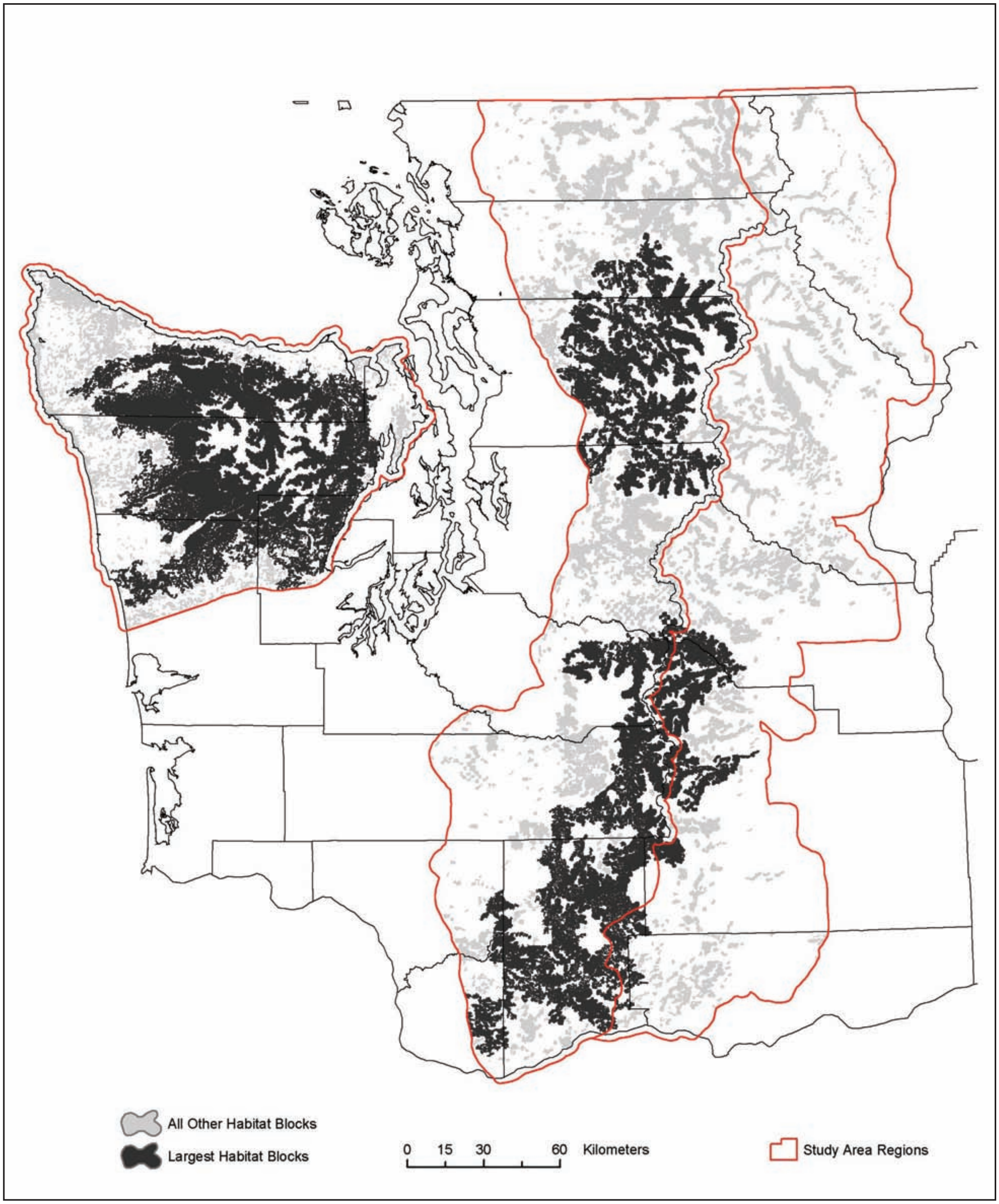

Figure 6. Largest blocks of interconnected fisher denning, resting, foraging and travel habitat in western Washington.

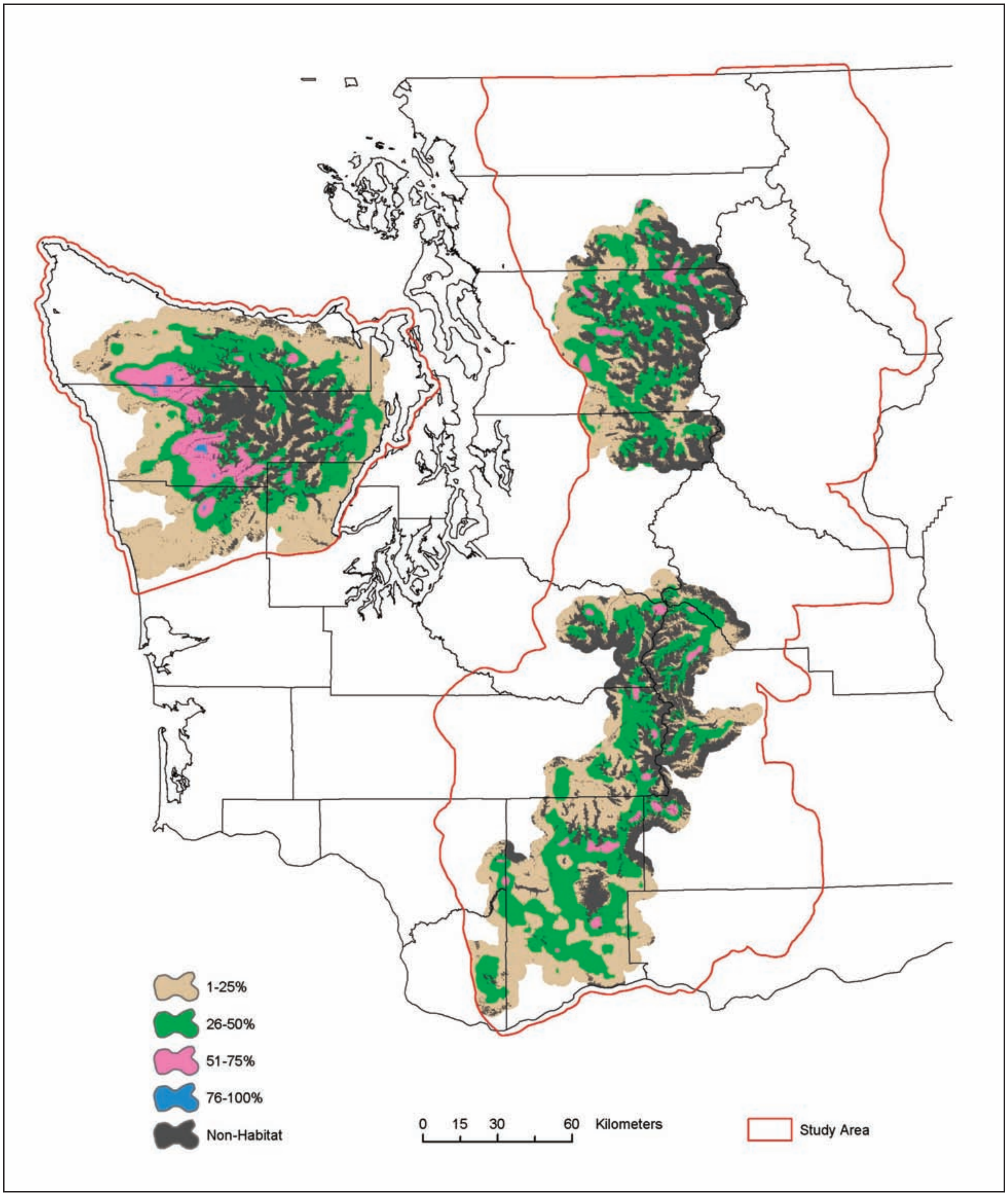

Figure 7. Percent concentrations of suitable fisher habitat within potential fisher reintroduction areas in western Washington.

snags, logs, and stumps will continue to decline, except in riparian management areas and other sites where they are deliberately grown or created (Lewis 1998). The amount of non-industrial private timberlands is expected to continue to slowly decline because of conversion and urbanization (Bolsinger et al. 1997).

CONSERVATION STATUS

Legal Status

Washington. Fisher trapping has been prohibited in Washington since 1934. The species was identified by the Washington Department of Wildlife (WDFW) as a "species of concern" in 1978, and was considered a sensitive species by WDFW policy from 1985-1991. In 1991, Washington Administrative Code 232.12.297 established the status of "sensitive" by regulation and outlined the procedures for listing species as endangered, threatened, or sensitive. The species became a candidate for listing in 1991 and was listed as endangered in Washington by the Washington Fish and Wildlife Commission in 1998.

Adjacent States/Provinces. In British Columbia, the fisher is classified as a furbearer and has a status rank of vulnerable (S2S3)(R. Weir pers. comm.). In Idaho, it is classified as a furbearer with a closed season. In Oregon, it is classified as a protected non-game species and is listed as sensitive by the Oregon Department of Fish and Wildlife (U.S. Fish and Wildlife Service 2004).

U.S. Fish and Wildlife Service. Currently the fisher is not listed as endangered or threatened by the U.S. Fish and Wildlife Service, and therefore receives no federal protection. In 1990, a petition to list the fisher as endangered in the Pacific States was submitted to the Fish and Wildlife Service and received a negative 90-day finding because it did not provide evidence sufficient to warrant listing. The fisher met the criteria for "species" under the Act based on the criterion of a distinct population that interbreeds (U.S. Fish and Wildlife Service 1991). In 1994, the fisher was petitioned for listing under the Endangered Species Act as threatened, this time throughout the western United States (U.S. Fish and Wildlife Service 1996). This petition also received a negative 90-day finding because the U.S. Fish and Wildlife Service contended that no evidence was provided to indicate that fisher populations occurring in the western United States were disjunct from fishers in the remainder of the species' North American range. Populations in the Pacific states and the Rocky Mountains were considered continuous peninsular extensions from Canada (U.S. Fish and Wildlife Service 1996). Moreover, with respect to the international border, the petition did not address differences between Canada and the western United States populations concerning control of exploitation, management of habitat, conservation status or regulatory mechanisms. In December of 2000, a petition to list the distinct population segment of the fisher in the Pacific states and designate critical habitat was submitted to the U.S. Fish and Wildlife Service. On July 12, 2003 the U.S. Fish and Wildlife Service published a 90-day finding in the Federal Register that the petition presented "substantial information that the West Coast population of the fisher may be a distinct population segment (DPS) for which listing may be warranted" (Jones 2003). This finding prompted a 12-month status review. On April 8, 2004 the Fish and Wildlife Service published its finding in the Federal Register that the petitioned action was warranted but precluded by higher priority actions (U.S. Fish and Wildlife Service 2004). Upon publication of the 12-month petition finding, the West Coast DPS of the fisher was added to the list of federal candidate species (U.S. Fish and Wildlife Service 2004). The Center for Biological Diversity and five other conservation groups filed a 60-day notice of intent to sue the U.S. Fish and Wildlife Service in 2004 to list the fisher as an endangered species.

