Draft

Washington State Status Report

for the

Fisher

by

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The Washington Department of Fish and Wildlife maintains a list of endangered, threatened and sensitive species (Washington Administrative Codes 232-12-014 and 232-12-011, Appendix C). In 1990, the Washington Fish and Wildlife Commission adopted listing procedures developed by a group of citizens, interest groups, and state and federal agencies (Washington Administrative Code 232-12-297, Appendix C). The procedures include how species listing will be initiated, criteria for listing and delisting, public review and recovery and management of listed species.

The first step in the process is to develop a preliminary species status report. The report includes a review of information relevant to the species' status in Washington and addresses factors affecting its status including, but not limited to: historic, current, and future species population trends, natural history including ecological relationships, historic and current habitat trends, population demographics and their relationship to long term sustainability, and historic and current species management activities.

The procedures then provide for a 90-day public review opportunity for interested parties to submit new scientific data relevant to the status report, classification recommendation, and any State Environmental Policy Act findings. During the 90-day review period, the Department holds one public meeting in each of its administrative regions. At the close of the comment period, the Department completes the Final Status Report and Listing Recommendation for presentation to the Washington Fish and Wildlife Commission. The Final Report and Recommendation are then released 30 days prior to the Commission presentation for public review.

This is a Draft Status Report for the fisher. **Submit written comments on this report by August 1, 1998 to: Endangered Species Program Manager, Washington Department of Fish and Wildlife, 600 Capitol Way N, Olympia, WA 98501-1091.** The Department will present the results of this status review to the Fish and Wildlife Commission for action at the October 2-3, 1998 meeting.

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EXECUTIVE SUMMARY

Fishers historically occurred throughout much of the forested areas of Washington, though they were not particularly abundant. The fisher was over-trapped in the 19th, and early 20th centuries. Trapping, predator and pest control programs, and loss and alteration of habitat combined to push the fisher to near extirpation. Despite being protected from legal harvest for 64 years, the fisher has not recovered. The fisher population may have been kept from recovering by a combination of factors. These factors likely include: a reduction in quality and quantity of habitat due to development and logging; past predator and pest control programs; low inherent reproductive capacity of the species; and demographic and genetic effects of small population size.

Fisher biology is characterized by low population density, low reproductive rates, and relatively short life span. They have large home ranges and generally avoid large openings, which suggests that viable populations would require large areas of relatively contiguous habitat. Throughout their range, fishers are generally associated with late-successional coniferous and mixed coniferous-deciduous forest. In western Washington, fishers may have been restricted by frequent soft snows or deep snow packs to elevations below 1800 m. Forests with high canopy closure, multiple canopies, shrubs, and that support a diverse prey base are most used. Large diameter trees, large snags, tree cavities, and logs are most often used for den and rest sites, and are an important component of suitable habitat.

Currently, the fisher is very rare in Washington. Infrequent sighting reports and incidental captures indicate that a small number may still be present. However, despite extensive surveys, no one has been able to confirm the existence of a population in the state. The lack of detections of fishers given the extensive carnivore surveys conducted since 1990, an average of less than four fisher sightings per year since 1980, and few incidental captures by trappers, all indicate that fishers are very rare in Washington and could become completely extirpated. We believe that any remaining fishers in Washington are unlikely to represent a viable population, and without recovery activities, the species is likely to be extirpated from the state.

For these reasons, the Department recommends that the fisher be listed as an endangered species in the state of Washington.

TAXONOMY

The fisher (*Martes pennanti*) is a member of the order Carnivora, family Mustelidae, and subfamily Mustelinae. Johann Erxleben first described the fisher in 1777 based on an account made by Welsh naturalist Thomas Pennant in 1771 and an earlier account by Buffon in 1765 (Powell 1981, 1993, Douglas and Strickland 1987). Erxleben (1777 cited in Powell 1981b, 1993) referred to the species as *Mustela pennanti*, after Thomas Pennant. In the late 1800s, Allen, Baird, Coues, Rhoads, and Smith independently agreed upon the binomial *Martes pennanti* (Hagmeier 1959, Powell 1981b). 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 three subspecies has been questioned (Grinnell et al. 1937, Hagmeier 1959, Coulter 1966). The genetic relations of fishers throughout their range are currently being investigated and may determine the validity of subspecific designations.

While fishers will eat fish, the name "fisher" is misleading. It may have resulted from the resemblance of this species to the European polecat, the pelts of which are referred to as fishet in France (Powell 1993). Alternatively, the name may have originated from trappers who caught this species while using fish as bait, and the fisher's habit of stealing fish from winter stores (Coues 1877). Black cat, fisher cat, pekan, pequam, wejack, and woods-otter are other common names given to this species (Douglas and Strickland 1987, Powell 1993).

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. Its pelage is dark brown on the snout, belly, legs, rump, and tail. It is often a lighter, grizzled brown (cinnamon to milk-chocolate color) on the top of its head, neck and shoulders. Fishers often have white markings on their chest, underarm region and around their genitals (Powell 1993). While the extent of the these markings stays the same on individual fishers, the color is known to vary from white to amber-yellow and back again over the period of a year. Females have finer, silkier fur than males, making females' pelts more valuable than that of males (Douglas and Strickland 1987). Fishers have a single molt in late summer and early fall, and shedding starts in late spring (Powell 1993). The molting of hair on the tail can be extensive, giving the appearance of a "rat-tail" in some individuals. Fishers 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 five 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 on top; and 3 incisors, 1 canine, 4 premolars and 2 molars bilaterally on bottom (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 skull of both males and females have sagittal crests which become quite large on adult males (Strickland et al. 1982).

GEOGRAPHICAL DISTRIBUTION

North America

The fisher, found only in northern North America, historically occurred as far south as the Appalachians of Tennessee and North Carolina (Fig. 1; Hagmeier 1956, Gibilisco 1994). Prehistoric remains have been found in Georgia, Arkansas, and possibly Alabama (Graham and Graham 1994). The present range includes much of the forested region of Canada, New England, northern New York, northern Minnesota, northern Wisconsin, and the Upper Peninsula of Michigan. In the western United States, continuous peninsular extensions occurred historically from Canada south through the Rocky Mountains to Central Idaho, and south through the Cascades, Coast Ranges, and the Sierra Nevada (Gibilisco 1994). The fisher's range in the western states now is fragmented and discontinuous (Zielinski et al. 1995a).

The fisher's range was reduced dramatically in the 1800s and early 1900s through overtrapping, alterations of forested habitats by logging, fire, and farming, and predator and pest control (Douglas and Strickland 1987, Powell 1993, Powell and Zielinski 1994). The combination of logging and trapping probably had the greatest impacts (Powell 1993). Fisher pelts have always been among the most valuable, and trapping pressure was intense. Fires, particularly in the northern Rockies, resulted in the loss of well over 1 million acres of potential fisher habitat (Pyne 1982). Logging removed, altered, or fragmented most of the older forests used by the fisher (Powell 1993). Consequently, in the 1920s, 1930s and 1940s, many states and provinces closed fisher trapping seasons to protect remaining populations and allow the fisher to recover (Powell

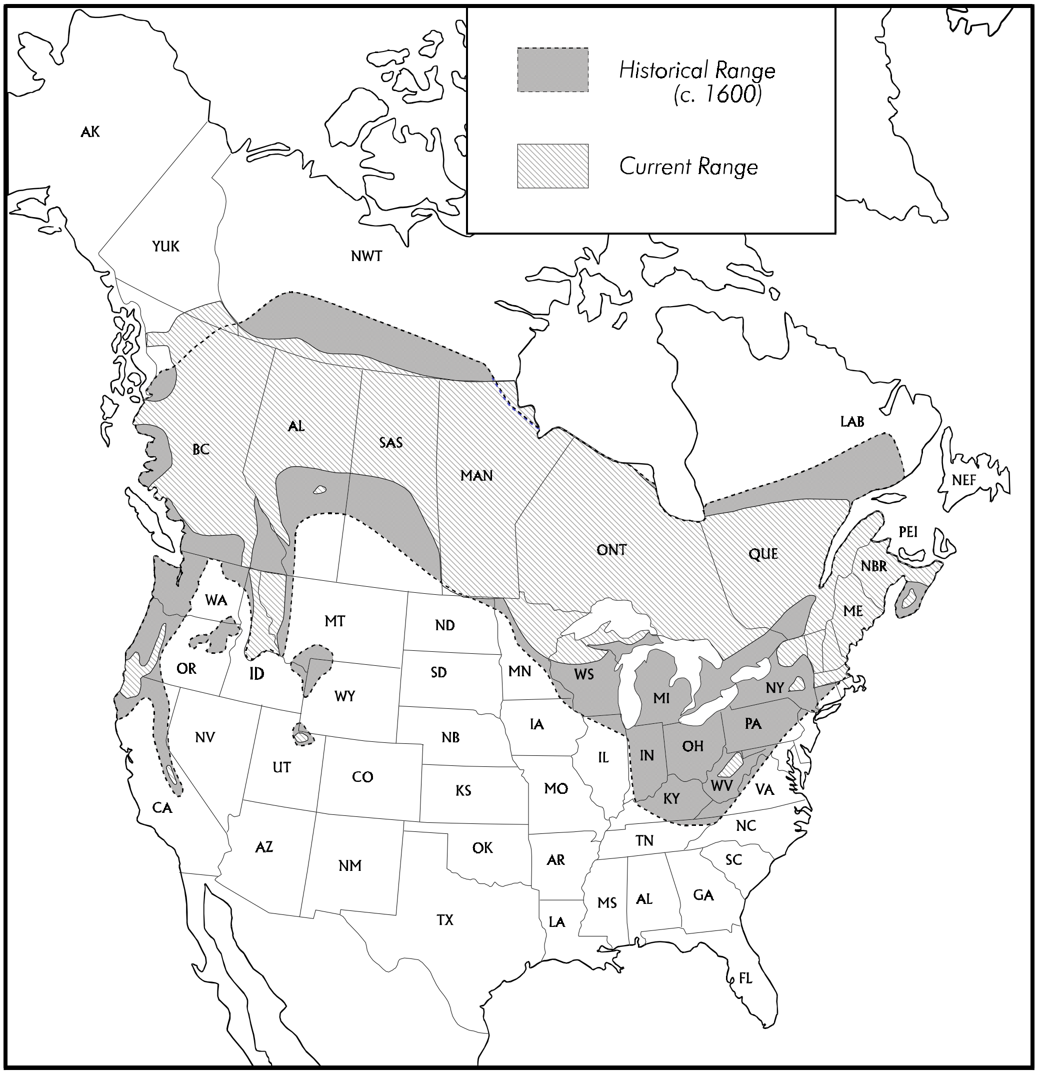

Figure 1. Historical and current range of fisher in North America (modified from Gibilisco 1994). The current range in Washington is unknown.

1993). Legal protection and the regrowth of forests after 19th century farm abandonment, allowed some populations in the Northeast to recover. Fishers were re-introduced in areas where trapping closures failed to allow fisher populations to recover (Berg 1982, Powell 1993; Strickland et al. 1982).

The present distribution in California, where fishers have not been reintroduced, includes populations in the southern Sierra Nevada, and a population in northwestern California that extends into the southwestern corner of Oregon (Zielinski et al. 1995a). Fishers also now occur in the southern Oregon Cascades and in the Clearwater region of northern Idaho (Aubry et al.1996a, Jones and Garton 1994, Heinemeyer 1995). Fishers presently occur throughout much of British Columbia (B.C. Minist. of Env. Lands, Parks, unpubl. data).

Washington

Early records. Based on habitat, the historic range of fishers in Washington probably included all the 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, B). Authors seem to disagree about the presence of fisher in southwestern Washington, the Blue Mountains, and northeastern Washington, due to the scarcity of specimens from these areas (Taylor and Shaw 1929, Booth 1947, Dalquest 1948, Johnson and Cassidy 1997). Dalquest's (1948) map excluded all these areas, but he states that "a few may occur in northeastern Washington, the Blue Mountains, and the Willapa Hills."

The Blue Mountains were included in fisher range by Booth (1947), but excluded by Taylor and Shaw (1929), and Johnson and Cassidy (1997). We included the Blue Mountains based on habitat, the mention of fisher in the Blues by Suckley and Cooper (1860:92,114), and the collection of two specimens in the Blue Mountains in Oregon (Bailey 1936). Hudson's Bay Company fur returns for the years 1836-1852 list 284 fishers from Fort Nez Perce at Walla Walla (Hudson's Bay Company Archives, Winnepeg). These fisher were probably trapped in the Blues in Washington and Oregon and the Wallowa Mountains in northeastern Oregon.

We included northeastern Washington in historical fisher range based on historical trapping records, habitat, and recent sightings (Hudson's Bay Company Archives, Winnepeg, Aubry and Houston 1992, Johnson and Cassidy 1997). Trapping records list a large number of fisher from Fort Colville which was near Kettle Falls. However, Fort Colville received furs from a part of southeastern British Columbia, northern Idaho, and western Montana, as well as northeastern Washington (Mackie 1997:250).

For southwestern Washington, Booth (1947) lists 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 has either been lost, or never existed (R. Johnson, pers. comm.). We include southwestern Washington based on habitat, historical accounts of single fishers being trapped near the Palix River, Pacific County in 1903, 1910, and 1913 (B. Adamire, pers. comm.), and an account of three being trapped near Seaview in 1930 (Scheffer 1957).

We excluded San Juan County, though Booth (1947) lists a specimen in the personal collection of Walter Dalquest from Blakely Island. However, Walter Dalquest has no recollection of such a specimen and did not believe fisher were ever found on the islands (F. Stangle, pers. comm.). Therefore, we disregarded that record, as did Dalquest (1948), and Johnson and Cassidy (1997).

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 of 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).