USDA Forest Service. The fisher is listed as a Forest Service sensitive species in Washington (R. Naney, pers. comm.). The recent designation of the fisher as a federal candidate species by the U.S. Fish and Wildlife Service provides no additional protections for fisher habitat on Forest Service lands in Washington.

Management Activities

Harvest and season closures. The fisher has not been recreationally trapped in Washington or Oregon during the last 70 years. Montana re-opened a limited fisher trapping season in 1983. At present, the fisher season in Montana occurs from 1 December to 15 February, and there is a statewide quota of 7 fishers per season. Two districts, the northwest and the west-central, have separate fisher quotas of 2 and 5, respectively. Both districts previously had quotas of 10 fishers each; however, variable detection rates of fishers from snow-track surveys prompted a conservative approach to harvest, and quotas have been reduced accordingly (B. Giddings, pers. comm.). Montana trappers are required to turn in fishers incidentally captured after the quota is reached. Idaho Fish and Game paid $5 for fishers found dead after being incidentally captured in traps set for other species (Melquist 1997). British Columbia closed the fisher trapping season in 2004 and re-opened the season in 2005. The 2006-07 trapping season extends from November 1 to February 15.

Reintroductions. The fisher is one of the most frequently and successfully reintroduced carnivores (Berg 1982, Reading and Clark 1996, Breitenmoser et al. 2001). Since the 1940s, wildlife managers have translocated fishers as a means of re-establishing a valuable furbearer, a native carnivore and predator of the porcupine (Berg 1982). Translocation efforts began in Nova Scotia in the 1940s and became commonplace in the 1950s and 1960s throughout the species' range (Table 7, Berg 1982). There have been at least 35 fisher translocations attempted throughout their range in the United States and Canada from 1947 to 2004 (Table 7). Of the 35 translocations, 27 (77%) were reintroductions, 6 (17%) were augmentations, and 2 (6%) were introductions. Twenty-nine of the 33 reintroductions and augmentations have been completed for over 8 years and were evaluated for success or failure (Lewis 2006). Of these 29, 23 (79%) were successful (i.e., fisher populations persisted) and 6 (21%) failed (Lewis 2006).

Although fishers have not been translocated to Washington, translocations have occurred elsewhere in the Pacific Northwest and have been successful at re-establishing fishers. During the late 1950s and early 1960s, fishers were translocated to Montana, Idaho and Oregon. Additional translocations occurred in the late 1970s and early 1980s in Oregon and Alberta, and during the late 1980s and 1990s in Montana, Alberta, and British Columbia (Table 7). Recent research indicates that a native fisher population still occurs in Montana and Idaho, and therefore several translocations to these states were actually augmentations (Vinkey et al. 2006).

Research and surveys. Until recently, there had been very little study of the fisher in the Pacific Northwest and northern Rockies. Research was conducted in Idaho from 1985-1988, when Jones (1991) studied habitat use, movements and diet of fishers in the northcentral part of the state. This Idaho population was the progeny of animals transplanted from British Columbia in 1962-63. In Montana, research on activities and movements, habitat use, and diet were conducted for a population reintroduced into the Cabinet Mountains in the northwestern part of the state over a 4-year period (1988-1991)(Roy 1991, Heinemeyer 1993). From 1995-2001 the USDA Forest Service, Pacific Northwest Research Station, conducted a field study of fishers on the west slope of the Cascade Range in southern Oregon. The study was the first radio-telemetry study of fishers in Oregon or Washington and was an investigation of food habits, movements, den and rest site characteristics, and the effects of forest management on fisher habitat at stand and landscape scales (Aubry et al. 1997, Aubry and Raley 2002, Aubry et al. 2004). In British Columbia, a study of diet, spatial organization and habitat relationships of fishers was conducted between 1990 and 1993 in the central interior of the province (Weir 1995, Weir and Harestad 2003, Weir et al. 2005). In 1996-98 fishers were translocated from the Williams Lake area of British Columbia and reintroduced into the East Kootenay Trench in the southeastern part of the province (Fontana et al. 1999). Thirty-seven radio-collared animals provided information on movements, seasonal home range size, and habitat selection. A follow-up study in 2003 determined that the 1996-1998 reintroduction in the Cranbrook area was apparently unsuccessful in establishing a resident population (Weir et al. 2003). A public

Table 7. Fisher translocations in North America (modified from Roy 1991; Lewis 2006).

Release location[a]	Source location[a]	Year	Number released	Sex ratio M:F	Status[b]	Source
NS	Unknown	1947-48	12	6:6	S	Benson 1959
ON	ON	1956	25	Unknown	U	Berg 1982
ON	ON	1956-63	97	37:60	S	Berg 1982
WI	MN, NY	1956-63	60	36:24	S	Petersen et al. 1977
MT	BC	1959-60	36	16:20	S	Weckworth & Wright 1968
VT	ME	1959-67	124	19:16, 89 Unknown	S	Berg 1982
OR	BC	1960	11	5:6	F	Aubry and Lewis 2003
OR	BC	1960	13	5:8	F	Aubry and Lewis 2003
MI	MN	1961-63	61	42:19	S	Brander and Brooks 1973, Irvine et al. 1964
ID	BC	1962-63	39	20:19	S	Williams 1962, 1963
NS	ME	1963-66	80	29:51	S	Dodds & Martell 1971
WI	MN	1966-77	60	30:30	S	Petersen et al. 1977
NB	NB	1966-68	25	10:15	S	Drew et al. 2003
WV	NH	1969	23	6:10, 7 Unknown	S	Pack & Cromer 1981
MN	MN	1968	15	Unknown	F	Berg 1982
ME	ME	1972	7	4:3	U	Berg 1982
MB	MB	1972	4	Unknown	F	Berg 1982
NY	NY	1976-79	43	19:24	S	Wallace & Henry 1985
OR	BC, MN	1977-81	30	15:15	S	Aubry and Lewis 2003
CO	Unknown	1978	2	1:1	F	J. Apker, pers. comm.
ON	ON	1979-81	55	23:32	S	Kyle et al. 2001
ON	ON	1979-82	29	15:14	S	Kyle et al. 2001
AB	AB	1981-83	32	16:16	F	J. Jorgenson, pers. comm.
MT	MN, WI	1988-91	110	47:63	S	Roy 1991, Heinemeyer 1993
MI	MI	1988-92	189	88:101	S	R. Earle, pers. comm.
CT	NH, VT	1989-90	32	13:19	S	P. Rego, pers. comm.
AB	ON, MB	1990	17	6:11	S	Proulx et al. 1994
BC	BC	1990-91	10	Unknown	F	R. Weir, pers. comm.
BC	BC	1990-92	15	2:13	S	R. Weir, pers. comm.
NS	NS	1993-95	14	8:6	S	Potter 2002
MB	MB	1994-95	45	24:21	S	Baird & Frey 2000
PA	NY, NH	1994-98	190	87:97; +6 unknown kits	S	Serfass et al. 2001
BC	BC	1996-98	60	24:36	F	Fontana et al. 1999, Weir et al. 2003
NS	NS	1999-2004	Unknown	Unknown	O	M. O'Brien, pers. comm.
TN	WI	2001-03	40	20:20	O	Anderson 2002

[a]AB = Alberta, BC = British Columbia, CO = Colorado, CT = Connecticut, ID = Idaho, ME = Maine, MI = Michigan, MN = Minnesota, MT = Montana, NB = New Brunswick, NH = New Hampshire, NY = New York, NS = Nova Scotia, ON = Ontario, OR = Oregon, PA = Pennsylvania, TN = Tennessee, VT = Vermont, WI=Wisconsin, WV = West Virginia.
[b]S = Successful (fishers persisted for >10 yrs.), F = Failed, U = No evaluation, O = On-going.

outreach program to increase public support for the Kootenay reintroduction program was also an objective of this study. Another study of fishers in the more mesic conifer forests near Williston, British Columbia is currently in the data analysis stage (Weir 2003).

Survey techniques were developed in recent years to improve assessments of the status of rare forest carnivores in the West (Zielinski and Kucera 1995). These techniques, and variations thereof, have been used to assess the status of fishers. WDFW, in cooperation with the USDA Forest Service, conducted marten surveys in 1992 and forest carnivore surveys in 1995-97 that would detect the presence of fishers. The National Park Service conducted forest carnivore surveys during winter months from 2001 to 2004 in Olympic, North Cascades, and Mount Rainier National Parks. No fishers were detected in any of these surveys. The Forest Service also conducted surveys for forest carnivores on national forests in Oregon. Although most surveys failed to detect fishers, they were detected on the Rogue River, Umpqua, and Siskiyou National Forests.

Population and habitat management. In 1991, the Western Forest Carnivore Committee, an interagency group of managers and scientists, was created to address the needs of martens, fishers, lynx and wolverines. In the same year, the first major conference on the biology of martens and fishers occurred (the first Martes Symposium; Buskirk et al. 1994). In 1994, the Forest Service published a conservation assessment for these four forest carnivores (Ruggiero et al. 1994), produced an extensive literature review and proposed an adaptive management strategy for fishers in the western United States (Heinemeyer and Jones 1994). These documents resulted from greater attention to the conservation, research and monitoring of forest carnivores. The second, third and fourth international *Martes* symposia occurred in 1995 (Proulx et al. 1997), 2000 (Harrison et al. 2004) and 2004 (Santos-Reis et al. 2006). The British Columbia Ministry of Environment published a bulletin, *A Fisher Management Strategy for British Columbia* that includes an annotated bibliography (Banci 1989). Proulx (2004, 2005) developed and field-tested a winter habitat use model for fisher in the sub-boreal biogeoclimatic zone of British Columbia. The distribution of tracks corresponded well with predicted high-quality fisher habitat characterized as late-successional, mixed-conifer forest stands with complex stand structure and 30-60% canopy closure. This predictive model of fisher distribution in winter could be a valuable tool in forest management plans for the region. WDFW, in partnership with Conservation Northwest, conducted a feasibility assessment for reintroducing fishers to Washington (Lewis and Hayes 2004).

FACTORS AFFECTING CONTINUED EXISTENCE

Incidental Mortalities

Trapping. When trapping seasons are closed for fishers, they often are incidentally captured in traps set for other species (Luque 1984, Lewis and Zielinski 1996). Following closure of the trapping season for fishers in British Columbia, incidental harvest increased (Banci 1992). Over a 2-year period (1991-92 and 1992-93) when a trapping closure on fishers was in effect, 302 fishers were incidentally captured in British Columbia (Banci 1992, Weir 2003). Incidental captures are not illegal provided the animal is released when possible; but these captures often result in crippling injury or mortality (Strickland and Douglas 1984, Lewis and Zielinski 1996). Banci and Proulx (1999) classified furbearers in Canada along a gradient of resiliency, which is the capability of a species to recover from a reduction in their population. Fishers were classified as intermediate in resiliency and capable of sustaining harvest rates of <30% of the pre-trapped population, depending on environmental conditions and population characteristics. The significance of incidental captures in Washington for population recovery is unknown, but any source of mortalities in very small populations can have significant negative effects. Powell (1979) reported that as few as 1-4 additional mortalities per year due to trapping over a 100 km^2 area could cause a decline in a mid-western fisher population. Mortalities from incidental captures could be frequent enough to prevent local recovery of populations or the re-occupation of suitable habitat.

Passage of Initiative 713 by Washington voters in 2000 banned the use of body-gripping traps to capture furbearers, prohibited the sale of furbearer pelts that were obtained by body-gripping traps, and directed that a permit system be used to capture only animals involved in nuisance or damage activity on private land (Koenings et al. 2003). Furbearers may be captured using live traps. As a result of these restrictions, total furbearer harvest in Washington declined by 80%, and trapper numbers declined by 60% (Koenings et al. 2003). Legislative proposals seeking to amend Initiative 713 have been developed, but have not passed. However, if I-713 is overturned and a recreational harvest of furbearers is reinstated, fishers reintroduced to Washington could become more vulnerable to incidental capture. Initiative 713 does not apply to trapping by members of Washington treaty tribes.

Vehicle collisions. Though not as important a source of mortality as trapping, fishers are sometimes struck and killed by vehicles (Proulx et al.1994; York 1996; Zielinski et al. 1995, 1997). The potential for vehicle collisions increases with the density of roads in suitable habitat. Vehicles caused the death of 2 of 50 (4%) radio-collared fishers in a Maine study (Krohn et al. 1994), and 3 of 97 (3%) fishers in Massachusetts (York 1996). Though no road-kills have been reported in Washington, vehicle collisions could be a significant mortality factor for any small fisher population, particularly following a reintroduction. The I-90 lane expansion project in the central Cascades provides for wildlife crossings. Whether fishers will use these crossings is unknown. Therefore, the I-90 corridor could be a barrier to dispersal, and thus genetic exchange, between fishers reintroduced north and south of the highway.

Habitat Loss, Alteration, and Fragmentation

Forest management. Fishers are among the most habitat-specialized mammals in western North America (Buskirk and Powell 1994) because of their association with closed-canopy forests and forest structures typical of late-successional forests. Habitat availability is the primary factor influencing fisher distribution (Bull et al. 2001). Extensive logging of late-successional forests at low- and mid-elevations and subsequent conversion of these forests to intensively managed forests and urban development eliminated a large portion of the fisher's habitat in Washington (Powell and Zielinski 1994). Clearcutting, selective logging and thinning may degrade fisher habitat by removing part of the insulating canopy and exposing the site to drying effects of sun and wind. In addition, removing large live trees and snags reduces vertical structural diversity and den and rest sites, and removing large volumes of coarse woody debris from the forest floor reduces foraging habitat (Spies et al. 1988, Buck et al. 1994, Ohmann et al. 1994, Bull et al. 2001). In northwestern California, harvest units on the Shasta-Trinity National Forest are often replanted with ponderosa pine rather than firs. At a regional scale this practice changes vegetative species composition from a mesic closed forest of firs to a drier open forest dominated by ponderosa pine; conditions likely unsuitable for fishers (Buck et al. 1994). In other areas, harvest units are replanted with Douglas-fir. Carey and Johnson (1995) reported that western hemlock seeds are a more abundant and reliable food source than Douglas-fir seeds for small mammals. Thus, conversion of mixed-species stands to Douglas-fir plantations may affect prey populations negatively. Timber harvesting also fragments fisher habitat. Fishers typically avoid areas with low canopy cover and large openings in the forest, such as clearcuts (Buck et al. 1983, Arthur et al. 1989*b*, Powell 1993, Buskirk and Powell 1994, Jones and Garton 1994, Weir 1995). In California, fishers were detected in larger forest stands with high connectivity, suggesting that fishers were sensitive to fragmentation (Rosenberg and Raphael 1986). Many remaining late-successional forests at low elevations occur in small islands surrounded by cutover areas. On federal lands, late-successional forests are distributed in a highly fragmented mosaic, surrounded by younger forest stands that were previously logged or burned (Forest Service and USDI Bureau of Land Management 1994*a*:3&4-29). Most contiguous landscapes of late-successional forests on federal lands occur at high elevations and these areas may be less suitable for fishers if they commonly develop deep snowpacks (Aubry and Houston 1992, Holthausen et al. 1994).

Little is known about the effects of uneven-aged management on fisher habitat quality. Buck et al. (1994) speculated that timber harvests that produced more open stands and thus, more xeric conditions over large areas, would be detrimental to fishers in coastal California. However, light harvests, or small patch cuts may increase habitat diversity, thus prey diversity, and have little negative impact on fishers where adequate late-successional forest are available (Arthur et al. 1989*b*, Jones and Garton 1994). Fishers will use forest stands where a majority of the mature timber has been removed but still contains patches of residual forest and high volumes of large woody debris and advanced regeneration (R. Weir, pers. comm.). In southwestern Oregon, fishers occur in uneven-aged, intensively managed forest; the area contains many roads and selectively harvested stands but snags, logs, and cavity trees are relatively abundant (K. Aubry, pers. comm.). Radio-collared fishers sometimes hunted in areas with low to moderate canopy closure, and 1 female denned in residual trees in a heavily harvested stand (K. Aubry, pers. comm.). In Maine, a radio-collared female denned in a residual snag within a 3-acre clearcut, but close to the forest edge and dense hardwood regeneration (T. Paragi, pers. comm.).

Research is needed to define and quantify the specific amounts and types of large live trees, snags and down logs (coarse woody debris) or other stand features that are required to provide adequate structure for fishers (e.g., Payer and Harrison 2004). Different silvicultural regimes (e.g., partial overstory removal), including both even-aged and uneven-aged management, may be consistent with maintenance of fisher populations if harvests provide for retention and recruitment of coarse woody debris and some mature-forest overstory characteristics.

Fire, wind, forest insects and tree disease. Wind, fire, forest insects and tree disease are agents of natural disturbance that create forest structures used by fishers. Wind, tree disease and forest insects can create finer scale disturbances, whereas fire is the primary agent of disturbance at the landscape scale (Spies and Franklin 1988, Agee 1991). Finer scale disturbances accelerate the change in stand development from young to old-growth condition by increasing: (1) inputs of woody debris to the stand, (2) vertical and horizontal heterogeneity, and (3) proportion of shade-tolerant tree species (Spies and Franklin 1988). Thus, over time measures of tree decadence are much higher in old-growth compared to younger aged stands (Spies and Franklin 1991).

While fire does contribute to the destruction of some late-successional forest types, it also is responsible for their creation and maintenance (Agee 1991). Insect outbreaks and stand replacement fires can convert mature forests over large areas to early successional forests that are unsuitable as fisher habitat. Fire suppression interrupts natural fire regimes and can change the composition and structure of forests. For some forest types, the understory becomes overcrowded and a vertical continuity of fuels facilitates understory or crown fires (Agee 1994). Similar structural changes occur in other forest types, but can be accompanied by a shift to shade-tolerant species. These shifts in species composition can result in increased duration and intensity of outbreaks of forest pests. Thus, successful fire suppression can result in changes in the vertical and horizontal structure of forest types. When fires do occur, the fuel buildup and "ladder" fuels allow fires to reach the canopy and result in more high-severity fires than occurred naturally and can burn greater areas of forest (Agee 1993, 1994). Late-successional forests embedded in a matrix of fire-suppressed, managed forests are also at greater risk to loss by stand replacing fires (Agee 1991). Salvage or thinning operations that remove dead or decadent trees or coarse woody debris on the forest floor reduce structural features of forests that are important as denning, resting and foraging sites. Management activities for improving forest health, such as thinnings, fuels reduction, and prescribed fire, also introduce other human disturbances to the landscape that could be detrimental to fisher recovery (Bull et al. 2001).

Forest landscape planning. Management of federal lands in Oregon and Washington within the range of the northern spotted owl is expected to provide substantial conservation benefits to the fisher (USDA Forest Service and USDI Bureau of Land Management 1994*b*, Holthausen et al. 1994). The Washington Department of Natural Resources (WDNR) and several companies that own large blocks of timberland in Washington have developed Habitat Conservation Plans with the U. S. Fish and Wildlife Service, as outlined under Section 10 of the Endangered Species Act. These landowners have committed to long-term (50-100 year) plans to protect selected species of birds and mammals. Some of these plans offered habitat management provisions likely to benefit any remnant or reintroduced fisher populations. The WDNR indicated in their habitat conservation plan that habitat provisions for spotted owls, Marbled murrelets, forest riparian habitat and large legacy trees would help conserve habitat for fishers (WDNR 1996).