Scheffer (1938, 1957, 1995) reports 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." Based on all the records and reports with good location information, Aubry and Houston (1992) reported that fisher on the west side of the Cascades were primarily found (87% of records) below 1000 m in elevation. They attributed the complete absence of fisher records above 1800 m west of the Cascade crest to the deep snow pack (see discussion below under Fishers and Snow).

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 marten and river otter (*Lutra canadensis*), can be mistaken for fisher, and large marten tracks are extremely similar to female fisher tracks (Zielinski and Truex 1995). Aubry and Houston (1992) carefully evaluated all fisher records and reports and assigned them to categories of reliability. Their summary suggests that the fisher is no longer found in the Blue Mountains, southern Coast Range, southernmost Cascades, the Kitsap Peninsula, and the eastern edge of Puget Sound (Aubry and Houston 1992).

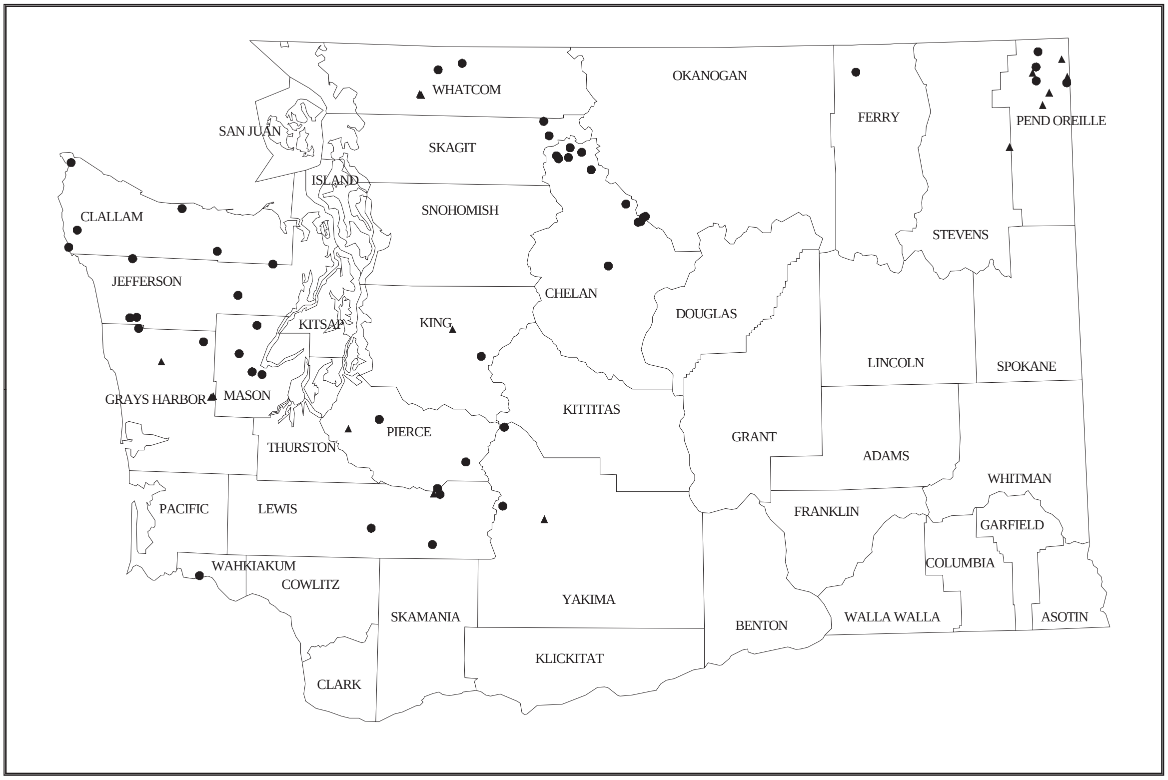

Figure 3. Fisher records in Washington, 1980-1997. Circles = records in Aubry and Houston (1992) with reliability ratings of 1-4 (see footnote, Appendix B), and triangles = more recent records on file at WDFW .

Approximately 16 sighting reports have been filed since Aubry and Houston compiled records in 1991 (Appendix B). These have not been categorized as to reliability, but nearly all occurred in the areas with other recent reports (Fig. 3) and add little information about fisher distribution besides what was reported by 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. Extensive surveys by WDFW and the U. S. Forest Service have failed to find a fisher population, or even confirm the presence of a fisher in areas where reports are concentrated (see discussion under Population Status). Infrequent sightings and coincidental captures indicate that a small number may remain that have gone undetected.

NATURAL HISTORY

Behavioral Characteristics

Fishers are solitary except when rearing young (done only by the female), breeding, and fighting. Aggression and fighting between males may occur during the breeding season (generally March-April), when males make extra-territorial movements in search of receptive females (Douglas and Strickland 1987). Male home ranges often overlap more than one female's home range but male-female interactions other than breeding and detecting scent marks of other fishers are probably incidental to other activities.

Scent marking with urine, feces, and glandular secretions on logs, stumps, and snow piles is used presumably to delineate territories. Defending territories using confrontation may be relatively rare (Powell 1993). Fishers have been observed marking deer carcasses by dragging their abdomens over the carcass and marking with urine. Scent marking rest sites with feces and urine is common as well (Pittaway 1984). The existence of an abdominal scent gland in fishers is in question, but these glands are present in American martens and wolverines (*Gulo gulo*) (Pittaway 1984).

Fishers are secretive and are seldom seen even where abundant, indicating that they generally avoid humans (Douglas and Strickland 1987, Powell 1993:1,201). However, they will use habitat near low-density housing, farms, and roads, and will den under unoccupied structures (Pittaway 1978, Johnson and Todd 1985, Arthur et al. 1989a, Jones 1991). Powell et al. (1997) reported fisher maternal dens near active roads and small logging operations. Fishers have also been known to take suet and other foods at bird feeders (Pittaway 1978, Jones 1991).

Home Range and Territoriality

Home range size of fishers varies widely for individuals and by region (Table 1). Powell and Zielinski (1994) state that there is no clear pattern in home range sizes, although the largest have been recorded in western studies. Typically, male home ranges (average 40-50 km^2; 15.4-19.3 mi^2) are two to three times the size of female home ranges (15-20 km^2; 5.8-7.7 mi^2). 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. 1989a, Powell and Zielinski 1994). There appears to be very little intra-sexual 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).

Table 1. Estimated home range sizes (mean ± sd) of fishers from seven studies in western North America.

Location (Study)	Male km²		n	Female km²		n	Method and comments
California (Buck 1982)	23	±12	4	6.8		2	Convex polygon; adults & juv with >20 locations; male-breeding season; female all year.
California (Self and Kerns 1992)	16	±6	2	-		-	Convex polygon
California (Zielinski et al. 1997a)	52	±34	4	8.3	±3.2	9	Adaptive kernal, 95% contours; preliminary data.
California (Dark 1997)	53.9	±50.6	4	53.5	±34	2	Adaptive kernal, 95%; animals with >15 locations.
Idaho (Jones 1991)	79	±35	6	32	±23	4	90% harmonic mean
British Columbia (Weir 1995)	46.5		1	26.4	±9.2	5	Adaptive kernal 90% contours Annual range
" "	122	±66.5	3	33	±10.7	8	Summer range
" "	73.9		1	25	±2.6	6	Winter range
Oregon (K. Aubry, pers. comm.)	40		1	26.4	±3.5	3	Convex polygon (100%); preliminary data.

Activity Patterns, Movement, and Dispersal

Fishers may be active day and night, but appear most active around sunrise and sunset; often resting during the afternoon (Kelly 1977, Arthur and Krohn 1991, Kohn et al. 1993, Powell 1993). They may be more active when they are hungry and when their prey are more available (Powell 1993). Powell (1993) reported that fishers generally have 1-3 activity periods per day lasting 2-5 hours each. They are also more active during summer than in winter (Kelly 1977, Arthur and Krohn 1991). Males and females have similar activity patterns (Arthur and Krohn 1991). Arthur and Krohn (1991) found that denning females were more active than females without young, especially during the day.

Using snow tracking, Powell (1993) estimated the typical daily movement in Michigan to be 5 km. Daily movements during summer seem to be somewhat less than in winter (Powell and Zielinski 1994). In Wisconsin, Kohn et al. (1993) found average minimum daily movements of 2.25 and 1.25 km (1.4 and 0.8 mi) typical for males and females, respectively (straight line distance using telemetry). Fishers can make long-distance movements in short periods of time, especially males during the breeding season. Reintroduced fishers typically travel > 50 km after being released, often over short periods of time (Weckworth and Wright 1968, Pack and Cromer 1981, Roy 1991, Heinemeyer and Jones 1994, Proulx et al. 1994).

Fishers are primarily terrestrial, but climb trees to reach den and resting sites, and 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). Kelly (1977) and Coulter (1966) reported that large rivers seem to be a barrier to movements and dispersal, but Weir (1995) reported that fishers in British Columbia crossed a large river on several occasions. Seton (1929), and deVos (1952, cited in Heinemeyer and Jones 1994) indicate that fishers will not hesitate to swim when advantageous. In Oregon, unpaved logging roads do not seem to impede fisher movements. However, larger paved roads seem to affect fisher movements because they do not maintain home ranges on both sides of paved roads (Aubry, pers. comm.).

In most mammals, males disperse away from the mother's home range, but females remain nearby (Greenwood 1980). In fishers, males and females seem to disperse similar distances, but females may disperse somewhat later than males (Arthur et al. 1993, Paragi 1990, Arthur et al. 1993). Juveniles in Maine dispersed about 10-16 km (Paragi 1990). In Idaho, 2 1-year-old males moved 26 and 42 km before establishing home ranges (Jones 1991).

Diet and Foraging

The fisher's diet generally consists of snowshoe hares (*Lepus americanus*), small mammals, squirrels, porcupines (*Erethizon dorsatum*), birds, ungulate carrion, and plant material (Fig. 4). Insects, reptiles, amphibians, and fungi are also occasionally eaten (Grenfell and Fasenfest 1979, Kuehn 1989, Zielinski et al. 1997a). Fishers will eat a variety of fruits and seeds; Washington trappers have reported that summer scat contained salal berries (*Gaultheria shallon*) and huckleberries (*Vaccinium* spp.) (Scheffer 1957). Other types of vegetation often appear on fisher diet lists but vegetation can be overestimated due to ingestion of the stomach contents of prey and incidental ingestion while trying to escape from a trap (Jones 1991). The occurrence of aquatic mammals in the fisher's diet may also be influenced by the use of beaver and muskrat as bait by trappers (Kuehn 1989). In Idaho, Jones (1991) found that snowshoe hares, ungulate carrion, and small mammals were the most frequently identified remains in scats and digestive tracts. Similarly, in Montana, Roy (1991) found that snowshoe hares made up the bulk of the diet, and small mammals, porcupines, mustelids, and black-tailed deer (*Odocoileus hemionus*) made up the balance. Ungulate meat is nearly always obtained as carrion, but there are rare observations of fisher attacking adult deer (Seton 1929, Weir 1995).

In southwestern Oregon, prey remains at den and rest sites included Steller's jay (*Cyanocitta stelleri*), flicker (*Colaptes auratus*), pileated woodpecker (*Dryocopus pileatus*), hairy woodpecker (*Picoides villosus*), ruffed grouse (*Bonasa umbellus*), deer fawn, snowshoe hare, California ground squirrel (*Spermophilus beecheyi*), northern flying squirrel (*Glaucomys*

Figure 4. Percent frequency of occurrence of food items in the fisher diet from six studies in western North America.

Location	**Idaho**	**Idaho**	**Montana**	**BC**[a]	**California**	**Manitoba**
Study	**Jones 1991 (7 g.i.)**[b]	**Jones 1991 (18 scat)**	**Roy 1991 (80 scat)**	**Weir 1995 (261 g.i.)**	**Grenfell & Fasenfest 1979(8g.i.)**	**Raine 1987 (159 scat)**
Snowshoe hare	●●●●	■	■	●●●●		■
Porcupine		◊◊◊	◊◊◊	✹✹✹✹		
Deer (carrion)	✹✹✹✹	✹✹✹✹	✳	◊◊◊	●●●●	
Moose/elk (carrion)	✹✹✹✹	✹✹✹✹		✹✹✹✹		
Unident. Ungulate	●●●●	●●●●				
Voles, red-backed	●●●●	◊◊◊		✹✹✹✹		✳
Unidentified		●●●●	✳	◊◊◊		✳
Peromyscus spp.	✹✹✹✹			✹✹✹✹		
Misc./unident. rodent			◊◊◊		✹✹✹✹	
Shrews				✹✹✹✹		
Moles					✹✹✹✹	
Squirrels, red	✹✹✹✹					✳
Ground		◊◊◊				
Flying				◊◊◊		
Chipmunks		◊◊◊	✳			
Marmot/ Woodchuck		◊◊◊				✳
Rabbit					✹✹✹✹	
Muskrat[c]						✳
Woodrat			◊◊◊		✳	
Fisher				✹✹✹✹		
Marten				◊◊◊		
Weasels		◊◊◊		◊◊◊		
unident./other			◊◊◊			
Domestic cat		◊◊◊				
Misc./unident.		◊◊◊				
Birds/ Galliformes				◊◊◊	◊◊◊	◊◊◊
other/unident.	✹✹✹✹	✹✹✹✹				✳
eggs						◊◊◊
Snake						✳
Arthropods		✹✹✹✹				✳
Snail		◊◊◊				
Fruits and seeds		✹✹✹✹		✳		✳
Fungi (false truffles)[d]					■	

Key: percent category	<5%	5-9 %	10-19 %	20-48%	>49%	
Symbol	✳	◊◊◊	✹✹✹✹	●●●●	■	

[a] BC = British Columbia. [b]g.i. = gastro-intestinal tract. [c]Beaver and other meat that appeared to be trap bait was excluded from the figure. [d]Fungi may have been from the gut of prey.

sabrinus), Douglas squirrel (*Tamiasciurus douglasi*), and porcupine (Aubry et al. 1996b, Lewis and Aubry 1997). Porcupines were detected in the diet during winter, but not during summer when less intimidating prey may be more readily available (K. Aubry, pers. comm.).

Sexual dimorphism in animals often results in different diets and thus is hypothesized to be an adaptation to avoid competition between the sexes for food (Selander 1966, Erlinge 1979). Most studies have failed to find a difference in diet between male and female fishers although they differ dramatically in size (Powell 1993, Giuliano et al. 1989). However, Weir (1995) found that females consumed small mammals and squirrels significantly more often than males, and that males consumed mustelids (including weasels, martens, fishers) more often than females. The greater frequency of males with porcupine quills in their tissues and feces suggests that males prey on porcupines more frequently than females (Douglas and Strickland 1987, Arthur et al. 1989b, Weir 1995, Aubry et al. 1997).

Fishers are considered opportunistic hunters that use two different hunting techniques. They employ a “zig-zagging” movement between sites with suitable cover in search of snowshoe hares (and other small and mid-sized mammals and birds), and a straight-line movement between suitable den trees when seeking porcupines (Powell 1993). They also will use logs, snowbanks, and small ridges as vantage points while hunting hares (Johnson and Todd 1985). Fishers are very quick, and once prey is flushed from cover, it is overtaken rapidly. Most prey species, with the exception of the porcupine, are killed with a bite to the back of the neck and head. Fishers kill porcupines by making repeated bites to their thinly quilled face (Powell 1993). To catch porcupines, fishers will ascend trees and descend head-first forcing an ascending porcupine back down to the ground where it can be killed and eaten (Powell 1993).

HABITAT REQUIREMENTS

General

Fishers use forests with high canopy closure, abundant large woody debris, large snags and cavity trees, and understory vegetation (Buck et al. 1983, Arthur et al. 1989b, Jones 1991, Powell 1993, Seglund 1995). Good fisher habitat seems to have a high degree of diversity; multi-aged stands interspersed with small openings and containing wetland or riparian habitats which help support a diverse prey base may be ideal (Banci 1989). Coues (1877) and Seton (1929) noted that fishers seem to prefer forest near swamps, especially swamps in large timber. Buck et al. (1983), Jones and Garton (1994), and Seglund (1995) have shown the importance of riparian habitats for fishers, especially as traveling corridors and rest sites.

Forest types. Fishers are found in northern coniferous, mixed coniferous-hardwood, and northern hardwood forests (Powell 1993). Fishers generally do not appear to select habitats based upon tree species composition. Roy (1991) reported that fishers avoided subalpine fir (*Abies lasiocarpa*) and preferred mixed-conifer and cedar-hemlock stands, but this may have resulted from selection for lower elevations. In Washington, Aubry and Houston (1992) found that fisher records were from western hemlock (*Tsuga heterophylla*), Sitka spruce (*Picea sitchensis*), and Pacific silver fir (*Abies amabilis*) forest zones west of the Cascade crest, and from subalpine fir and grand fir/Douglas-fir (*Abies grandis/Pseudotsuga menziesii*) zones east of the crest. In winter, conifer forests are preferred as foraging habitats, but mixed and hardwood forests are also used (Arthur et al. 1989, Powell and Zielinski 1994). Fishers tend to forage in coniferous forests when hunting for hares, and seek porcupines in hardwood and mixed forests. Powell (1994) hypothesized that fishers make brief but direct forays into hardwood stands to seek out porcupine dens so that little time is spent in this cover type. Standard use-versus-availability analyses may underestimate the importance of hardwood habitats because though the fisher spends little time there, the porcupines killed there may be an important food source (Powell 1994).

Late-successional forest association. Ruggiero et al. (1994b) used the term "late-successional" to refer to mature and older forests that possess the structure typical of older forests (large trees, logs, and snags, and vertical and horizontal complexity). The importance of late-successional forest to fisher in the west has been the subject of much discussion and needs further study. Thomas et al. (1993) list the fisher as "closely associated" with old-growth forest. Holthausen (1994) stated that fishers are not dependent on late-successional forest, but do require closed-canopy forest with adequate prey populations. In eastern and mid-western forests, fishers are associated with mid-successional and mature second-growth stands of lowland conifers and upland hardwoods with high canopy closure (Arthur et al. 1989b, Powell 1993, 1994).

In western forests, fishers have been associated with late-successional conifer forests but also use younger stands, especially as foraging habitat (Table 2; Buck et al. 1983, Jones 1991, Roy 1991, Jones and Garton 1994 Weir 1995). Buskirk and Powell (1994) hypothesized that in meeting the needs of fishers, mid-successional mixed forest of the mid-western and northeastern U.S. were equivalent to late-successional Douglas-fir in the Pacific Northwest. Roy (1991) did not detect any preference for stand age (seedling through large saw-timber) by fishers introduced into Montana from Minnesota. In Idaho, Jones and Garton (1994) reported that pole-sapling stands were little used, and not used at all in winter. They found that late-successional forests were preferred in summer (90% of observations) when younger stand types (non-forest, pole-sapling, and young) were avoided, but that fishers showed a preference for young forests in winter. They speculated that the winter preference for young stands may have been in response to greater availability or vulnerability of prey in these cover types in winter. They hypothesized that there is a shift away from voles to more squirrels and hares in winter, as observed for marten (Jones and Garton 1994, Zielinski et al. 1983). Though there was a preference for young stands, mature and old-growth still represented 53% of winter locations and was present at 53% of random sample points (Jones and Garton 1994).

Stand age may not be as important as the structural characteristics which provide foraging, resting, and denning sites for fishers, and affect snow depth and density (Buskirk and Powell 1994, Powell and Zielinski 1994). Jones and Garton (1994) observed that within young stands used in winter, fishers selected sites with higher availability of large trees (>47 cm or 18.5 in

Table 2. Fisher habitat use in radio-telemetry studies in western North America.

Study (Location)	Forest Type	Use of Stand Type: Preferred	Use of Stand Type: Avoided
Buck 1982 (NWCalifornia)	Mixed coniferous	mature closed conifer; multi-species stands; forested riparian	hardwood stands; monotypic Doug-fir
Roy 1991[a] (Montana)	Mixed coniferous	Winter-Spring: mixed conifer; cedar-hemlock; (no selection by stand age)	Winter-Spring: subalpine fir; hardwood; rock
Jones & Garton 1994 (Idaho)	Grand fir /subalpine fir	Summer: mature forest; old-growth Winter: young forest	Summer: non-forest; pole-sapling, young forest Winter: non-forest; pole-sapling
Weir 1995 (British Columbia)	Spruce-fir	Summer: 20-40% deciduous. Summer & Autumn: mixed decid./conifer	Summer: 100% conifer. Winter: non-forested; selectively logged. All seasons: herb stage

[a] Study of fishers trapped in Minnesota and transported to Montana for reintroduction.

dbh), snags (>52 cm or 20.5 in dbh) and logs (>47 cm) than random sites. The young stands in the study area were naturally regenerated after a stand replacement fire, and contained some of the structure associated with older forest (Jones and Garton 1994). Carey (1995) found that flying squirrels may be twice as abundant in young managed stands with old-growth legacies (large live trees, large snags, and large logs) than in managed stands without them. Fishers in southwestern Oregon are found in selectively logged areas, where forests contain abundant large snags and logs (K. Aubry, pers. comm.). Jones (1991) concluded that fishers in Idaho may not be old-growth dependent and that viable populations can be maintained as long as adequate proportions of mature forest are available.

Fisher association with late-successional forest may in part result from the need for a diverse prey base. Although young stands may support higher numbers of snowshoe hares (Koehler 1990), old-growth forest in Washington supports higher populations of Douglas' squirrels than younger stands (Buchanan et al. 1990); it also may support higher populations of forest-floor small mammals than younger managed stands (Carey and Johnson 1995).

Effects of forest management. Even-aged management degrades fisher habitat by periodically removing the canopy and reducing the abundance of snags, cavity trees and coarse woody debris (Ohmann et al. 1994). Fishers typically avoid areas with low canopy cover, large forest openings, clearcuts, and other cleared areas (Buck et al. 1983, Arthur et al. 1989, Powell 1993, Buskirk and Powell 1994, Jones and Garton 1994, Weir 1995). Fisher detections in California were associated with larger forest stands, and stands with high connectivity, suggesting that fishers were sensitive to fragmentation (Rosenberg and Raphael 1986). Powell and Zielinski (1994) state that it is unlikely that early and mid-successional even-aged forests provide the same prey resources, rest sites, and den sites as more mature forest. J. Jones (pers. comm.) suggests that even-aged management is not deleterious to fisher *per se*, but it is the extent and frequency at which it is applied on the landscape that is important.

The conversion of mixed species stands to Douglas-fir plantations may negatively affect prey populations. Carey and Johnson (1995) state that western hemlock seeds are a more abundant and reliable food source than Douglas-fir seeds for small mammals. Johnson (1984) found that monotypic conifer forests were not often used by fishers in Wisconsin, probably due to the low prey diversity present. Fishers in Michigan avoided pine plantations (Thomasma 1996).

Little is known about the impacts of uneven-aged management. Buck et al. (1994) reported that the level of harvest influenced fisher habitat use and they speculated that harvest that results in open stands and xeric conditions over large areas would be detrimental to fisher. Buck (1982) reported that 3 of 8 fisher rest sites were in harvest units where <20% of the canopy was removed. However, light harvests, or small patch cuts may increase habitat diversity and thus prey diversity and have little negative impact on fishers where adequate proportions of late-successional forest is available (Arthur et al. 1989b, Jones and Garton 1994). In southwestern Oregon, fishers are found in uneven-aged forest that is intensively managed; 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 there have been detected hunting in areas with low to moderate canopy closure, and one female denned in residual trees in a heavily harvested stand. Ongoing studies may determine if differences in the level of harvest are responsible for local variation in habitat use by fisher (K. Aubry, pers. comm.).

Habitat models. Allen (1983) developed a habitat suitability index (HSI) model for fishers and used winter habitat as the critical resource limiting fishers. His model assumed (based on a literature review) that stands with higher canopy closure, larger trees, greater canopy diversity, and >10% and <50% deciduous tree composition provided more suitable winter habitat, and also provided habitat in other seasons as well. Thomasma et al. (1991) evaluated Allen’s (1983) model on the Ottawa National Forest in Upper Peninsula Michigan. They found that fishers used habitats with higher HSI values more frequently than expected, and that fishers showed greater preference for habitats with greater HSI values. This model has not been tested in habitats in the West. The model focuses on a stand, and does not address the landscape in which the stand occurs which may be more important (J. Jones, pers. comm.).

Fishers and Snow

Raine (1983) reported that fisher habitat use in Manitoba was affected by their mobility in deep snow. Travel in deep, soft snow is energetically costly, and fishers may concentrate their activities where snow is shallow or is packed (Leonard 1980). Krohn et al. (1995, 1997) reported that patterns of fisher distribution and monthly winter snowfall in both Maine and California were consistent with the hypothesis that deep snow limits fisher populations. However, Jones (1991) found no evidence that snow conditions affected fisher habitat use in Idaho.

Aubry and Houston (1992) noted that in western Washington, 48 of 55 fisher records (87%) were from less than 1000 m elevation, and none were from elevations over 1800 m. East of the Cascade crest, 6 of 33 records (18%) were from 1800-2200 m, and only 10 (30%) occurred below 1000 m (Aubry and Houston 1992). They suggest the absence of fisher records from the mountain hemlock zone in western Washington could be attributed to snowpacks of up to 7.5 m, whereas the shallower snowpack east of the crest allowed fishers to inhabit higher elevations there. J. Jones (pers. comm.) suggests that the records compiled by Aubry and Houston (1992) may be biased due to the lack of observers at elevations with deep snowpacks, or that competition with martens at high elevations could be reponsible for the pattern. However, most of the records with known dates are not from the winter when snowpack would be expected to limit access by observers (Appendix B). Also, though fisher and marten do appear to compete, fisher seem to displace marten, except in areas with frequent deep snowfall (Krohn et al. 1995, 1997, Thomasma 1996).

Dens and Rest Sites

Maternal dens. Female fishers typically use elevated cavities in live trees or snags as natal dens (i.e., where kits are born; Buck et al. 1983, Weir 1995, Zielinski et al. 1995b, Aubry et al. 1996a, Paragi et al. 1996). Holthausen et al. (1994) speculated that this rather specialized requirement for natal den sites may have contributed to the decline of fishers in the Northwest with the conversion of old-growth forests to even-aged plantations. Use of down logs and rock formations as natal dens has also been reported (Grinnell et al. 1937, Roy 1991, Zielinski et al. 1995b). When the kits are somewhat mobile, the female may move them to a maternal den (i.e., a den used subsequent to the natal den) in a hollow down log or other lower structure (Aubry et al. 1996a,b) so the uncoordinated, wandering kits will not fall from an elevated cavity den. As kits grow and become more coordinated, they may be moved to elevated maternal den sites. Females have been reported using up to five dens sites while raising kits (Paragi et al. 1996), but disturbance by researchers may have increased the number of maternal dens used (Aubry, pers. comm.). In Oregon, females were recorded using single dens for 8-10 weeks (Aubry pers. comm.)

Maternal dens have been found in a wide variety of hardwood and conifer trees. In Maine, Paragi et al. (1996) found that 31 of 33 den trees were in hardwoods, 16 of which were quaking aspens (*Populus tremuloides*). In Massachusetts and New Hampshire, Powell et al. (1997) found maternal dens in a variety of tree species, but 60% were in white pine (*Pinus strobus*) or eastern hemlock (*Tsuga canadensis*). In the West, dens have been reported in quaking aspen, black oak (*Quercus kelloggii*), black cottonwood (*Populus balsamifera*), incense cedar (*Calocedrus decurrens*), Douglas-fir, white fir (*Abies concolor*), and pine (probably *Pinus ponderosa*) (Buck 1983,Weir 1995, Zielinski et al. 1995b, Aubry et al. 1996b).