Genetic, Demographic, and Environmental Risks to Small Populations

Any small population of fishers that exists or became established in Washington would be vulnerable to random demographic events (e.g., variation in sex ratios, reproduction, and survival) and stochastic environmental events (e.g., severe weather, fire, volcanic eruption) and their indirect effects (Shaffer 1987). Disease does not seem to be a significant mortality factor in fisher populations (Powell 1993); however, in small populations, the loss of a few reproductive females could affect local population stability. Random factors are more likely to negatively affect small populations than larger populations. The ability to find mates may be reduced in small or sparse populations, potentially resulting in a loss of productivity (Lande 1988).

Small populations are more likely to suffer negative genetic effects as a result of the loss of genetic diversity and the potential for inbreeding depression (Allendorf 1983, Haig and Wagner 2001). Genetic diversity is lost primarily through random genetic drift, which increases the likelihood of inbreeding and decreases effective population size (Haig and Wagner 2001). Inbreeding may reduce fertility, thus making a population less able to recover from periods of low recruitment and greatly increase the probability of extirpation. Also, small populations can suffer genetic "bottlenecks," in which the descendants of remaining individuals exhibit little genetic variation and may be more susceptible to diseases or less able to adapt to new conditions (Schonewald-Cox et al. 1983). In establishing a new population, it is important to include unrelated individuals in the founding population (to mitigate the effects of genetic drift) and to increase population size as quickly as possible (to minimize the effect of a bottleneck) (Haig and Wagner 2001).

CONCLUSIONS

The fisher is a state endangered species that is likely extirpated from the state. Overtrapping, and loss and fragmentation of low and mid-elevation, late-successional forest were the primary factors in the decline of fisher populations. Logging of older conifer forests at low and mid-elevations likely had the greatest impact on fisher habitat. Complex structural diversity of late seral forests provided suitable fisher habitat. Large live trees, snags, and logs provided seasonal denning and resting sites, and a forest floor characterized by large volumes of dead and downed logs and a dense shrubby understory provided foraging habitat. The multi-layered canopy provided overhead cover for travel to access prey and resting structures. Logging replaced these forests with a more simplified forest structure that is lacking one or more of these habitat components. In addition to habitat loss, logging also fragmented fisher habitat. Fishers likely vanished from landscapes as remaining blocks of suitable habitat became smaller and more isolated and thus supported fewer fishers over time. Despite decades of protection from commercial harvest, fisher populations never recovered. Reintroduction has been successful in re-establishing fisher populations in other parts of North America and is the only means of fisher recovery in western Washington. A habitat assessment was conducted for western Washington that identified three areas of suitable habitat that may support fisher populations. Forests within Olympic National Park and Olympic National Forest are most suitable for the first reintroduction, and additional areas for reintroductions have been identified on federal lands in the southwestern and northwestern Cascades. Fisher recovery will require cooperation among Washington Department of Fish and Wildlife, the National Park Service, U.S. Forest Service, U.S. Fish and Wildlife Service, state and local agencies, tribes, timber industry, non-governmental organizations, and private citizens.

PART TWO: RECOVERY

RECOVERY GOAL

The goal of the recovery plan is to re-establish self-sustaining fisher populations in a geographic distribution that allows for their persistence in Washington into the foreseeable future (>100 years). The recovery plan outlines strategies that will restore fisher populations and enhance habitat to the point that the fisher can be down-listed from state endangered or threatened status in Washington. Achieving this goal will require collaboration and partnerships among state, federal, and local agencies, tribal governments, and non-governmental organizations.

Figure 8. Fisher Recovery Areas in Washington.

INTERIM RECOVERY OBJECTIVES

Three recovery areas have been delineated for Washington: the Olympic, Cascade, and Selkirk (Fig. 8). The current state of knowledge of fisher ecology in Washington does not allow for the development of population numbers or specific geographic distribution goals as recovery criteria. As new information is obtained on fishers in Washington, more specific recovery objectives may be developed. In the interim:

Fishers will be considered for downlisting from State Endangered to State Threatened status when:

1. Self-sustaining populations of fishers are established in multiple locations in the Olympic Recovery Area and in the southern (south of Interstate 90) or northern (north of Interstate 90) portion of the Cascade Recovery Area.

Fishers will be considered for downlisting from State Threatened to State Sensitive status when:

1. Self-sustaining populations of fishers are established in multiple locations within the Olympic Recovery Area, and in the southern and northern portions of the Cascade Recovery Area, and

2. Agreements and/or forest management plans for managing habitat on federal and state forest lands within the Olympic and Cascade Recovery Areas are in place to provide for the continued viability of fisher populations in Washington.

Rationale

Interim recovery objectives are to establish core breeding populations of fishers in both the Olympic and Cascade Recovery Areas and to have management plans in place to ensure their long-term persistence. Another long-term objective is to re-establish fishers in the Selkirk Recovery Area. This may occur through reintroduction or immigration from populations in northern Idaho.

Long-term persistence of fishers in Washington will be accomplished by re-establishing a number of widely distributed, self sustaining populations within suitable areas of their historical range. Re-establishing multiple populations serves to spread the risk of extirpation that could result from catastrophic or stochastic events such catastrophic wildfires, volcanic eruptions, forest disease outbreaks, fisher disease outbreaks or the genetic and demographic effects of small, isolated populations.

Fisher recovery areas (Fig. 8) were delineated to identify areas where the greatest potential exists for fisher re-establishment. The Olympic Recovery Area is centered on the Olympic Peninsula and is comprised primarily of Olympic National Park, Olympic National Forest and Washington Department of Natural Resources land ownerships. The Cascade Recovery Area is comprised primarily of national forests and national parks in the Cascade Range, and the Selkirk Recovery Area is composed primarily of the Colville and Idaho Panhandle national forests. The Olympic and Cascades Recovery Areas are part of the historical core range of the fisher in Washington based on the locations of collected specimens, historical trapping accounts, sightings, and the historical distribution of suitable habitat. The Cascades Recovery Area has sufficient habitat to support populations in both the southern and northern portions of the recovery area. The Selkirk Recovery Area was identified as a separate recovery area based on historical occurrence of fishers in this area, the presence of suitable habitat, and the potential of federal lands to support fishers. Mature and old-growth cedar/hemlock forests and forested riparian types (Jones 1991) in the southern Selkirk Mountains could provide suitable habitat for fishers in northeastern Washington, but a formal fisher habitat assessment will need to be conducted in this area.

Federal and state ownerships provide the greatest quantity and quality of fisher habitat likely to support viable fisher populations in Washington; and federal lands (national parks and forests) provide the greatest opportunities for managing fisher habitat at the large spatial scale needed for a wide-ranging carnivore. Fisher population viability over time will depend on cooperative management within the recovery areas to maintain suitable habitat and habitat connectivity. Federal land managers are currently collaborating with scientists to develop a “Fisher Conservation Assessment and Strategy” for Washington, Oregon and California (R. Naney and L. Finley, pers. comm.). The purpose of the assessment and strategy is to provide guidance to: restore and/or maintain habitat conditions that support fisher populations; re-establish fisher populations; and restore connectivity of fisher populations. Knowledge gained through reintroductions and the conservation assessment and strategy should provide the information needed for fisher conservation planning on federal lands in Washington. Fisher recovery in the Selkirk Mountains will require cooperative conservation planning efforts that span the borders of Washington, Idaho, and southern British Columbia.

RECOVERY STRATEGIES AND TASKS

1. Reintroduce fishers and establish a breeding core of individuals.

Reintroductions are the only means of recovering fisher populations in western Washington. Limited dispersal of fishers from Idaho into the Selkirks of northeastern Washington is unlikely to result in a self-sustaining population unless fishers are translocated to this region.

1.1 Evaluate the feasibility of fisher reintroductions.

1.1.1 Conduct feasibility studies to identify potential reintroduction areas.

A feasibility assessment for reintroducing fishers in western Washington was conducted in 2004 (Lewis and Hayes 2004). The assessment identified 3 potential reintroduction areas: the Olympic Peninsula, the southwestern Cascades, and the northwestern Cascades. If post-release monitoring of fishers on the Olympic Peninsula indicates substantial deviation from the definition of suitable habitat that was used in the 2004 feasibility assessment, it may require re-running the assessment for the Cascades Mountains prior to selection of reintroduction areas.

A habitat feasibility study has not been conducted for northeastern Washington. A habitat assessment will be needed for the Kettle Range and southern Selkirk Mountains to evaluate whether sufficient amounts and configurations of fisher habitat exist, and to identify and address any factors that might impede recovery (e.g., trapping in transboundary areas outside Washington).

1.1.2 Establish a fisher recovery team to assist WDFW with fisher recovery in Washington.

A fisher recovery team should be established to advise the Department on the implementation of recovery strategies, including pre-release protocols, post-release monitoring activities, and needs for adaptive management during reintroductions. Representatives from federal, state, and tribal governments, non-governmental organizations, industry, and academia with experience in fisher ecology, conservation biology, genetics, biometry, and public outreach should be included on the recovery team.

1.1.3 Identify source populations that are suitable for reintroductions.

Historically, gene flow occurred among fisher populations along the Pacific coast from British Columbia to California. Genetic similarities of fishers from British Columbia, California, and western Alberta to fishers that historically occurred in Washington suggest that they could adapt more easily and survive better in Washington than fishers from other areas of North America. Recent genetic studies have found that the best source population for fisher reintroductions in Washington is British Columbia. The next best source population would be from California or the western-most regions of Alberta (Warheit 2004).

1.2 Develop an implementation plan for fisher reintroductions.

In 2005-06, the U.S. Fish and Wildlife Service, Yreka Office, funded WDFW to develop an implementation plan for a proposed fisher reintroduction to Olympic National Park (Lewis 2006). The implementation plan (1) evaluates factors associated with translocation success based on a review of 29 translocations in North America, (2) identifies protocols for the capture, transport, and captive care of fishers from source populations, (3) proposes a release strategy, and (4) outlines approaches for post-release monitoring and research priorities.