Maternal den trees are typically large. The smallest den trees were reported by Paragi et al. (1996) in Maine, where den trees had a median dbh of 45 cm (17.7 in; range: 25-92 cm; 10-36 in). In California, Zielinski et al. (1995b) reported that mean dbh of den trees and snags was 98 cm (38.6 in; range: 53-138 cm; 21-54 in), and Buck (1982) found a den in a 89 cm snag (35 in). In British Columbia, Weir (1995) found five dens in cavities in the largest trees available (averaging 103 cm dbh). In Oregon, Aubry et al. (1996b) found natal dens in a >70 cm dbh Douglas-fir and in a >100 cm dbh incense cedar, and maternal dens in an 85 cm (33.5 in) hollow white fir log and a 142 cm (56 in) hollow Douglas-fir log. Both natal dens occurred in cavities excavated by pileated woodpeckers in diseased live trees (Aubry et al. 1996b). Female fishers appear to select pileated woodpecker cavities with openings large enough for them to squeeze through but too small for males to enter (K. Aubry, pers. comm.). This den-site selection behavior by females would help prevent infanticide by male fishers (Powell 1993, Paragi et al. 1996). Powell et al. (1997) recorded a mean dbh of 63 cm (24.8 in) for maternal den trees before 1 May, and a mean of 76 cm (29.9 in) after 1 May. They believed the shift to larger den trees with larger den openings later in the spring was made to accomodate the growing kits, and for improved ventilation (Powell et al., 1997).

Dens, especially natal dens, are often well above the ground. In Oregon, Aubry et al. (1996b) found natal dens at a height of 18.0 m (59 ft) and 21.4 m (70.2 ft). Paragi et al. (1996) reported a median den entrance height of 7.0 m (23 ft). Buck et al. (1983) reported a den 10.6 m (34.8) from the base of a snag. Powell et al. (1997) reported a mean den height of 6.28 m (20.6 ft). Weir (1995) recorded a mean height of 25.9 m (85 ft) for five dens in British Columbia.

Rest sites. Fishers use a variety of structures in live trees and snags for rest sites, including cavities, witches' brooms, mistletoe clumps, large lateral branches, squirrel and woodrat nests, stick nests, and forks. Large-diameter live trees are used most often (Table 3; Buck 1982, Arthur et al. 1989b, Seglund 1995, Weir 1995, Aubry et al. 1996b, Zielinski et al. 1997a). Fishers will also use hollow logs, stumps, log and brush piles, root wads, ground and snow burrows, rock outcrops, and dense understory vegetation as rest sites (Buck 1982, Arthur et al. 1989b, Kohn et al. 1993, Powell 1993, Zielinski et al. 1994, Seglund 1995, Weir 1995, Aubry et al. 1996b).

Fishers seem to select rest sites based on thermal cover needs, with cavities and ground dens used more often in winter than are more open live-tree sites (Arthur et al. 1989b, Jones 1991, Seglund 1995). Fishers in British Columbia only used ground dens in winter, and only when the temperature dipped below -20°C (Weir 1995). Seglund (1995) reported that males appeared to use downed logs and subnivean rest sites more frequently than females, whereas females used snags in winter more frequently than males. She also found that rest sites were frequently ≤100 m from water and >100 m from human disturbance (Seglund 1995). In the southern Sierra Nevada of California, Zielinski et al. (1997a) found that fishers commonly used large-diameter conifers (105.4 cm, 41.5 in dbh average, n = 188 excluding giant sequoias) and large oaks (65.3 cm, 25.7 in dbh average, n = 145) as rest sites. Jones and Garton (1994) reported a preference for large-diameter Engelmann spruce and hollow grand fir logs as resting sites in Idaho.

Table 3. Percent use by fisher of tree and ground rest sites in western North America.

Study	Location	Trees[a] Live (n)	Snags (n)	Total % (n)	Ground Sites (n)
Buck 1982	California	67(6)	22 (2)	89 (8)	11 (1)
Jones 1991	Idaho	78 (134)	8 (13)	85 (147)	15 (250
Zielinski 1995	California	63 (80)[b]	27 (34)	90 (114)	10 (13)
Seglund 1995	California	67 (76)	20 (23)	87 (99)	13 (15)
Aubry et al. 1996a	Oregon	53 (49)	16 (15)	70 (64)	30 (28)
	Subtotal	67 (345)	16.9 (87)	84 (432)	16 (82)
Weir 1995	British Columbia			81 (26)	19 (6)
	Total	67 (345)	16.9 (87)	84 (458)	16 (88)

[a] In live trees, rest sites included mistletoe-brooms or rust-brooms, cavities, and exposed large limbs. In snags, rest sites included cavities and hollow tops. Ground sites included sites inside logs or root-wads, in log or slash piles, in stumps, in rock outcrops, in subnivean and ground burrows, and in vegetation thickets.
[b]Numbers interpreted from figure.

POPULATION DYNAMICS

Reproduction

Fishers have a relatively low reproductive capacity. Females are capable of breeding at age 1 and can give birth for the first time at age 2 (Powell 1993, Frost et al. 1997). Adult females may not produce litters every year and the proportion that does varies from year to year. Paragi et al. (1994) reported that for the years 1984-1989, an average of 63% of females raised litters to weaning each year in a heavily trapped population in Maine. The rate of reproductive success may depend on the age of the female, prey availability, and the physical condition of the female during fall and winter (Arthur and Krohn 1991, Paragi 1990). Productivity of females appears to peak at 4-5 years of age (Douglas and Strickland 1987, Paragi 1990).

Females mate 3-10 days after parturition (Hall 1942). Mating may occur over a period of several hours in a single day, or a similar amount of time on several days. Females typically give birth to 1-4 young in late February, March and early April (Mead 1994). Fishers, like all other *Martes* species, exhibit delayed implantation. That is, the fertilized egg or “blastocyst” develops only briefly after being fertilized and then goes into a state of suspended development (Mead 1994). This period of suspended development lasts for 10-11 months (March or April to February). Implantation in the uterus and an active gestation of about 36 days is triggered by lengthening photo-period (Powell 1993, Frost et al. 1997). Wright and Coulter (1967) reported that trapped females typically had 3 or 4 embryos in their uteri. However, Mead (1994) found that litter size is typically 2-3 and Paragi et al. (1994) reported a mean litter size of 2.2; this data suggests that fetus reabsorption, abortion, or post-partum mortality commonly occurs.

The kits open their eyes at about day 50 and attempt to walk at 6-8 weeks (Powell 1993, Frost and Krohn 1994). 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 (Powell 1993), and will roam around outside the den entrance (Aubry et al. 1996b). Kits become independent of their mother in late summer and early fall.

Males can produce sperm during their first breeding season (Wright and Coulter 1967, Leonard 1986, Frost et al. 1997) but are not effective breeders until age 2 (Douglas and Strickland 1987). This may be due to insufficient development of the baculum in yearling males such that they are unable to induce ovulation in a receptive female (Douglas and Strickland 1987).

Males make extensive forays from established home ranges during the breeding season in March and April (Arthur et al. 1989a). Males apparently attempt to mate with as many females as possible and may interact with other males with similar intentions at this time. Breeding season forays outside their home range could provide males with breeding opportunities with additional females (Powell 1993).

Population Cycle

Fisher populations that rely heavily upon snowshoe hares for food reflect the cyclic abundance of prey. 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) reports that fishers in British Columbia do not cycle, and Leonard (1986) saw no evidence of a cycle in southern Manitoba. In Washington and other areas in the southern portions of the hare's range, hare populations do not have a pronounced cycle (see Koehler 1990, Koehler and Aubry 1994). Kuehn (1989) demonstrated that Minnesota fishers fed more on small mammals (voles, mice, and shrews) and deer carrion in response to a decline in hare abundance, and showed no decline in reproductive success or condition.

Mortality and Survival

Where fisher trapping occurs, it is typically the largest source of fisher mortality (Douglas and Strickland 1987). Fishers may also be killed by vehicle collisions, predation, fighting and poisoning (Strickland and Douglas 1984, Douglas and Strickland 1987). Male fisher pelts commonly (40-50%) show scarring from intraspecific fighting (Douglas and Strickland 1987). Fighting may account for a significant portion of natural mortalities among males. In Maine, Krohn et al. (1994) found that 94% of 50 radio-collared fisher deaths were human related; trapping accounted for 80%, illegal shooting 6%, road-kills 4%, and one fisher died after its radio-collar got caught on a branch. Of 3 natural mortalities, one fisher died choking on deer cartilage, one of an infection, and the last was killed by coyotes (*Canis latrans*) on a frozen lake (Krohn et al. 1994). Other natural mortalities include deaths from fighting (most often males), infection and disease, debilitation from porcupine quills, accidents, starvation, and predation (Douglas and Strickland 1987, Proulx et al. 1994). Kits would be most vulnerable to predation, but there is little data on the frequency of predation on fishers. Douglas and Strickland (1987) stated that hawks, great horned owls (*Bubo virginianus*), red foxes (*Vulpes vulpes*), bobcats (*Lynx rufus*), lynx (*Lynx canadensis*), and black bears (*Ursus americanus*) may prey on fishers, especially young fishers. They also reported a fisher killed by dogs (*Canis familiaris*). In Montana, Roy (1991) reported that of 32 radio-collared fishers transplanted from Minnesota, 3 males were killed by mountain lions (*Felis concolor*), 2 females by coyotes, 1 male by a wolverine, 1 female by an eagle, and another female by a lynx.

Maximum life span of wild fishers is approximately 10 years (Kohn et al. 1993, Powell 1993). In Wisconsin, Kohn et al. (1993) found that of 919 harvested fishers 48% were juveniles, 91% were $\leq$ 3 years of age, and only 2% were $\geq$ 7 years of age. They found that the average age for captured females and males was 2.0 and 1.9 years of age, respectively. During the trapping season in Maine, juveniles had the lowest survival rate (0.38), while adult survival rates differed by sex with males having a significantly lower survival rate (0.57) than females (0.79). Survival rates outside the trapping season were higher for both adults (0.89) and juveniles (0.72) (Krohn et al. 1994). Paragi et al. (1994), used the same Maine data and found that mean annual survival rate was 0.65 for adult females ($\geq$1 year old), and 0.27 for juveniles (sexes pooled).

Population Density

For their body size, fishers have one of the lowest population densities of any terrestrial carnivore. All estimates of fisher densities contain considerable error because they are very difficult to estimate and their populations violate some assumptions of standard estimating techniques (Powell and Zielinski 1994). The best information on population densities of fishers (sexes combined) comes from Maine where densities were one per 2.8-10.5 km^2 in summer and one per 8.3-20.0 km^2 in winter (Arthur et al. 1989a), and from Wisconsin where densities were one per 2.5-3.0 km^2 (Kohn et al. 1993). Buck et al. (1983) reported a density of one per 3.2 km^2 in northwestern California, and fisher density in a 100 km^2 area in the southern Sierra Nevada of California was estimated at one per 10 km^2 (W. Zielinski, pers. comm.). Based on live-trapping capture rates, Jones (1991) states that fisher density in Idaho seemed to be slightly greater than in Manitoba, similar to the density in New Hampshire, lower than in Maine, and much lower than in California. Powell and Zielinski (1994) suggest that populations that resulted from reintroductions (Idaho, Montana, Michigan, Wisconsin) may not have had time to rebuild. Alternatively, lower densities in Idaho and Montana may result from regional differences in habitat productivity, predation, and incidental trapping (J. Jones, pers. comm.).

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).

Historical trapping records indicate that, though a significant number of fisher were taken, they were not as abundant in Washington as in other parts of their range. Notes for 1833, purportedly from the Ft. Nisqually account books, record 23 fisher (Anonymous undated). Hudson's Bay Company (HBC) records indicate that for the period 1836-1852, a total of 6,551 fisher were obtained at forts in present-day Washington (HBC Archives, Winnepeg)(Table 4). However, most of this total (88%) was collected at Fort Colville which was 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 Penninsula by the S.S. *Beaver* during this same period (Gibson 1992, Mackie 1997). The total is modest considering that over 150,000 fisher were taken in North America during that period (Obbard et al. 1987). The Washington post returns are also low compared to modern returns from other parts of the fisher's range. For example, for the period 1969-1979, trappers took a average of 2,000/year in Maine, and over 3,000/year in Ontario (Strickland and Douglas 1981). The total for North America during 1980-1984 was 20,000/year (Obbard et al. 1987).

Fishers, and furbearers in general, were not very abundant in Washington's coastal forests, and mammal populations were depressed by trapping rather quickly. As early as the 1820's the HBC was disappointed with the lower Columbia fur trade (Mackie 1997). Fort Vancouver fur returns declined steadily from 1833-1843 (Mackie 1997). Fort Vancouver averaged only 7.6 fisher/year, and Fort Nez Perce averaged only 19.5 fisher/year, for 1836-1852. The Puget Sound fur trade was also very modest, and in 1840 George Simpson, who managed HBC's affairs west of the Rockies, stated "fur trade almost extinct in that quarter" (Mackie 1997). The trader at Fort Nisqually indicated that though the fisher were of very good quality, very few were killed (Huggins undated). 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 HBC.

Later in the 19th century Suckley and Cooper (1860) obtained 53 specimens at Fort Dalles, and 45 at Steilacoom. Suckley (p. 92) reported that fishers were found "quite plentifully" in the thickly wooded areas of the Cascades; but Cooper (p. 76), who traveled to different areas, indicates that fishers "do not seem to be common" (Suckley and Cooper 1860). Coues (1877) quoted Newberry, who stated that fishers were "rare in Oregon, but less so in Washington."

Washington fisher populations were probably in trouble by 1900. C.H. Merriam reported that they 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 fisher 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 prior to the 1933 season closure 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,

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

Year	Fort Vancouver	Fort Nisqually	Fort Nez Perces[a]	Fort Colville[b]	Total
1836	1	29	23	197	250
1837	8	21	-	395	425
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
ttl	129	332	284	5806	6551

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

fishers on the Olympic Peninsula were largely restricted to the "wild and roadless portions of the Olympic Mountains" (Scheffer 1938). Scheffer (1938) includes 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, Wenatchee 40. These estimates are probably only inaccurate guesses, but they are indicative of the fisher's rarity at that time.

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. The season was closed in Washington in 1933, Oregon and Wyoming in 1936, Idaho and Montana sometime in the 1930s, and California in 1946. Yocum and McCollum (1973) obtained only nine fisher records for Washington from the National Park Service and the Forest Service for the years 1955-73; seven from the Olympics, two from the northern Cascades; there was also a record from Idaho just across the state line from Pend Oreille County. These were among the total of only 88 fisher records that Aubry and Houston (1992) compiled for Washington for the years 1955-91.

In the 1980s, efforts were made to find fisher populations in Washington. In 1984, Keith Aubry of the USDA Forest Service conducted sooted track-plate surveys in 45 old-growth forest stands on the Wind River District of the Gifford Pinchot National Forest (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 6 line-triggered cameras, track plates, and live traps (Aubry and Houston 1989). The total effort of 241 trap-nights and 130 plate-nights resulted in the capture of 2 bobcats, but no fisher. In 1986, the Park Service and Forest Service conducted live-trapping and snow tracking in the Skokomish and Hamma Hamma River drainages. They captured one spotted skunk (*Spilogale putorius*) during 252 trap nights, but no fishers (Aubry and Houston 1989). In 1990 and 1991, Aubry (with the help of Roger Powell in 1991) used live traps and line-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 estrus female fishers, among other lures and strong-smelling bait (Powell 1991). None of these efforts were successful at detecting fishers; it appears that fishers were either absent or extremely rare in the areas sampled.

Present

The fisher is, by all indications, extremely rare in Washington. These indicators include incidental captures in traps, sighting reports, and systematic surveys. This supports the premise that fishers have never recovered from over-trapping in the 1800s and early 1900s.

Incidental captures. Fishers are relatively easy to trap, and where they are present, they occasionally get caught in traps set for other species, especially bobcat, marten, and coyote. Incidental capture data depends on trappers reporting the capture, which, though required by law, may impose serious inconvenience in remote areas, and 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 fisher presence and relative abundance.

There are four reports of incidental capture of fisher in Washington in recent decades (1 each in 1969, 1987, 1990, and 1992; Appendix A). WDFW obtained a photo or carcass for three of these fisher. Since 1985, three incidental captures have occurred during a period when a total trapping effort of approximately 2.4 million trap-nights was expended for bobcat, marten, and coyote. How much of this effort occurred in potential fisher habitat, or in areas with sightings, is unknown. This compares with 72 fisher captures during approximately 76,500 trap-nights (50,908 set-nights x 1.5 traps per set; for coyote, bobcat, raccoon, gray fox, and ringtail) where fisher are found in California (Lewis and Zielinski 1996). Lewis and Zielinski (1996) estimated an incidental capture rate of 1 fisher per 407 set nights for the five trappers interviewed.

From 1993-1996, in Idaho 4 fisher carcasses were turned in with a statewide effort of 59,398 trapper days for all furbearer species combined (Melquist 1997). Luque (1983) conducted extensive interviews in Idaho which revealed that the number of fishers actually caught may be much higher than the number reported. He estimated that, although 14 carcasses had been turned in from 1978-82, 33 **per year** were caught by the trappers interviewed; and he speculated that as many as 80 captures per year occurred in Idaho during that period (Luque 1983, 1984).

In British Columbia, there were 7 incidental captures between 1991-1995 in the 3 administrative regions that border Washington (Kootenay, Okanagan, and Lower Mainland). The fisher season was closed during this period due to low populations.

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 with high reliability occurred (Aubry and Houston 1992). An additional 16 relatively reliable sightings have been reported since (Appendix B), but have not been ranked for reliability using the criteria of Aubry and Houston (1992). Countless individuals hunt, trap, hike, and work in Washington forests, yet fewer than 4 reliable fisher sightings per year were compiled for the past 18 years. This compares with a total of about 35 sightings during a 5-year period by 20 trappers and 2 Conservation Officers in Idaho (Luque 1983). Also, although fishers are susceptible to collisions with vehicles (Paragi et al. 1994, Proulx et al. 1994, Zielinski et al. 1997b), no road kills have ever been reported in Washington.

Systematic surveys. Several survey efforts using baited automatic cameras and track plates to determine the status and distribution of forest carnivores in Washington have been conducted in recent years (Table 5). The camera stations consist of cameras that are triggered by tripping a string or breaking an infrared beam when an animal investigates bait. Track plates consist of sooted metal sheets that record animal tracks at bait. Both track plates and camera stations are effective at detecting fisher (Zielinski and Kucera 1995, Zielinski et al. 1997b, Foresman and Pearson 1995). We do not have good quantitative data on all the past surveys or current forest carnivore work that would be expected to detect fisher. We include the following summary of surveys for which we have obtained data. 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, we cannot be certain whether it was a fisher or marten track. Male marten tracks are extremely similar to small female fisher tracks,

Table 5. Recent forest carnivore camera surveys (no fisher were detected).

Years	Study	Methods	Effort (# nights)	Result
1991	U.S. Forest Service (Jones & Raphael 1991)	1,081 line-triggered cameras (110 mm)	9,023	260 photos; 28 species
1992	WDFW-USFS (Sheets 1993)	197 line-triggered cameras (110 mm) located in patches of mature forest ≥780 ha	3,068	24 photos; 7 species
1994	Murray Pacific Corp. (Beak 1995)	27 camera stations; line-triggered (110 mm) and infrared- triggered cameras (35mm)	260	57 photos; 7 species
1995-1997	WFDW	183 infrared-triggered cameras	ca. 5,000	100s of photos; 27 species

and techniques for distinguishing these two species were only recently developed (Zielinski and Truex 1995).

In 1991, the Forest Service conducted extensive camera surveys in four study areas (Central Cascades, North Cascades, Olympic Peninsula, and Puget Trough), as part of a marten research project. This effort involved 1,081 line-triggered camera stations which were run for a total of 9,023 camera nights (Jones and Raphael 1991). This resulted in 260 photos of 28 species, but no fishers were detected.

In 1992, the Department of Fish and Wildlife (WDFW) in cooperation with the Forest Service conducted camera station surveys to determine the current distribution of marten in the state (Sheets 1993). The surveys involved sampling 15 areas scattered in the Olympic, Mt. Baker-Snoqulamie, and Gifford Pinchot National Forests using 197 line-triggered camera stations (110 mm). Stations were located in patches of at least 780 ha of contiguous mature timber, near riparian areas, and at elevations over 720 m. These cameras took 24 photos of 7 species. No fishers were detected during a total of 3,068 camera nights.

In 1994, camera surveys were conducted on the Mineral Tree Farm, Lewis County, for Murray Pacific Corporation (Beak 1995). Infrared and line-triggered cameras at 27 stations were placed in mature timber. These cameras took photos of 7 species, including spotted skunk, bobcats, and mountain lions, during a total of 260 camera nights. No fishers were detected (Beak 1995).

From 1995-97, WDFW conducted carnivore surveys using 35-mm camera stations in forested areas throughout the state (Fig. 5). Zielinski and Kucera (1995) developed a standard survey protocol to detect carnivores in which two 35-mm camera stations or six line-triggered cameras or enclosed track-plate stations are placed in each survey “sample unit” (4-square-mile block or 4 sections). The 1995-97 WDFW surveys varied from this protocol by placing single camera stations at each of 183 sample units of 2 mi^2. Camera stations were dispersed throughout the survey areas 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 fishers (Kucera et al. 1995). These stations were run an average of 31.0 ($\pm$12.4) sample nights. The exact total camera nights for the effort is unknown due to the lack of documentation at some stations and camera malfunctions, but the surveys totaled approximately 5,000 operational camera nights (4,073 known operational +1,296 sample nights of unknown operability/effectiveness). No fishers were detected.

Fishers have been detected by these survey techniques in California, Montana, and Oregon (Foresman and Pearson 1995, Aubry et al. 1997, Zielinski et al. 1997b). Zielinski et al. (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 surveys using track plates or line-triggered cameras in the historical range of the fisher in California (Zielinski et al. 1997b). The number of days (latency) to detection was about 12 in a smaller survey on commercial timberlands in California (Zielinski et al. 1997b), and 9 days in

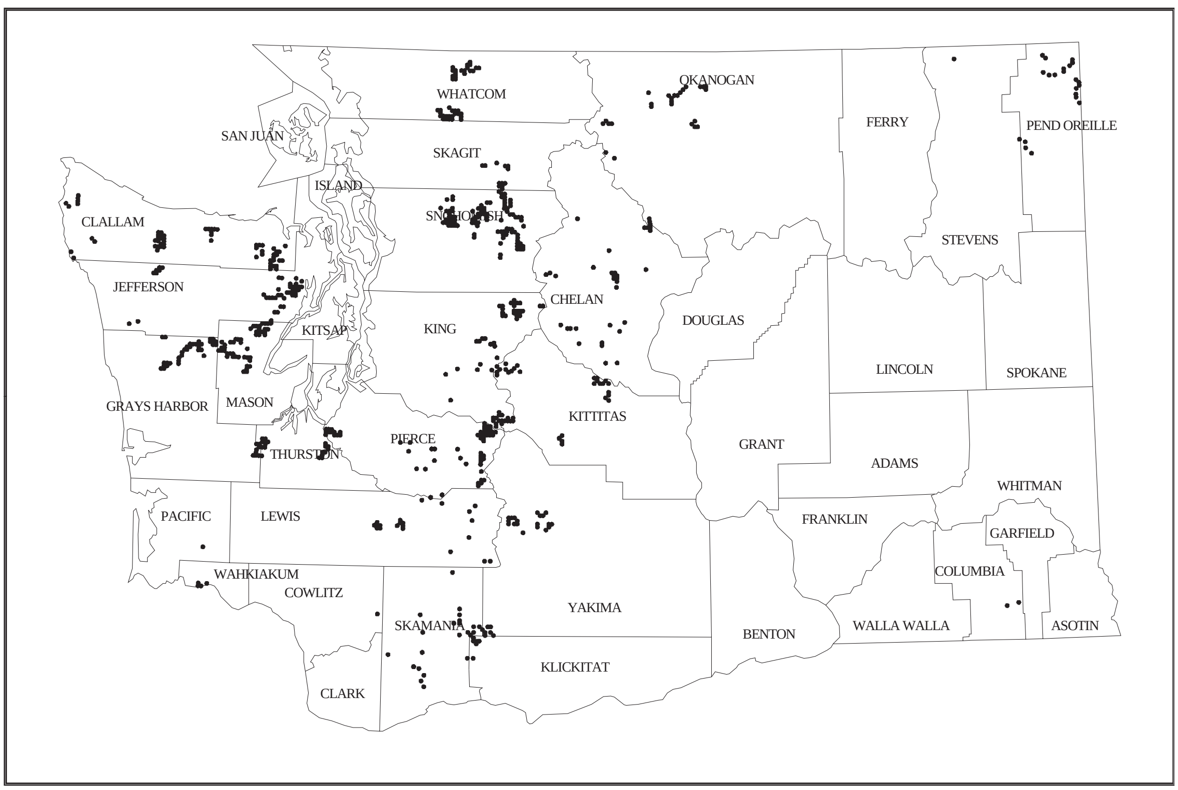

Figure 5. Locations of camera and track-plate stations in Washington, 1990-1997. (The 647 plotted locations represent 1088 of the survey stations during surveys conducted by WDFW, USFS, and Beak (1995).

Montana (Foresman and Pearson 1995). During the WDFW carnivore surveys, approximately 92% of stations were run for more than 12 sample days.

The carnivore survey effort that was expended to detect the presence of fisher and other forest carnivores in Washington from 1990 to 1997 has been fairly extensive (Fig. 5). WDFW and USFS surveys involved ~1500 sample stations and totaled over 17,000 camera/track plate nights. The lack of detections of fishers given these and previous efforts indicates that fishers are very rare in Washington.

Future

The current rarity of fishers brings their continued existence in Washington in question. It is unknown whether the individual fishers that may exist in the state could repopulate Washington in the future (Forest Ecosystem Management Assessment Team 1993). Thomas et al. (1993) stated that existing fisher populations in northern Oregon and Washington were at a medium to high risk of extirpation on National Forest lands within the next 50 years. Reintroductions have been successful in other parts of the fisher's range. Recovery of the fisher in Washington would probably not occur without reintroductions.

Immigration of fishers into Washington from British Columbia, Idaho, or Montana, is possible but unlikely to provide significant demographic support to Washington's fisher population. A fisher from Minnesota that was part of a Montana reintroduction project migrated from Montana to northeastern Washington (S. Pozzanghera, pers. comm.). This animal may have been in Washington for several years (S. Zender, pers. comm.). Dispersing fishers from Idaho or British Columbia could be responsible for the recent sightings of fisher in northeastern Washington. However, fisher populations in adjacent parts of Idaho and British Columbia are low, and the number of these dispersing individuals is probably very low (Heinemeyer 1995, A. Fontana, pers. comm.).