Additional implementation plans may be developed in the future for reintroductions in the Cascades and possibly, the Selkirk Recovery Areas.

1.3 Reintroduce fishers in the Olympic Recovery Area.

1.3.1 <u>Work with the National Park Service and Olympic National Park to conduct an evaluation of a proposed fisher reintroduction into Olympic National Park, as outlined by the National Environmental Policy Act (NEPA)</u>.

Follow NEPA guidelines for public disclosure and an evaluation of reasonable alternatives for a proposed reintroduction of fishers in Olympic National Park. Provide tribes and stakeholders, including federal, state, and local agencies, interest groups, trappers, and private citizens, opportunities to participate in the evaluation process.

1.3.2 <u>Obtain funding to conduct the reintroduction and monitoring of fishers in Olympic National Park</u>.

Apply for grants to fund the reintroduction. The high costs of fisher reintroduction and monitoring will require collaborative partnerships among WDFW, National Park Service, U.S. Forest Service, U.S. Fish and Wildlife Service, tribes, WDNR, and interested non-governmental organizations and citizens. Look for opportunities to cost-share and to use citizen science participation in the project.

1.3.3 <u>Conduct releases in Olympic National Park based on protocols established in the implementation plan</u>.

Obtain fishers from British Columbia, if possible, or from Alberta. Transport and release fishers at selected areas within the park. Work with Olympic National Park and the Olympic National Forest to keep the public informed on the progress of the releases and status of released fishers.

1.3.4 <u>Conduct post-release monitoring of fishers to evaluate progress and success of reintroductions</u>.

Monitor reintroduced fishers to obtain information on 4 biological measures: survival, movements, home range establishment, and reproduction (Lewis 2006). These measures will determine if a reproductive population has become established in ≥1 reintroduction area. If additional funding becomes available, monitoring efforts should be expanded to track recruitment and population expansion.

1.3.5 Evaluate needs for adaptive management during the post-release monitoring.

Release and monitoring approaches may need to be modified during the course of the reintroduction program, if monitoring results indicate problems or concerns with existing methodologies. Status updates on post-release monitoring should be provided to the recovery team to keep them informed. The recovery team can be a resource to help develop and evaluate recommendations for potential adaptive management options, if needed.

1.4 Reintroduce fishers in the Cascade Recovery Area.

Use fishers from British Columbia and/or Alberta to translocate to the Cascade Recovery Area. Alternatively, if a sufficient number of animals are available to remove from established populations on the Olympic Peninsula, use fishers from the Olympic Recovery Area as a source for reintroductions in the Cascades Recovery Area. Information on survival, habitat use, and movements of fishers gained from post-release monitoring in the Olympic recovery area can be used to maximize success of fisher reintroductions in the Cascades.

1.4.1 Identify and prioritize reintroduction areas in the Cascades Recovery Area.

1.4.2 Coordinate with federal, state, and local agencies, tribal governments, and non-governmental organizations on recovery activities.

1.4.3 Conduct post-release monitoring of fishers to evaluate progress and success of reintroductions.

1.4.4 Expand the distribution of fishers in the Cascade Mountains and connect distant populations using a "stepping stone" approach to reintroductions.

Fishers should be released at multiple core release areas throughout the Cascade Recovery Area to expand the geographic distribution of occupied habitat, and to facilitate gene flow among subpopulations.

1.5 Determine if fishers should be translocated into the Selkirk Recovery Area.

Translocations into the Selkirk recovery area would expand the geographic range of fishers and, in combination with reintroductions into the Olympic and Cascades recovery areas, would increase the occupancy within the historical range in Washington.

1.5.1 Determine if fishers are present in northeastern Washington.

Conduct surveys to determine abundance and distribution of fishers in the Selkirk Recovery Area. Coordinate surveys with Idaho and British Columbia to determine if fishers are occupying habitat adjacent to Washington.

1.5.2 Determine the feasibility of reintroducing fishers to the Selkirk Mountains.

Conduct a feasibility study to determine if an adequate amount and configuration of suitable habitat is available to support a fisher population in this region. The habitat assessment should include federal, provincial, and state lands within the Selkirk Mountains of northern Idaho and southern British Columbia to assess connectivity with fisher populations from these jurisdictions.

1.5.3 If a successful reintroduction appears feasible, develop an implementation plan for a Selkirk translocation and identify and prioritize core release areas.

1.5.4 Coordinate with federal and state agencies, tribal governments, landowners and non-governmental organizations on recovery activities.

1.5.5 If funding and support are available, translocate fishers from within Washington and/or from suitable out-of state sources.

1.5.6 Conduct post-release monitoring of fishers to evaluate reintroduction success.

2. Increase public awareness and support of fisher recovery in Washington.

Conduct public information meetings near fisher reintroduction areas to respond to public interest in fisher recovery. Provide background information on fisher biology, ecology, management, conservation and reintroduction feasibility and progress. Involve interested citizens and groups in the project where possible.

2.1 Develop an education and outreach strategy to engage the public in fisher recovery.

The strategy should include measurable objectives and an established timeline for implementation.

2.1.1 Develop a strategic media strategy for fisher reintroduction and recovery.

Develop information releases about the fisher, reintroduction, species biology, and current status in the wild, in a variety of formats (television, print, web, etc.) for use in large and small markets statewide.

2.1.2 Develop educational curriculum materials about the fisher to be used in schools.

Consider developing a program such as "Project CAT" (Cougars and Teaching; http://wdfw.wa.gov/science/articles/cougar/index.html) for local school participation in the fisher recovery program and to integrate fisher recovery activities into local school programs.

2.1.3 Enlist the help of partners with informing the public about fishers and their status as recovery efforts move forward.

Identify partners to work with Washington Fish and Wildlife and its regional offices to increase public knowledge and advance the goals of the recovery plan. Initial focus of outreach and education should be in areas closest to recovery areas.

2.2 Share information with the scientific community on aspects of fisher recovery in Washington.

Provide updates to the scientific community on the implementation and progress of fisher reintroductions.

3. Coordinate and cooperate in recovery activities with landowners and other public agencies.

3.1 Coordinate with the National Park Service, U.S. Forest Service, Department of Natural Resources, tribes, and donor sources in the planning and implementation of fisher reintroductions and post-release monitoring.

3.2 Provide assistance to landowners, if requested, to help develop fisher habitat plans or agreements.

3.3 Review and comment on new or revised conservation plans and management strategies that address fishers.

3.3.1 Review agency plans and agreements that address management of fisher habitat. These might include U.S. Fish and Wildlife Service Habitat Conservation Plans, Candidate Conservation Agreements, and U.S. Forest Service Management Plans.

Potential conservation measures that could be taken for fishers might include actions such as protecting fishers from trapping or incidental capture in traps set for other species, protection of known fisher den sites, and providing access for monitoring and research activities.

3.4 Establish and maintain relationships for information exchange on fisher issues with Provincial agencies in British Columbia and with adjacent states.

4. Protect fisher populations.

4.1 Work with trappers to reduce chances of incidental capture of fishers in traps set for other species.

Fishers are protected from trapping in Washington and the use of body-gripping traps for trapping other species is prohibited. Tribal trappers, however, are allowed to use body-gripping traps. Work with trappers to minimize incidental capture of fishers in traps set for other species. Develop and distribute information on reintroductions to inform trappers and the general public about fisher ecology and recovery.

4.2 Address conflicts with predation if they occur.

In rare cases, fishers might prey on pets or small livestock such as poultry. If a conflict occurs, it should be addressed through the problem wildlife management program conducted by the WDFW enforcement program. Resolution of conflicts may involve trapping and transplanting problem individuals.

5. Survey and monitor re-established fisher populations.

Once fishers have been re-established through reintroductions, long-term monitoring will be needed to determine presence and geographic distribution of fishers and progress toward achieving recovery. Because federal lands are the focus of fisher reintroductions and provide the greatest opportunity for recovery in Washington, coordination and partnerships with federal land management agencies on monitoring will be essential.

5.1 Employ standardized protocols to document the presence and distribution of fishers within recovery zones.

Track plates, hair-snares, and remote cameras are likely to be the most cost-effective techniques to document the presence of fishers (Raphael 1994, Gese 2001, Belant 2003) and changes in distribution (Zielinski and Stauffer 1996, Zielinski and Mori 2001). WDFW, U.S. Forest Service, and National Park Service should seek funding to develop and implement a sampling protocol to monitor fisher recovery on federal lands in Washington.

5.2 Develop partnerships among state and federal agencies, tribal governments, academia, forest industry, and non-governmental organizations to obtain logistical and financial support for fisher monitoring.

Implementation of a fisher monitoring plan would be most efficient if all suitable habitat at various elevations and on various ownerships could be sampled. Collaboration and partnerships would be needed to meet the logistical and financial goals of such an extensive monitoring program. Participants would benefit by receiving site-specific information on fishers and other forest carnivores on their lands, and they would contribute to a more extensive monitoring program that increases the knowledge of fisher distribution and habitat requirements in Washington.

5.3 Conduct periodic surveys to determine population persistence and distribution.

Given that fishers are wide-ranging and occur at low densities, periodic surveys will occur over an extensive landbase and incur high costs. For these reasons stakeholders could coordinate funding opportunities and logistics of field personnel to implement standardized survey protocols to monitor presence and change in distribution of fishers in recovery areas.

6. Manage habitat to improve conditions for fishers over time.

The large home range size of individual fishers suggests that the re-establishment of viable fisher populations in the state will require landscape-scale habitat management. Landscape and multi-scale habitat models provide the knowledge needed for long-term and large-scale conservation planning across multiple ownerships (Mladenoff et al. 1995; Carroll et al. 1999, 2001, Zielinski et al. 2006). Cooperation among adjacent management jurisdictions in British Columbia and Idaho will be needed to maintain connectivity (i.e., gene flow, demographic support) among regional fisher populations.

6.1 Develop a conservation strategy for the fisher on federal lands.

Fisher recovery will occur primarily on federal lands in Washington. An interagency effort was initiated in fall 2005 to develop a fisher conservation assessment and strategy for federal lands in the Pacific states (Washington, Oregon, California). Completion of the assessment and strategy is expected by June 2007. The conservation assessment and strategy is expected to provide guidance to the U.S. Forest Service and Bureau of Land Management for fisher habitat management on federal lands.