HABITAT STATUS

Past

When white settlers first arrived in Washington, there were about 10 million ha (24.7 million ac) of forest. Of this, perhaps 6.1 million ha (15 million ac) were potential fisher habitat (excludes ponderosa pine and west-side mountain hemlock, Engelmann spruce, and subalpine fir where heavy snowpacks accumulate). The exact percentage of this forest that was in late-successional or old-growth condition is unknown, but it was a high proportion (Bolsinger and Waddell 1993). After nearly 100 years of logging, inventories in the 1930s indicate about 40% was still in old-growth. The remainder of the landscape included openings and areas of younger forest created by stand-replacing fires, windstorms, beaver ponds, and a few natural prairies and meadows.

These old forests had abundant large woody structures for den and rest sites for fisher and prey species.

Historical trap returns indicate that though fisher were present in these forests, the populations were not as high or resilient as populations in Maine and inland Canada. Reasons remain obscure, but the coastal and Puget Sound forests do not seem to have been very productive for furbearers in general (Mackie 1997), and fisher in particular.

Logging began with clearing of valleys for agriculture, and later proceeded up drainages to the higher elevations. The impacts to fisher habitat were of two types: the permanent loss of forest by conversion to non-forest uses, and the temporary loss of habitat from timber harvest. Indicative of the impact to older forest is that the estimate of standing volume of sawtimber for 1869 is 3.8 times the volume present today (Bolsinger et al. 1997). Nearly all the forests in the Puget lowlands and other readily accessible areas were logged by the early 1900s. Much of the forest in the valleys was converted to farmland, but private industry eventually acquired a large portion of the productive lower elevation timberlands. Since the 1930's about 10% of the forest has been converted to other uses (Bolsinger et al. 1997).

The area of older forest has steadily diminished. Between 1933-36 and 1992, the area of old-growth forest was reduced by 70%, from >3.7 million ha to 1.1 million ha (Bolsinger and Waddell 1993). Some low and mid-elevation forest has now been logged twice.

Much of the original mixed-species stands were converted to managed stands of Douglas-fir. Inventories in 1967 and 1991 for the Olympic Peninsula and Puget Sound areas, which represents 2/3 of western Washington timberlands, indicate changes in species representation. Western hemlock made up the highest percentage of growing-stock volume in 1967, but declined across all ownerships. The percent growing-stock volume of Douglas-fir on industry lands increased from 24 to 33% and on non-National Forest public lands from 20.7 to 44.4% during that period.

Present

Washington’s forest landscapes today are made up of small patches of different ages, interspersed with recently logged areas (Bolsinger and Waddell 1993). Most of the low elevation late-successional forest that was suitable fisher habitat has been converted to short-rotation plantation or non-forest uses, and forests are fragmented by highways, railroads, powerlines and residential development. Industry-owned forest accounts for 29% of the state’s timberland (81% in western Washington), 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 as 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 forest supports 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) state that a landscape of mostly early successional stands and small patches of mature forest is unlikely to provide suitable habitat for fisher.

The representation of western hemlock and Pacific silver fir in managed forests have decreased notably (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' squirrel, *Peromyscus*, and shrews) as western hemlock which produces some seed every year (Buchanan et al. 1990, Carey and Johnson 1995). Therefore, the current landscape of mostly managed Douglas-fir plantations may not support as abundant a prey base for fisher as older forest that contained more western hemlock.

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 6) (Bolsinger and Waddell 1993, Bolsinger et al. 1997). Outside national forests, late-seral stands (100+ years old) make up only 3% of the forest in western Washington, and 15% in eastern Washington (Bolsinger et al. 1997:19).

Fishers can probably live in some mid-successional forest, where it contains sufficient structure and large logs, snags, and cavity trees, or patches of late-successional forest. Excluding ponderosa pine and west-side high elevation types (mountain hemlock, Engelmann spruce, subalpine fir), there is a total of less than 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

Table 6. 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
U.S. Fish & Wildlife Service	121	0	121	0.01
State parks	3,591	0	3,591	0.3
State forests	9,308	18,363	27,671	2.4
Tribal	12,017	13,598	25,615	2.2
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.

contiguous high canopy cover, and sufficient structure for den and rest sites is not known, but would likely be far below this total.

Fisher densities reported range from one fisher per 250-2000 ha (see Population Density). Assuming a density of one fisher/800 ha, a small population of 50 fishers may require 40,000 ha (100,000 ac or 150 mi^2) of more or less contiguous suitable habitat. If young, even-aged managed forest is incapable to support fisher, then suitable fisher habitat may be very limited and extremely fragmented. Areas in Washington with a history of uneven-aged management may currently provide better habitat for fishers than areas with a matrix of young even-aged plantations (K. Aubry, pers. comm.).

In the spring of 1991, Roger Powell spent 10 days assessing habitat suitability for fisher in Olympic National Park, as well as east and south of the Park boundary. He observed hare tracks in old growth and in dense naturally regenerated mixed stands of Douglas-fir, hemlock, and cedar that had complex physical structure. He believed these stands were good fisher habitat, but that outside the Park they were so small and widely scattered that "it is impossible to support a fisher population outside the Park" (Powell 1991).

Future

As of 1992, there were about 0.76 million ha (1.9 million ac; excluding ponderosa pine) of forest in reserves (parks, wilderness, etc.)(Bolsinger et al. 1997). Where natural fire and other disturbance frequencies are low, these areas would be expected to be maintained in, or produce, late successional forest. However, some of this forest is at higher elevations in western Washington that fishers may be unable to use due to frequent or deep snow. In eastern Washington, fire return rates may prevent the establishment of late seral forest but forest with adequate levels of snags and logs needed by fisher may be maintained. There will always be a portion of these reserves regrowing after moderate intensity and stand-replacement fires.

In addition to reserves, the preservation and management of older stands for northern spotted owls (*Strix occidentalis caurina*), marbled murrelets (*Brachyramphus marmoratus*), and protection of structure in riparian areas for salmonids in Washington may provide areas of suitable habitat for fishers in the future (Forest Ecosystem Management Assessment Team 1983). However, fishers have larger area requirements than spotted owls, and may require more extensive habitat connectivity of closed-canopy stands (Holthausen et al. 1994). 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 carnivores such as fishers (Holthausen et al. 1994).

Under short-rotation, even-aged management, the forest matrix is unlikely to support fisher populations without specific steps to maintain or create large logs and snags. Most of the large (>100 cm) woody debris that remains in managed forests are legacies of the original old-growth stand. The number of large snags, logs, and stumps may continue to decline except in riparian management areas and other sites where they are deliberately grown or created. The amount of non-industrial private timberlands is expected to continue to slowly decline due to conversion and urbanization (Bolsinger et al. 1997).

CONSERVATION STATUS

Legal Status

Washington. The fisher is classified as a Protected Species and as a state Candidate species in Washington. Fisher trapping has been prohibited since 1933. 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 from 1985-1991. The species became a Candidate for listing as Sensitive, Threatened, or Endangered in 1991.

USDI Fish and Wildlife Service. The fisher is listed as a "species of concern;" i.e., a species whose conservation standing is of concern to the Service, but for which status information is still needed (USDI Fish and Wildlife Service 1996). Species of Concern receive no formal protection; conservation efforts on their behalf are voluntary.

In 1990, a petition to list the fisher as Endangered in the Pacific States was submitted to the Fish and Wildlife Service (Central Sierra Audubon Society et al. 1990) and received a negative 90-day finding because it did not provide evidence sufficient to warrant listing. The Pacific fisher met the criteria for listing as a "species" under the Act, even though it may not be a valid subspecies (USDI Fish and Wildlife Service 1991). In 1994, the fisher was petitioned for listing as Threatened, this time throughout the western U. S. (USDI Fish and Wildlife Service 1996). This petition also received a negative 90-day finding because the Service contended that no evidence was provided to indicate that fisher populations occurring in the western U. S. were disjunct from the larger continuous population in Canada; the populations in the Pacific States and the Rocky Mountains were considered continuous peninsular extensions south from Canada (USDI Fish and Wildlife Service 1996). This decision was, in part, based on a policy change that stopped listings based on a species status within political boundaries unless it included all the species' range in the lower 48 states (USDI Fish and Wildlife Service 1996).

USDA Forest Service. The fisher is listed as a Forest Service Sensitive Species in every region where it occurs except Region 6, which includes Oregon and Washington (McFarlane 1994). The fisher is currently a proposed Sensitive Species in Region 6 (G. Gunderson, pers. comm.).

Oregon. The fisher is designated a protected nongame species, and is listed as sensitive in Oregon (L. Cooper, pers. comm.). It is has been protected from commercial harvest since the trapping season was closed in 1936.

Idaho. In Idaho the fisher is classified as a protected non-game animal. Commercial trapping has been prohibited in Idaho since the season was closed sometime in the 1930s.

British Columbia. The fisher is a furbearing mammal that is commercially harvested in British Columbia. It is also included on British Columbia's blue list which includes indigenous species not threatened, but at risk. Four of 8 administrative regions presently have fisher trapping seasons which occur between 1 November and 28 February.

California. The fisher is classified as a furbearing mammal that is protected from commercial harvest and is listed as a Species of Special Concern by the state of California. Commercial trapping for fishers has been prohibited since 1946.

Montana. The fisher is classified as a furbearer in Montana, where there has been an annual trapping season since 1983.

Wyoming. The fisher is designated a protected species in Wyoming and there is no commercial trapping season in the state (B. Luce, pers. comm.). The trapping season was closed in 1937 and there are no known reports of incidental captures (Brander and Books 1973). There are few observations of fishers in Wyoming and their occurrence in the state is in question.

Management Activities

Harvest and season closures. The fisher has not been commercially trapped in the western U.S. for most of this century. California, the last western state to allow commercial trapping, closed its season in 1946. Montana re-opened a limited 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 in statewide surveys prompted a conservative approach to harvest, and quotas have been reduced accordingly (B. Giddings, pers. comm.). Montana trappers are required to turn in incidentally captured fishers. Idaho Fish and Game pays $5 for fishers that are found dead after being incidentally captured in traps set for other species (Melquist 1997).

The fisher has continued to be commercially harvested in British Columbia, and 4 of 8 administrative regions presently have fisher trapping seasons. Fisher abundance is low in southern and coastal British Columbia and trapping seasons have been closed in the 3 southernmost regions since 1991. British Columbia has a system of registered traplines for the management of furbearer harvests.

Reintroductions. The fisher has been reintroduced in numerous jurisdictions since the 1940's to re-establish populations after historical over-trapping (Table 6). A total of 54 fishers have been reintroduced at 3 locations in Oregon. In 1961, 13 fishers from British Columbia were reintroduced to the Eagle Cap Wilderness Area of the Wallowa-Whitman National Forest and 11 fishers were reintroduced in the Winema National Forest at Buck Lake in Klamath County (Kebbe 1961). There was no evidence indicating that these reintroductions were successful, and consequently, additional reintroductions were attempted in the 1970s. Between 1977 and 1980, 17 fishers from British Columbia were reintroduced in the Rogue-Umpqua Divide Wilderness

Table 7. Fisher reintroductions in North America (modified from Roy 1991).

Release Location	Source Location[a]	Date	Sex Ration Males, Females	Literature Source	Comments
Nova Scotia	ranch	1947-48	6, 6	Benson 1959	Successful[b]
Wisconsin	NY	1955-57	6, 8	Bradle 1957	Successful, 1 site
Ontario	ON	1956	25 unk.	C. Douglas (Berg 1982)	No evaluation
Ontario	ON	1956-63	37, 60	C. Douglas (Berg 1982)	Successful
Wisconsin	MN, NY	1956-63	60 unk.	Irvine et al. 1964	Successful
Montana	BC	1959-60	16, 20	Weckwerth & Wright 1968	Mod. successful
Vermont	ME	1959-60	19, 16	T. Fuller (Berg 1982)	Successful
Oregon	BC	1960	10, 14	Kebbe 1961, Morse 1961 Aubry et al.1996a	Failed, 2 sites
Michigan	MN	1961-63	61 unk.	Irvine et al. 1964	Successful
Idaho	BC	1962	39	Luque 1984	Successful- 1 site
Nova Scotia	ME	1963-66	80 unk.	Dodds & Martell 1971	Successful
Wisconsin	MN	1966-77	30, 30	Petersen et al. 1977	Successful
New Brunswick	NB	1966-68	10, 15	Dilworth 1974	No repro., 3 sites
West Virginia	NH	1968	6, 10; 7 unk.	Pack & Cromer 1981	Successful, 2 sites
Minnesota	MN	1968	15 unk.	W. Marshal (Berg 1982)	No evaluation
Maine	ME	1972	7 unk.	J. Hunt (Berg 1982)	Failed
Manitoba	MB	1972-73	4 unk.	R. Leonard (Berg 1982)	Failed
New York	NY	1977	43 unk.	Brown & Parsons 1983, Wallace & Henry 1985	Successful
Oregon	BC	1977-80	17 unk.	Aubry & Lewis, in prep.	Possibly success.
Ontario	ON	1979-82	27, 30	C. Douglas (Berg 1982)	No evaluation
Oregon	MN	1981	8, 5	Berg 1982, Aubry et l.1996a	Possibly success.
Montana	MN	1988-89	13, 19	Roy 1991	Mod. successful?
Alberta	ON, MB	1990	6, 11	Proulx et al. 1994	Unknown
Montana	WI	1990-91	34, 44	Heinemeyer 1993	Mod. successful?
British Columbia	BC	1990-92	2, 13	Weir 1995	Unknown
Manitoba	MB	1991-93	14, 8	Schmidt & Baird 1995	Unknown
Pennsylvania	NY, NH	1994-96	121 unk.	Serfass et al. 1996	Unknown
British Columbia	BC	1997	20 unk.	A. Fontana, BC Minist. Env.	Ongoing

[a] BC = British Columbia, NY = New York, MN = Minnesota, NB = New Brunswick , NH = New Hampshire, ME = Maine, WI = Wisconsin, ON = Ontario, MB = Manitoba, ranch = ranch raised.
[b]Success indicates that fisher have persisted in the area since releases.