It is anticipated that the guidance will be incorporated into future land management plans. Ecosystem management objectives in the Northwest Forest Plan (USDA and USDI 1994a) provide a suitable framework for fisher conservation on federal lands. Development of late-successional and old growth forests in reserves should contribute substantially to fisher recovery on federal lands in western Washington.

6.2 Manage habitat on federal lands to improve conditions for fishers over time.

Lyons et al. (1994) provide general guidelines and considerations of spatial scale for habitat and population management of fishers in the western United States. They suggest that habitat management occur at both forest stand and landscape scales. At the stand level, management should emphasize maintaining large trees, snags, and logs for denning and resting structures and high canopy cover and structural diversity for travel cover and foraging habitat. At the landscape level, management should result in forest stands that facilitate occupancy, reproduction and gene flow over time. Washington-specific data are needed for both stand and landscape-level habitat models. This information could be developed in the future through monitoring and research associated with reintroductions. These models could be useful for refining fisher habitat management strategies in the future.

7. Conduct research necessary to conserve fisher populations.

There is no empirical information on fisher habitat use patterns, food habits, or demography for Washington. Answers to basic biological and ecological questions will be important for managing and conserving fisher populations and fisher habitat in Washington. Reintroductions will provide opportunities, through research and monitoring, to obtain these data for Washington. Implementing these research studies will be contingent on funding and will require cooperation and partnerships between WDFW, National Park Service, U.S. Forest Service, academia and other interested cooperators.

7.1 Conduct research studies in the Olympic and Cascade Recovery Areas on habitat use, movement patterns, and food habits.

7.1.1 <u>Determine seasonal home range characteristics, habitat use and selection, and food habits of fishers in Washington.</u>

Investigate fisher habitat use and selection at a range of spatial scales, including resting/den sites, foraging sites, stand, home range and landscape scales (e.g., Payer and Harrison 2000, 2003, 2004; Lewis 2006). Where possible, habitat use and selection should be investigated across land ownerships. Lacking population size information, home range size can provide a coarse indication of population densities within a recovery area. An assessment of seasonal fisher food habits among recovery areas can provide insight into foraging habitat and diversity of available prey resources.

7.1.2 Determine movements and dispersal patterns of reintroduced fishers.

Increased risk of mortality is associated with extensive movements and dispersal. Dispersal of juvenile fishers is expected to be an important means of re-establishing fishers throughout reintroduction areas and recovery areas. Monitor released fishers and juveniles to determine movement and dispersal patterns (e.g., timing, distance, habitat use, and sex-specific survival) and eventual establishment of home ranges (Lewis 2006). Empirical data on juvenile dispersal may be used in conservation planning to determine the spacing of local fisher populations to ensure connectivity and gene flow.

8. Maintain a fisher database.

8.1 Provide a central repository for fisher surveys and detections.

WDFW will maintain a centralized database in its Wildlife Resource Data System (WRDS) for fisher locations in the state. Reliable data on the distribution of fishers is needed for making conservation decisions or management recommendations. Anecdotal occurrence data (sighting reports, descriptions of tracks, etc.) cannot be independently verified, and therefore are inherently unreliable; whereas, verifiable records (specimens, photos, track-plate impressions, etc.) provide conclusive evidence of presence

Aubry and Jagger (2006) developed a centralized database to permanently archive reliable data on surveys of fishers, and other forest carnivores. The Internet website allows users to add new data as well as query existing distribution data using an interactive mapping application. WDFW and Forest Service data managers will probably exchange data periodically to ensure distribution records are kept current. A link to the Forest Carnivore Surveys website is available at the following URL: http://www.fs.fed.us/pnw/olympia/wet/index.html.

IMPLEMENTATION RESPONSIBILITIES

The outline of strategies and tasks on the following page identifies co-managers, WDFW involvement, and task priorities (Table 8). Cost estimates have only been forecast for the reintroduction in the Olympic Recovery Area (Lewis 2006). The following conventions are used:

Priority 1	First priority actions include those necessary to prevent further decline or extirpation, or to reestablish species in Washington. These actions include: preventing further habitat loss or decline in habitat quality, monitoring of populations, evaluating the feasibility for species reintroduction, and conducting reintroductions and associated post-release monitoring as well as research necessary to aid additional reintroduction activities.
Priority 2	Second priority actions are those necessary to increase populations and expand their range such as additional reintroductions, and assessment, restoration, and acquisition of habitat.
Priority 3	All other actions necessary to meet objectives, such as interagency coordination, education activities, and research activities.

Acronyms:

BLM	Bureau of Land Management
WDFW	Washington Department of Fish and Wildlife
DNR	Washington Department of Natural Resources
FWS	USDI, Fish and Wildlife Service
FS	USDA, Forest Service
NGO	Non-governmental organizations
NPS	National Park Service

Table 8. Prioritization and annual costs of recovery tasks to implement the Washington State Fisher Recovery Plan.

Priority	Recovery Task	Responsible Agency	Estimated Cost ($1000's)
1	1.1 Evaluate the feasibility of fisher reintroductions	WDFW	60
1	1.2 Develop an implementation plan for fisher reintroductions	WDFW	40
1	1.3 Reintroduce fishers in the Olympic Recovery Area	WDFW, FS, NPS, DNR	200
1	1.4 Reintroduce fishers in the Cascade Recovery Area	WDFW, FS, NPS, DNR	200
1	1.5 Determine if fishers should be translocated into the Selkirk Recovery Area	WDFW, FS, DNR	TBD [a]
1	3.1 Coordinate with NPS, USFS, DNR, NGOs and donor sources in planning and implementation of fisher reintroductions and post-release monitoring	NPS, FS, DNR, NGOs	-
1	4.1 Work with trappers to reduce chances of incidental capture of fishers in traps set for other species	WDFW	-
1	3.1 Coordinate with the National Park Service, U.S. Forest Service, Department of Natural Resources, tribes, and donor sources in the planning and implementation of fisher reintroductions and post-release monitoring	WDFW	-
2	2.1 Develop an education and outreach strategy to engage the public in fisher recovery	WDFW, NPS	10
2	3.2 Provide assistance to landowners, if requested, to help develop fisher habitat plans or agreements.	WDFW	5
2	4.2 Address conflicts with predation, if they occur	WDFW	1
2	5.1 Employ standard survey protocols to document the presence and distribution of fishers within recovery zones	WDFW, FS, NPS, tribes, NGOs	TBD
2	5.2 Develop partnerships among state and federal agencies, tribal governments, academia, forest industry, and non-governmental organizations to obtain logistical and financial support for fisher monitoring	WDFW, FWS, NPS, FS, Tribes, Academia, Forest Industry, NGOs	TBD
2	5.3 Conduct periodic surveys to determine population persistence and distribution	WDFW, FS, NPS, Tribes, NGOs	TBD
2	6.1 Develop a conservation strategy for the fisher on federal lands	FS, BLM, NPS, WDFW	30
2	6.2 Manage habitat on federal lands to improve conditions for fishers over time	FS, BLM, NPS	TBD
2	7.1 Conduct research studies in the Olympic and Cascade recovery areas on habitat use, movement patterns, and food habits	WDFW, FS, NPS	TBD
2	8.1 Provide a central repository for fisher surveys and detections	WDFW, FS	3
3	2.2 Share information with the scientific community on aspects of fisher recovery in Washington	WDFW	-
3	3.3 Review and comment on revisions to Habitat Conservation Plans and Forest Service management strategies	WDFW, FWS, FS	2
3	3.4 Establish and maintain relationships for information exchange on fisher issues with Provincial agencies in British Columbia and with adjacent states	WDFW	-
3	3.5 Provide updates to scientific community on implementation and progress of fisher reintroductions	WDFW, NPS	-

[a]TBD = to be determined.

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Appendix A. Collection locality for fisher specimens and trapping accounts for Washington, 1890-1992.