Area in Douglas County (n = 11), and near Prospect, Oregon in Jackson County (n = 6). In 1981, 13 fishers from Minnesota were reintroduced in the Rogue Umpqua Divide Wilderness Area in Douglas County (Aubry et al. 1996a, Lewis and Aubry 1997). A resident population of fishers occurs in the southern Cascades and possibly in southern Josephine County in southwestern Oregon.

The Idaho Department of Fish and Game (IDFG) released 39 fishers from British Columbia at 3 release sites in north-central Idaho in 1962 (Luque 1984). This reintroduction was successful and a population of fishers was re-established in the Clearwater drainage of the southern panhandle region. In Montana, fishers were first reintroduced at three locations in 1959-1960 (Weckworth and Wright 1968) and then were reintroduced into the Cabinet Mountains in 1988-1991 (Roy 1991, Heinemeyer 1993). These reintroductions were apparently successful, as fishers appear to be widely distributed throughout the western third of the state (B. Giddings, pers. comm.). Fishers were transplanted to augment existing populations from central, to south-central, British Columbia in 1990-92 (Weir 1995) and to the Kootenay region in 1997 (A. Fontana, pers. comm.).

Research and surveys. Until recently, there had been very little study of the fisher in the Pacific Northwest and northern Rockies. Idaho Fish and Game, U.S. Forest Service, and the Idaho Trappers Association provided financial and material support for a study of the fisher population in Idaho (Jones 1991, Jones and Garton 1994). The Montana Department of Fish, Wildlife and Parks, Kootenai National Forest (USFS), and the Montana Cooperative Wildlife Research Unit supported two fisher studies concurrent with reintroductions conducted with the cooperation of the Minnesota Department of Natural Resources and the Wisconsin Department of Natural Resources (Roy 1991, Heinemeyer 1993).

In 1995, the USDA Forest Service, Pacific Northwest Research Station, initiated a fisher research project in the Rogue River National Forest. This research is being supported in part by Boise Cascade Corporation and the Oregon Department of Fish and Wildlife. This study is the first radio-telemetry study of fishers ever conducted in Washington or Oregon. The study is an investigation of den and rest site characteristics and habitats, the effect of stand and landscape composition on habitat use and home range, and food habits (Aubry et al. 1997).

The USDA Forest Service Region 5 and Pacific Southwest Research Station, and the USDI Bureau of Reclamation, with various cooperators have conducted or supported several studies of fisher on the Six Rivers, Shasta-Trinity, and Sequoia National Forests in California (Buck 1982,Buck et al.1983, Seglund 1995, Dark 1997, Zielinski et al. 1994, 1995b, 1997).

The British Columbia Ministry of the Environment, B.C. Ministry of Forests, B.C. Trappers Association, and the Science Council of B.C., supported a recent study of fisher in British Columbia (Weir 1995).

In 1994, the Forest Service published a Conservation Assessment for forest carnivores including the lynx, American marten, wolverine, and fisher (Ruggiero et al. 1994). They also produced an extensive literature review and a proposed adaptive management strategy for fishers in the western U. S. (Heinemeyer and Jones 1994). These documents resulted from increased attention on the conservation, research and monitoring of forest carnivores. The Western Forest Carnivore Committee has produced maps of potential fisher habitat, draft Conservation Strategy overlays, and draft management recommendations for the Northern Rockies and for Idaho (Heinemeyer 1995, Ruedigger 1994). The British Columbia Ministry of Environment has published a bulletin, *A Fisher Management Strategy for British Columbia*, that includes an annotated bibliography (Banci 1989).

Survey techniques have been developed in recent years to improve assessments of the status of rare forest carnivores in the West (Zielinski and and Kucera 1995). These techniques, and variations thereof, have been used to assess the status of fisher. WDFW, in cooperation with the USDA Forest Service, conducted marten surveys in 1992 and carnivore surveys in 1995-97 which would be expected to detect the presence of fisher (see discussion under POPULATION STATUS: Present). The Forest Service also conducted surveys for forest carnivores on national forests in Oregon. While most surveys failed to detect fishers, fishers were detected on the Rogue River and Umpqua national forests in Oregon prior to the study initiated in 1995.

Information and education. WDFW is currently revising Priority Habitats and Species management recommendations for the fisher. Most jurisdictions have developed information brochures, packets, or classes for trappers that include information on techniques to avoid incidentally capturing fishers and other non-target species.

FACTORS AFFECTING CONTINUED EXISTENCE

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 environmental events (e.g., severe weather, fire, volcanic eruption) and their indirect effects (Shaffer 1987). Disease does not appear 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. In small populations, multiple random factors are more likely to interact to negatively affect the population than in larger populations. The ability to find mates may be reduced in small or sparse populations, potentially resulting in a loss of productivity (the “Allee effect”). Small populations are more likely to suffer negative genetic effects as a result of genetic drift and inbreeding (Allendorf 1983). Inbreeding may reduce fertility, thus making a population less able to recover from periods of low recruitment and greatly increase the probability of extinction. 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 be less able to adapt to new conditions (Schonewald-Cox et al. 1983).

Incidental Mortalities

Trapping. Fishers are easily captured in traps (Young 1975, Coulter 1960, Powell 1993). Although protected from commercial trapping in many states, fishers are often incidentally captured in traps set for other species (Luque 1984, Lewis and Zielinski 1996). Incidental captures are not illegal provided the animal is released when possible. However, these captures often result in crippling injury or mortality (Strickland and Douglas 1984). 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 prevent the re-occupation of suitable habitat. Area trapping restrictions on land sets could be used to reduce trapping mortalities if a population was found, or re-established through reintroduction.

Vehicle collisions. Though not as important a source of mortality as trapping, fishers are struck and killed by vehicles (Proulx et al.1994, Zielinski et al. 1995, 1997b). The potential for vehicle collisions would increase with the density of open roads in the forest. Krohn et al. (1994) reported that 2 of 50 (4%) deaths of radio-collared fishers were caused by vehicles. Though no road-kills have been reported in Washington, vehicle collisions could be a significant mortality factor for any very small fisher population, particularly following a reintroduction.

Habitat Loss, Alteration, and Fragmentation

Forest management. The conversion of low-elevation forests in western Washington to plantations and non-forest uses may have eliminated a large portion of the fisher habitat in the state (Powell and Zielinski 1994). Most of the low and mid-elevation forest is now younger, fragmented, and has reduced amounts of large snags and coarse woody debris, and may not be able to sustain fisher populations (Rosenberg and Raphael 1986, Lyon et al 1994, Powell and Zeilinski 1994). Most contiguous landscapes of older forests occur at high elevations and these areas may be less suitable for fishers in areas of deep snowpacks (Aubry and Houston 1992, Holthausen et al. 1994). The effects of partial cutting and commercial thinning of forest stands on habitat suitability are unknown, but may depend on how much of the canopy is removed and if potential den sites are lost. Jones (1991) suggests that viable populations of fishers could be maintained in the absence of old-growth forest, as long as adequate proportions of mature forest are available. Fragmentation of late-successional forest and loss of potential natal den sites may be the most detrimental aspects of habitat alteration that have occurred. Younger forest in which large logs, snags, and cavity trees are maintained in significant numbers, and which provides a diverse prey base may be suitable for fisher.

Fire, wind, and vulcanism. Stand replacement fires can impact large areas, and would render them unsuitable for fisher for several decades. During unusually dry and windy conditions, wildfires and reburns destroyed the forest on millions of acres in the northern Rockies and Pacific Northwest. For example, the Yacolt fire of 1902 burned 200,000 acres in the Lewis Valley (Pyne 1982). Modern fire suppression techniques reduce the likelihood of such large fires, but fire has the potential for significant impacts to fisher habitat.

Unusual events, like weather and volcanic eruptions could impact fisher habitat. The 1980 eruption of Mt. St. Helens leveled large areas of forest with the initial blast and subsequent mudflows. Severe wind storms that produce large blowdowns can impact large areas of forest, primarily in coastal areas. For example, a hurricane hit the Olympic Penninsula in 1921 and leveled large areas of forest, and a 1962 windstorm felled 7 billion board feet (Pyne 1982).

Forest Landscape Planning

Management of federal lands in Oregon and Washington within the range of the northern spotted owl is expected to provide some conservation benefits to the fisher (USDA Forest Service and USDI Bureau of Land Management 1994, 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 offer habitat management provisions likely to benefit any remnant or reintroduced fisher populations. WDNR states in their habitat conservation plan, that habitat provisions for spotted owls and marbled murrelets as well as protection for forest riparian habitat and large legacy trees will help conserve habitat for fishers (WDNR 1996).

CONCLUSIONS AND RECOMMENDATIONS

The fisher is very rare in Washington. Infrequent sighting reports and incidental captures indicate that a small number may still be present. However, despite extensive surveys, the Department has been unable to confirm the existence of a population in the state. Fisher biology is characterized by low population density, low reproductive rates, relatively short life span, and large home range. Fishers are generally associated with late-successional (mature and old-growth) coniferous and mixed coniferous-deciduous forest, but use a variety of stand ages. In western Washington, fishers may have been restricted to elevations below 1800 m by deep snow packs or frequent soft snow conditions. Forests with high canopy closure, multiple canopies, shrubs, and habitats that support a diverse prey base are most used. Large-diameter trees, large snags, tree cavities, and logs are most often used for den and rest sites, and are an important component of suitable habitat.

The fisher was seriously over-trapped in the 19th, and early 20th centuries. Trapping, predator and pest control programs, and loss and alteration of habitat probably combined to push the fisher close to extirpation. Despite being protected from commercial harvest for 64 years, the fisher has not recovered. We believe that remaining fishers in Washington are unlikely to represent a viable population, and without recovery activities, the species is likely to be extirpated from the state. For these reasons, the Department recommends that the fisher be listed as an endangered species in the state of Washington.

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Appendix A. Fisher specimens collected in Washington.

No.	Location	County	Date	Year	Collector/Citation [a]	Museum No. [b]
1	S. base of Mt. Adams, near Trout Lake	Klickitat		1894	C. Wegstein	USNM #63907
2	S. base of Mt. Adams, near Trout Lake	Klickitat	11 Dec.	1894	D. Kaegi	USNM #69972
3	Mt. Adams, Trout Lake	Klickitat		1894	C. Wegstein	USNM #64758
4	S. base of Mt. Adams, near Trout Lake	Klickitat		1894	C. Wegstein	USNM #63908
5	Mt. Adams, Trout Lake	Klickitat		1894	C. Wegstein	USNM #64759
6	Base of Mt. Adams, near Trout Lake	Klickitat	17 Jan.	1895	D. Kaegi	USNM #70541
7	Mt. Adams, Trout Lake	Klickitat	22 Dec.	1895	D. Kaegi	USNM #76616
8	S. base of Mt. Adams, near Trout Lake	Klickitat	2 Mar.	1895	D. Kaegi	USNM #70928
9	S. base of Mt. Adams, near Trout Lake	Klickitat	Feb.	1895	D. Kaegi	USNM #70927
10	Olympic Peninsula, Lake Cushman region	Mason		1895	R. Harps	UNSM #268769
11	Mt. Adams, Trout Lake	Klickitat	5 Dec.	1896	P. Schmid	USNM #81843
12	Mt. Adams, Trout Lake	Klickitat	23 Mar.	1896	D. Kaegi	USNM #77873
13	Mt. Adams, Trout Lake	Klickitat	2 Jan.	1896	D. Kaegi	USNM #76615
14	Mt. Adams, Trout Lake	Klickitat	29 Dec.	1896	P. Schmid	USNM #81951
15	Lake Cushman	Mason	18 Jan.	1896	T. Hayes	USNM #78410
16	Mt. Adams, Trout Lake	Klickitat	15 Jan.	1897	P. Schmid	USNM #87084
17	Mt. Adams, Trout Lake	Klickitat	31 Dec.	1897	P. Schmid	USNM #92113
18	Olympic Mts., Barnes Cr., Solduck Trail	Clallam	13 Oct.	1898	D. Elliot	FMNH #6342
19	Olympic Mountains, Solduck Trail	Clallam	9 Oct.	1898	D. Elliot	FMNH #6341
20	Mt. Adams, Trout Lake	Klickitat	17 Jan.	1898	P. Schmid	USNM #92770
21	Lake Cushman	Mason	29 Jan.	1899	T. Hayes	USNM #96581
22	Lake Cushman	Mason	17 Feb	1899	T. Hayes	USNM #96582
23	Lake Cushman	Mason	9 Feb.	1899	T. Hayes	USNM #96580
24	Mt. Adams, Trout Lake	Klickitat	20 Jan.	1900	P. Schmid	USNM #99457
25	Mt. Adams, Trout Lake	Klickitat	10 Mar.	1900	P. Schmid	USNM #99652
26	Mt. Adams, Trout Lake	Klickitat	26 Jan.	1901	P. Schmid	USNM #107624
27	Hoodsport	Mason	6 May	1901	H. Finch	USNM #116653
28	Mt. Adams, Trout Lake	Klickitat	8 Mar.	1901	P. Schmid	USNM #108213
29	Mt. Adams, Trout Lake	Klickitat	24 Feb.	1902	P. Schmid	USNM #116480
30	Olympic Mts. Skokomish R.	Mason	20 Apr.	1902	K. Robbins	USNM #119959
31	Mt. Adams, Trout Lake	Klickitat	25 Feb.	1902	P. Schmid	USNM #116481
32	Olympic Mts. Skokomish R.	Mason	9 Mar.	1902	K. Robbins	USNM #119960

Appendix A. Fisher specimens (Cont'd)