Year	Location	County	Collector/ Trapper	Collection No.[a] or account source
1890	Tacoma	Pierce	Edwards Bros.	ANSP #7295
1892	Martin	Kittitas	A. Rupert	ANSP #7618
1893	Lake Keechelus	Kittitas	A. Rupert	ANSP #8074
1894	Lake Keechelus	Kittitas	A. Rupert	ANSP #8872
1894	S. base of Mt. Adams, near Trout Lake	Klickitat	C. Wegstein	USNM #63907
1894	S. base of Mt. Adams, near Trout Lake	Klickitat	D. Kaegi	USNM #69972
1894	Mt. Adams, Trout Lake	Klickitat	C. Wegstein	USNM #64758
1894	S. base of Mt. Adams, near Trout Lake	Klickitat	C. Wegstein	USNM #63908
1894	Mt. Adams, Trout Lake	Klickitat	C. Wegstein	USNM #64759
1895	Base of Mt. Adams, near Trout Lake	Klickitat	D. Kaegu	USNM #70541
1895	Mt. Adams, Trout Lake	Klickitat	D. Kaegi	USNM #76616
1895	S. base of Mt. Adams, near Trout Lake	Klickitat	D. Kaegi	USNM #70928
1895	S. base of Mt. Adams, near Trout Lake	Klickitat	D. Kaegi	USNM #70927
1895	Olympic Peninsula, Lake Cushman region	Mason	R. Harps	USNM #268769
1896	Mt. Adams, Trout Lake	Klickitat	P. Schmid	USNM #81843
1896	Mt. Adams, Trout Lake	Klickitat	D. Kaegi	USNM #77873
1896	Mt. Adams, Trout Lake	Klickitat	D. Kaegi	USNM #76615
1896	Mt. Adams, Trout Lake	Klickitat	P. Schmid	USNM #81951
1896	Lake Cushman	Mason	T. Hayes	USNM #78410
1896	Olympic N.P., T25NR5WS19	Jefferson	F. Reid	Aubry & Houston 1992
1897	Mt. Adams, Trout Lake	Klickitat	P. Schmid	USNM #87084
1897	Mt. Adams, Trout Lake	Klickitat	P. Schmid	USNM #92113
1897	Mt. Rainier N.P., Nisqually Valley	Pierce	C. Merriam	Aubry & Houston 1992
1898	Olympic Mtns., Barnes Cr., Solduck Trail	Clallam	D. Elliot	FMNH #6342
1898	Olympic Mountains, Solduck Trail	Clallam	D. Elliot	FMNH #6341
1898	Mt. Adams, Trout Lake	Klickitat	P. Schmid	USNM #92770
1899	Lake Cushman	Mason	T. Hayes	USNM #96581
1899	Lake Cushman	Mason	T. Hayes	USNM #96582
1899	Lake Cushman	Mason	T. Hayes	USNM #96580
1900	Mt. Adams, Trout Lake	Klickitat	P. Schmid	USNM #99457
1900	Mt. Adams. Trout Lake	Klickitat	P. Schmid	USNM #99652
1901	Mt. Adams. Trout Lake	Klickitat	P. Schmid	USNM #107624
1901	Hoodsport	Mason	H. Finch	USNM #116653
1901	Mt. Adams. Trout Lake	Klickitat	P. Schmid	USNM #108213
1902	Mt. Adams. Trout Lake	Klickitat	P. Schmid	USNM #116480
1902	Olympic Mts., Skokomish R.	Mason	K. Robbins	USNM #119959
1902	Mt. Adams, Trout Lake	Klickitat	P. Schmid	USNM 116481
1902	Olympic Mts., Skokomish R.	Mason	K. Robbins	USNM #119960
1902	Mt. Adams, Trout Lake	Klickitat	P. Schmid	USNM #116766
1902	Olympic Mts., Skokomish R.	Mason	K. Robbins	USNM #119958
1902	Olympic Mts., Skokomish R.	Mason	K. Robbins	USNM #119961
1902	Olympic Mts., Skokomish R.	Mason	K. Robbins	USNM #119957
1903	Palix or Nemah River watershed	Pacific	J. Prior	B. Adamire, pers. comm.
1904	Mt. Rainier N.P., below Longmire	Pierce	C. Stoner	Aubry& Houston 1992
1907	Hoodsport	Mason	T. Rule	USNM #170607
1907	Hoodsport	Mason	T. Rule	USNM #170606
1908	Hoodsport	Mason	T. Rule	USNM #17069
1908	Hoodsport	Mason	T. Rule	USNM #170608
1909	Hoodsport	Mason	T. Rule	USNM #170610
1909	Hoodsport	Mason	T. Rule	USNM #170611
1909	Hoodsport	Mason	T. Rule	USNM #170612
1909	Cosmopolis, Water Reservoir T17NR9WS23	Grays Harbor	L. Fairbrother	Aubry & Houston 1992
<1910	Lower Elwha Dam	Clallam	B. Everett	B. Adamire, pers. comm.
1910	Hoodsport	Mason	T. Rule	USNM #170613
1910	Hoodsport	Mason	T. Rule	USNM #170614

Appendix A. Collection locality of fishers, 1890-1992 (Cont'd)

Year	Location	County	Collector/ Trapper	Collection No.[a] or account source
1910	Hoodsport	Mason	T. Rule	USNM #170615
1910	Hoodsport	Mason	T. Rule	UNSM #170616
1912	Mt. Rainier N.P.	Pierce	S. Estes	Taylor & Shaw 1927
1912	Olympic N.F., T24NR5WS36	Mason	R. Harps	Aubry & Houston 1992
1912	Mt. Rainier N.P.	Pierce	C. Stoner	Taylor & Shaw 1927
1913	Palix River or Nemah River watershed	Pacific	J. Prior	B. Adamire, pers. comm.
1915	Wenatchee N.F., Hyas Lake, T24NR14ES17	Kittitas	M. Nordrum	Aubry & Houston 1992
1917	Okanogan N.F., T38NR20ES9	Okanogan	H. Mason	Aubry & Houston 1992
1919	Queets River W. of Clearwater, narrow spit below Copalis	Jefferson	Cantwell	Scheffer 1995
1919	Olympic Ranger Stn., Glacier Cr., 2 mi SE of Hoh R.	Jefferson	W. Taylor	USNM #241949
1919	Near the town of Tieton	Yakima	H. Beebe	Aubry & Houston 1992
1920s	Crooked Cr., E. side of Lake Ozette	Mason	Arbriter	B. Adamire, pers. comm.
1920s	Hoko River	Clallam	S. Iverson	B. Adamire, pers. comm.
1920s	Near old coal mine along beach in Pysht area	Clallam	Fernandez	B. Adamire, pers. comm.
1920s	Lake Sutherland	Clallam	O. Hansen	B. Adamire, pers. comm.
1915-1925	Wolf R. and Grand Cr. T28NR4WS18	Clallam	A. B. Cameron	B. Adamire, pers. comm.
1921	E. Fork of Quinault R.	Grays Harbor	E. & I. Olson	Scheffer 1995
1923	Vance, 27 mi SW of Iron Cr.	Skamania	W. Scalf	USNM 3243790
1925	Crooked Cr. Between Lake Ozette & Dickey Lake	Clallam	G. Fargo	Aubry & Houston 1992
1925	Trout Lake	Klickitat	D. Smith	Scheffer 1957
1926	Clallam Bay	Clallam	C. Keller	Scheffer 1995
1930	Seaview	Pacific	J. Petit	Scheffer 1957
1933	Methow Valley just S. of Canadian border	Okanogan	R. Johnson	Scheffer 1938
1939	Olympic Mts.		J. Allen	Scheffer 1957
1946	Dragoon Cr. T29NR42ES34	Spokane	J. Berry	J. Berry, pers. comm.
<1947	Near Olympia	Thurston	G. Gibbs	USNM #3379
1947	Iron Cr.	Lewis	Booth 1947	USFWS
1969	Lilliwaup Swamp area, T23NR4WS11	Mason	G. Gray	UPSMNH #14784
1971	Near Sultan,T28NR9ES6	Snohomish	R. Akers	Aubry & Houston 1992
1987	Peterman Hill, S. of Morton, T12NR4ES10	Lewis	S. Curry	Aubry & Houston 1992
1990	3 mi W of Orting, T19NR4ES34	Pierce	D. Robertson	UWBM #37530
1992	Ft. Lewis T18NR02ES13	Pierce	G. Sovie	WDFW-NHDB[b]
1994	Calispell Peak T34NR42ES9	Stevens	S. Zender	WDFW-NHDB[c]

[a]Museum and source acronyms include: ANSP = Academy of Natural Sciences Museum , Philadelphia; USNM = U.S. National Museum of Natural History (Smithsonian Inst.); FMNH = Field Museum of Natural History, Chicago; USFWS = Bird and Mammal Collection, Fish and Wildlife Service, Washington, D.C.; UPSMNH = University of Puget Sound Museum of Natural History; UWBM = University of Washington Burke Museum; WDFW-NHDB = Washington Department of Fish and Wildlife, Natural Heritage Database records.

[b]Photograph of trapped animal is on file at WDFW.

[c]Carcass of fisher identified by ear tag as animal released in Montana reintroduction project.

Appendix B. Responses to written public comment received on the Draft Washington State Recovery Plan for the Fisher.

Section	Comments and Response
General comments	One hundred and fifty-five citizens submitted comments on the draft recovery plan expressing their support for fisher reintroduction and recovery in Washington. *Thank you.*
Recovery Objectives	Add the following interim recovery objective – "population growth rates in each recovery area show consistently increasing population abundances (lambda > 1.0)." Status relative to the objective could be assessed using data from research described in section 7.1.2 of the recovery plan. Given slow rates of fisher reproduction, "consistent" population increases should mean increases that continue for more than ten years. To account for variable weather conditions, demographic variability, and other uncertainties, it might be appropriate to evaluate population increases using a running 3-year average growth rate. *Obtaining reliable data on fisher demography in order to assess population trends would require intensive ground-based radiotelemetry research that is not feasible due to high annual costs and logistical constraints associated with road access into remote portions of recovery areas.*
Recovery	Section 5.2 should include collaboration and partnerships with researchers and educators from universities, colleges, and other educational organizations. *This information has been added.*

Appendix C. Washington Administrative Code 232-12-297. Endangered, threatened, and sensitive wildlife species classification.

PURPOSE

1.1 The purpose of this rule is to identify and classify native wildlife species that have need of protection and/or management to ensure their survival as free-ranging populations in Washington and to define the process by which listing, management, recovery, and delisting of a species can be achieved. These rules are established to ensure that consistent procedures and criteria are followed when classifying wildlife as endangered, or the protected wildlife subcategories threatened or sensitive.

DEFINITIONS

For purposes of this rule, the following definitions apply:

2.1 "Classify" and all derivatives means to list or delist wildlife species to or from endangered, or to or from the protected wildlife subcategories threatened or sensitive.

2.2 "List" and all derivatives means to change the classification status of a wildlife species to endangered, threatened, or sensitive.

2.3 "Delist" and its derivatives means to change the classification of endangered, threatened, or sensitive species to a classification other than endangered, threatened, or sensitive.

2.4 "Endangered" means any wildlife species native to the state of Washington that is seriously threatened with extinction throughout all or a significant portion of its range within the state.

2.5 "Threatened" means any wildlife species native to the state of Washington that is likely to become an endangered species within the foreseeable future throughout a significant portion of its range within the state without cooperative management or removal of threats.

2.6 "Sensitive" means any wildlife species native to the state of Washington that is vulnerable or declining and is likely to become endangered or threatened in a significant portion of its range within the state without cooperative management or removal of threats.

2.7 "Species" means any group of animals classified as a species or subspecies as commonly accepted by the scientific community.

2.8 "Native" means any wildlife species naturally occurring in Washington for purposes of breeding, resting, or foraging, excluding introduced species not found historically in this state.

2.9 "Significant portion of its range" means that portion of a species' range likely to be essential to the long-term survival of the population in Washington.

LISTING CRITERIA

3.1 The commission shall list a wildlife species as endangered, threatened, or sensitive solely on the basis of the biological status of the species being considered, based on the preponderance of scientific data available, except as noted in section 3.4.

3.2 If a species is listed as endangered or threatened under the federal Endangered Species Act, the agency will recommend to the commission that it be listed as endangered or threatened as specified in section 9.1. If listed, the agency will proceed with development of a recovery plan pursuant to section 11.1.

3.3 Species may be listed as endangered, threatened, or sensitive only when populations are in danger of failing, declining, or are vulnerable, due to factors including but not restricted to limited numbers, disease, predation, exploitation, or habitat loss or change, pursuant to section 7.1.

3.4 Where a species of the class Insecta, based on substantial evidence, is determined to present an unreasonable risk to public health, the commission may make the determination that the species need not be listed as endangered, threatened, or sensitive.

DELISTING CRITERIA

4.1 The commission shall delist a wildlife species from endangered, threatened, or sensitive solely on the basis of the biological status of the species being considered, based on the preponderance of scientific data available.

4.2 A species may be delisted from endangered, threatened, or sensitive only when populations are no longer in danger of failing, declining, are no longer vulnerable, pursuant to section 3.3, or meet recovery plan goals, and when it no longer meets the definitions in sections 2.4, 2.5, or 2.6.

INITIATION OF LISTING PROCESS

5.1 Any one of the following events may initiate the listing process.

1.1.1 The agency determines that a species population may be in danger of failing, declining, or vulnerable, pursuant to section 3.3.

1.1.2 A petition is received at the agency from an interested person. The petition should be addressed to the director. It should set forth specific evidence and scientific data which shows that the species may be failing, declining, or vulnerable, pursuant to section 3.3. Within 60 days, the agency shall either deny the petition, stating the reasons, or initiate the classification process.

1.1.3 An emergency, as defined by the Administrative Procedure Act, chapter 34.05 RCW. The listing of any species previously classified under emergency rule shall be governed by the provisions of this section.

1.1.4 The commission requests the agency review a species of concern.

5.2 Upon initiation of the listing process the agency shall publish a public notice in the Washington Register, and notify those parties who have expressed their interest to the department, announcing the initiation of the classification process and calling for scientific information relevant to the species status report under consideration pursuant to section 7.1.

INITIATION OF DELISTING PROCESS

6.1 Any one of the following events may initiate the delisting process:

1.1.1 The agency determines that a species population may no longer be in danger of failing, declining, or vulnerable, pursuant to section 3.3.

1.1.2 The agency receives a petition from an interested person. The petition should be addressed to the director. It should set forth specific evidence and scientific data which shows that the species may no longer be failing, declining, or vulnerable, pursuant to section 3.3. Within 60 days, the agency shall either deny the petition, stating the reasons, or initiate the delisting process.

1.1.3 The commission requests the agency review a species of concern.

6.2 Upon initiation of the delisting process the agency shall publish a public notice in the Washington Register, and notify those parties who have expressed their interest to the department, announcing the initiation of the delisting process and calling for scientific information relevant to the species status report under consideration pursuant to section 7.1.

SPECIES STATUS REVIEW AND AGENCY RECOMMENDATIONS

7.1 Except in an emergency under 5.1.3 above, prior to making a classification recommendation to the commission, the agency shall prepare a preliminary species status report. The report will include a review of information relevant to the species' status in Washington and address factors affecting its status, including those given under section 3.3. The status report shall be reviewed by the public and scientific community. The status report will include, but not be limited to an analysis of:

1.1.1 Historic, current, and future species population trends.

1.1.2 Natural history, including ecological relationships (e.g. food habits, home range, habitat selection patterns).

1.1.3 Historic and current habitat trends.

1.1.4 Population demographics (e.g. survival and mortality rates, reproductive success) and their relationship to long term sustainability.

1.1.5 Historic and current species management activities.

7.2 Except in an emergency under 5.1.3 above, the agency shall prepare recommendations for species classification, based upon scientific data contained in the status report. Documents shall be prepared to determine the environmental consequences of adopting the recommendations pursuant to requirements of the State Environmental Policy Act (SEPA).

7.3 For the purpose of delisting, the status report will include a review of recovery plan goals.

PUBLIC REVIEW

8.1 Except in an emergency under 5.1.3 above, prior to making a recommendation to the commission, the agency shall provide an opportunity for interested parties to submit new scientific data relevant to the status report, classification recommendation, and any SEPA findings.

8.1.1 The agency shall allow at least 90 days for public comment.

FINAL RECOMMENDATIONS AND COMMISSION ACTION

9.1 After the close of the public comment period, the agency shall complete a final status report and classification recommendation. SEPA documents will be prepared, as necessary, for the final agency recommendation for classification. The classification recommendation will be presented to the commission for action. The final species status report, agency classification recommendation, and SEPA documents will be made available to the public at least 30 days prior to the commission meeting.

9.2 Notice of the proposed commission action will be published at least 30 days prior to the commission meeting.

PERIODIC SPECIES STATUS REVIEW

10.1 The agency shall conduct a review of each endangered, threatened, or sensitive wildlife species at least every five years after the date of its listing. This review shall include an update of the species status report to determine whether the status of the species warrants its current listing status or deserves reclassification.

1.1.1 The agency shall notify any parties who have expressed their interest to the department of the periodic status review. This notice shall occur at least one year prior to end of the five year period required by section 10.1.

10.2 The status of all delisted species shall be reviewed at least once, five years following the date of delisting.

10.3 The department shall evaluate the necessity of changing the classification of the species being reviewed. The agency shall report its findings to the commission at a commission meeting. The agency shall notify the public of its findings at least 30 days prior to presenting the findings to the commission.

1.1.1 If the agency determines that new information suggests that classification of a species should be changed from its present state, the agency shall initiate classification procedures provided for in these rules starting with section 5.1.

1.1.2 If the agency determines that conditions have not changed significantly and that the classification of the species should remain unchanged, the agency shall recommend to the commission that the species being reviewed shall retain its present classification status.

10.4 Nothing in these rules shall be construed to automatically delist a species without formal commission action.

RECOVERY AND MANAGEMENT OF LISTED SPECIES

11.1 The agency shall write a recovery plan for species listed as endangered or threatened. The agency will write a management plan for species listed as sensitive. Recovery and management plans shall address the listing criteria described in sections 3.1 and 3.3, and shall include, but are not limited to:

1.1.1 Target population objectives.

1.1.2 Criteria for reclassification.

1.1.3 An implementation plan for reaching population objectives which will promote cooperative management and be sensitive to landowner needs and property rights. The plan will specify resources needed from and impacts to the department, other agencies (including federal, state, and local), tribes, landowners, and other interest groups. The plan shall consider various approaches to meeting recovery objectives including, but not limited to regulation, mitigation, acquisition, incentive, and compensation mechanisms.

1.1.4 Public education needs.

1.1.5 A species monitoring plan, which requires periodic review to allow the incorporation of new information into the status report.

11.2 Preparation of recovery and management plans will be initiated by the agency within one year after the date of listing.

1.1.1 Recovery and management plans for species listed prior to 1990 or during the five years following the adoption of these rules shall be completed within 5 years after the date of listing or adoption of these rules, whichever comes later. Development of recovery plans for endangered species will receive higher priority than threatened or sensitive species.

1.1.2 Recovery and management plans for species listed after five years following the adoption of these rules shall be completed within three years after the date of listing.

1.1.3 The agency will publish a notice in the Washington Register and notify any parties who have expressed interest to the department interested parties of the initiation of recovery plan development.

1.1.4 If the deadlines defined in sections 11.2.1 and 11.2.2 are not met the department shall notify the public and report the reasons for missing the deadline and the strategy for completing the plan at a commission meeting. The intent of this section is to recognize current department personnel resources are limiting and that development of recovery plans for some of the species may require significant involvement by interests outside of the department, and therefore take longer to complete.

11.3 The agency shall provide an opportunity for interested public to comment on the recovery plan and any SEPA documents.

CLASSIFICATION PROCEDURES REVIEW

12.1 The agency and an ad hoc public group with members representing a broad spectrum of interests, shall meet as needed to accomplish the following:

1.1.1 Monitor the progress of the development of recovery and management plans and status reviews, highlight problems, and make recommendations to the department and other interested parties to improve the effectiveness of these processes.

1.1.2 Review these classification procedures six years after the adoption of these rules and report its findings to the commission.

AUTHORITY

13.1 The commission has the authority to classify wildlife as endangered under RCW 77.12.020. Species classified as endangered are listed under WAC 232-12-014, as amended.

13.2 Threatened and sensitive species shall be classified as subcategories of protected wildlife. The commission has the authority to classify wildlife as protected under RCW 77.12.020. Species

WASHINGTON STATE STATUS REPORTS AND RECOVERY PLANS

Status Reports

2005	Mazama Pocket Gopher, Streaked Horned Lark, Taylor's Checkerspot	√
2005	Aleutian Canada Goose	√
2004	Killer Whale	√
2002	Peregrine Falcon	√
2001	Bald Eagle	√
2000	Common Loon	√
1999	Northern Leopard Frog	√
1999	Olympic Mudminnow	√
1999	Mardon Skipper	√
1999	Lynx Update	
1998	Fisher	√
1998	Margined Sculpin	
1998	Pygmy Whitefish	√
1998	Sharp-tailed Grouse	√
1998	Sage-grouse	√
1997	Aleutian Canada Goose	√
1997	Gray Whale	√
1997	Olive Ridley Sea Turtle	√
1997	Oregon Spotted Frog	√
1993	Larch Mountain Salamander	
1993	Lynx	
1993	Marbled Murrelet	
1993	Oregon Silverspot Butterfly	
1993	Pygmy Rabbit	
1993	Steller Sea Lion	
1993	Western Gray Squirrel	
1993	Western Pond Turtle	

Recovery Plans

2006	Western Gray Squirrel (Draft)	√
2004	Greater Sage-Grouse	√
2003	Pygmy Rabbit: Addendum	√
2002	Sandhill Crane	√
2004	Sea Otter	√
2001	Pygmy Rabbit: Addendum	√
2001	Lynx	√
1999	Western Pond Turtle	√
1996	Ferruginous Hawk	√
1995	Pygmy Rabbit	√
1995	Upland Sandpiper	
1995	Snowy Plover	

√: These reports are available in pdf format on the Department of Fish and Wildlife's web site: http://wdfw.wa.gov/wlm/diversty/soc/concern.htm.

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