No.	Location	County	Date	Year	Collector/Citation [a]	Museum No. [b]
33	Mt. Adams, Trout Lake	Klickitat	12 Apr.	1902	P. Schmid	USNM #116766
34	Olympic Mts. Skokomish R.	Mason	19 Mar.	1902	K. Robbins	USNM #119958
35	Olympic Mts. Skokomish R.	Mason	22 Nov.	1902	K. Robbins	USNM #119961
36	Olympic Mts. Skokomish R.	Mason	28 Mar.	1902	K. Robbins	USNM #119957
37	Hoodsport	Mason		1907	T. Rule	USNM #170607
38	Hoodsport	Mason	Mar.	1907	T. Rule	USNM #170606
39	Hoodsport	Mason		1908	T. Rule	USNM #17069
40	Hoodsport	Mason		1908	T. Rule	USNM #170608
41	Hoodsport	Mason	5 Dec.	1909	T. Rule	USNM #170610
42	Hoodsport	Mason	16 Dec.	1909	T. Rule	USNM #170611
43	Hoodsport	Mason	30 Dec.	1909	T. Rule	USNM #170612
44	Hoodsport	Mason	10 Feb.	1910	T. Rule	USNM #170615
45	Hoodsport	Mason	22 Jan.	1910	T. Rule	USNM #170613
46	Hoodsport	Mason	24 Mar.	1910	T. Rule	UNSM #170616
47	Hoodsport	Mason	29 Jan.	1910	T. Rule	USNM #170614
48	Olympic Ranger Sta., Glacier Cr., 2 mi SE of Hoh River	Jefferson	Dec.	1919	W. Taylor	USNM #241949
49	Vance, 27 mi. SW of Iron Cr.	Skamania	5 Sept.	1923	W. Scalf	USNM #243790
50	near Olympia	Thurston	unknown	before 1947	G. Gibbs	USNM #3379
51	Iron Creek	Lewis	unknown	before 1947	Booth 1947	USFWS
52	Lilliwaup Swamp area, T23NR4WS11	Mason	Jan.	1969	G. Gray	UPSMNH #14784
53	Colville Indian Res., T33NR30ES9	Okanogan	Dec.	1975	E. McGinnis	WDFW-NHDB[?][c]
54	3 mi. W of Orting, T19NR4ES34	Pierce	11 Dec.	1990	D. Robertson	UWBM #37530
55	Ft. Lewis T18NR02ES13	Pierce	Fall	1992	G. Sovie	WDFW-NHDB
56	Calispell Peak, T34NR42ES9	Stevens	25 May	1994	S. Zender	WDFW-NHDB

[a] see bibliography for Booth (1947).

[b] Museum and source acronyms include: 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.

[c] Photograph of pelt is on file at WDFW, but it is not definitely identifiable as a fisher.

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

Appendix B. Sighting, tracks, and trapping reports of fishers in Washington.

Location	County	Date	Year	Type[a]	Reported by	Rel.[b]	Reference[c]
Olympic N.P., T25NR5WS19	Jefferson	-	1896	Trapping	F. Reid	2	Aubry & Houston
Mt. Rainier N.P., Nisqually Valley	Pierce	-	1897	Trapping	C. Merriam	3	Aubry & Houston
Palix River	Pacific	-	1903	Trapping	J. Prior	-	B. Adamire
Mt. Rainier N.P., Below Longmire	Pierce	-	1904	Trapping	C. Stoner	3	Aubry & Houston
Cosmopolis, Water Reservoir T17NR9WS23	Grays Harbor		1909	Trapping	L. Fairbrother	2	Aubry & Houston
Lower Elwha Dam	Clallam	-	<1910	Trapping	B. Everett	-	B. Adamire
Palix River	Pacific	-	1910	Trapping	J. Prior	-	B. Adamire
Stream near Neah Bay	Clallam	-	1910s	Trapping	J. Cowans	-	B. Adamire
Mt. Rainier Nat'l Park	Pierce	-	1912	Trapping	S. Estes	-	Taylor & Shaw 1927
Olympic N.F., T24NR5WS36	Mason	Jan.	1912	Trapping	R. Harps	1	Aubry & Houston
Mt. Rainier N.P.	Pierce	-	1912	Trapping	C. Stoner	-	Taylor & Shaw 1927
Palix River	Pacific	24 Mar	1913	Trapping	J. Prior	-	B. Adamire
Wenatchee N.F., Hyas Lake, T24NR14ES17	Kittitas	-	1915	Trapping	M. Nordrum	2	Aubry & Houston
Bumping Lake	Yakima	-	1915	Tracks	J. Nelson	-	Scheffer 1938
Okanogan N.F., T38NR20ES9	Okanogan	-	1917	Trapping	H. Mason	2	Aubry & Houston
Queets River W. of Clearwater, narrow spit below Copalis	Jefferson	Winter	1919	Trapping	Cantwell	-	Scheffer 1995
Near the town of Tieton	Yakima	-	1919	Trapping	H. Beebe	2	Aubry & Houston
Crooked Cr., E. side of Lake Ozette	Mason	-	1920s	Trapping	Arbriter	-	B. Adamire
Hoko River	Clallam	-	1920s	Trapping	S. Iverson	-	B. Adamire
Near old coal mine along beach in Pysht area	Clallam	-	1920s	Trapping	Fernandez	-	B. Adamire
Lake Sutherland	Clallam	-	1920s	Trapping	O. Hansen	-	B. Adamire
Wolf R. and Grand Cr. T28NR4WS18	Clallam	-	1915-1925	Trapping	A.B.Cameron	-	B. Adamire
N of Gold Mt. T24NR1W	Kitsap	-	-	Trapping	H. Dahl	-	B. Adamire
Oak Ponds S. of Hintzville, T24NR2W	Kitsap	-	-	Trapping	Carlson	-	B. Adamire
E. Fork of Quinault	Grays Harbor	-	1921	Trapping	E. & I. Olson	-	Scheffer 1995
Crooked Cr. between Lake Ozette & Dickey Lake	Clallam	-	1925	Trapping	G. Fargo	2	Aubry & Houston

Appendix B. Fisher sighting, tracks, and trapping records (Cont'd)

Location	County	Date	Year	Type[a]	Reported by	Rel.[b]	Reference[c]
Trout Lake	Klickitat	-	1925	Trapping	D. Smith	-	Scheffer 1957
Clallam Bay	Clallam	-	1926	Trapping	C. Keller	-	Scheffer 1995
Big Creek	Jefferson ?	-	1929	Tracks	J. Alloid	-	Scheffer 1938
Seaview	Pacific	-	1930	Trapping	J. Petit	-	Scheffer 1957
Methow Valley just S. of Canadian border	Okanogan	-	1933	Trapping	R. Johnson	-	Scheffer 1938
Little Wenatchee River, above Lake Wenatchee	Chelan	-	1936	Tracks	L. Dickinson	-	Scheffer 1938
Queets River	Jefferson	Winter	1937	Tracks	T. Anderson	-	Scheffer 1995
Big Log, N. Fork of the Skokomish	Mason	-	1938	Sighting	R. Harps	-	Scheffer 1995
Olympic Mts.		18 April	1939	Trapping	J. Allen	-	Scheffer 1957
Lake Whatcom	Whatcom	Fall	1939	Sighting	B. Austen	-	Scheffer 1957
Barnes Creek, Lake Crescent	Clallam	-	1940	Sighting	NPS	-	Scheffer 1995
Hoh River rd., T26NR11WS30	Jefferson	2 Aug.	1949	Sighting	M. Johnson	3	Aubry & Houston
Okanogan N.F., Winthrop rd., T39NR21ES34	Okanogan	-	1955	Sighting	Unknown	4	Aubry & Houston
Mt. Baker/Snoqualmie N.F., T30NR9ES1	Snohomish	-	1958	Sighting	J. Vance	4	Aubry & Houston
Cedar River, T22NR6ES24	King	July	1963	Sighting	H. Beecher	4	Aubry & Houston
Stevens Creek, T20NR11WS12	Grays Harbor	-	1963	Sighting	H. Beecher	4	Aubry & Houston
Slide Lake, T34NR11ES14	Skagit	Sum.	1965	Sighting	B. Bosman	4	Aubry & Houston
Wenatchee N.F. T16NR11ES34	Yakima	1 Sept.	1966	Sighting	B. Van Reenan	4	Aubry & Houston
Wenatchee N.F., T16NR11ES34	Yakima	25 July	1966	Sighting	B. Van Reenan	4	Aubry & Houston
Olympic N.P., T23NR9WS19	Grays Harbor	-	1967	Sighting	Unknown	6	Aubry & Houston
Olympic N.P., Klahhane ridge, T29NR6WS29	Clallam	Jun.	1969	Sighting	Unknown	3	Aubry & Houston
Mt. Baker/Snoqualmie N.F., T27NR10ES35	Snohomish	-	1969	Tracks	R. Breeden	5	Aubry & Houston
Near Lake Quinault, T23NR9WS19	Grays Harbor	-	1969	Sighting		-	Yocom & McCollum 1973
Olympic N.P., T28NR6WS11	Clallam	June	1969	Sighting		-	Yocom & McCollum 1973

Appendix B. Fisher sighting, tracks, and trapping records (Cont'd)

Location	County	Date	Year	Type[a]	Reported by	Rel.[b]	Reference[c]
Olympic N.F., T25NR3WS16	Jefferson	Sept.	1971	Sighting	Unknown	4	Aubry & Houston
Near Sultan, T28NR9ES6	Snohomish	Winter	1971	Trapping	R. Akers	2	Aubry & Houston
N. Cascades N.P., T36NR11ES1	Skagit	July	1971	Sighting	Swickard	4	Aubry & Houston
Wenatchee N.F., T16NR11ES34	Yakima	4 July	1971	Sighting	B. Van Reenan	4	Aubry & Houston
Near Gold Bar, T27NR9ES6	Snohomish	-	1971	Sighting	R. Reynolds	4	Aubry & Houston
Olympic N.F., T30NR11WS3	Clallam	Oct.	1971	Sighting	Unknown	4	Aubry & Houston
Near Gold Bar, T28NR9ES31	Snohomish	-	1971	Sighting	N. Payne, R. Taber	-	WDFW-NDHB
Olympic N.P., T24NR3WS34	Mason	Apr.	1972	Sighting	Unknown	4	Aubry & Houston
Sultan Basin, Anderson creek, T27NR9ES25	Snohomish	-	1972	Sighting	E. Isco	4	Aubry & Houston
Mt. Baker/Snoqualmie N.F., T30NR8ES19	Snohomish	-	1973	Sighting		-	Payne & Taber 1974
Wenatchee N.F., T13NR12ES2	Yakima	10 Nov.	1973	Tracks	M. Wagner	5	Aubry & Houston
Bald Mt., T29NR8ES12	Snohomish	Fall	1973	Sighting	R. Kelley	4	Aubry & Houston
Wenatchee N.F., T22NR17ES35	Chelan Kittitas	-	1973	Sighting	G. Cook	4	Aubry & Houston
Lower Skokomish river, T21NR4WS22	Mason	Feb.	1973	Sighting	Unknown	4	Aubry & Houston
Mt. Baker/Snoqualmie N.F., T30NR7ES13	Snohomish	Fall	1973	Sighting	R. Kelley	4	Payne & Taber 1974
Olympic N.F., T23NR11WS1	Grays Harbor	-	1973	Sighting	M. Miller	3	Aubry & Houston
Mt. Baker/Snoqualmie N.F., T26NR10ES6	King	-	1974	Tracks	D. Bergstrom	5	Aubry & Houston
Green River Road		-	1974	Sighting	M. Rasmussen	6	Aubry & Houston
Mt. Rainier N.P., Ohanapecosh hot springs, T15NR10ES4	Pierce	26 Jan.	1974	Sighting	D. Shannon	4	Aubry & Houston
Mt. Rainier N.P., T17NR10ES9	Pierce	4 Oct.	1974	Sighting	J. Chaffen	4	Aubry & Houston
Wenatchee N.F., T16NR11WS8	Yakima	Nov.	1975	Sighting	R. Beaman	3	Aubry & Houston
Gifford Pinchot N.F., T6NR7ES25	Skamania	-	1975	Sighting	Unknown	4	Aubry & Houston

Appendix B. Fisher sighting, tracks, and trapping records (Cont'd)

Location	County	Date	Year	Type[a]	Reported by	Rel.[b]	Reference[c]
Big Creek Campground, T23NR4WS16	Mason	-	1975	Sighting	B. Goodpaster	4	Aubry & Houston
Mt. Rainier N.P., T15NR8ES7	Pierce	35991	1975	Sighting	J. Farr	6	Aubry & Houston
Mt. Rainier N.P., T17NR10ES31	Pierce	5 Aug.	1975	Sighting	J. Van Horn	3	Aubry & Houston
Elwha River Valley, T30NR7WS32	Clallam	-	1975	Sighting	G. Kish	3	Aubry & Houston
Wenatchee N.F., T15NR11ES4	Yakima	11 Aug.	1975	Sighting	M. Boltz	4	Aubry & Houston
Snoqualmie River, T23NR9ES18	King	Winter	1976	Sighting	F. Lawrence	4	Aubry & Houston
Yakima River, T20NR14ES25	Kittitas	-	1976	Sighting	H. Beecher	4	Aubry & Houston
Kaniksu N.F., T38NR45ES13	Pend Oreille	May	1977	Sighting	D. Weatherman	-	WDFW-NHDB
Olympic N.F., T23NR10WS1	Grays Harbor	2 Nov.	1977	Sighting	K. Pearson	4	Aubry & Houston
Okanogan N.F., T38NR20ES17	Okanogan	7 July	1977	Sighting	J. Hook	4	Aubry & Houston
Mt. Rainier N.P., T16NR9ES2	Pierce	6 July	1977	Sighting	S. Sabel	6	Aubry & Houston
Mt. Rainier N.P., T17NR10ES31	Pierce	20 may	1977	Tracks	J. Van Horn	5	Aubry & Houston
Colville N.F., T39NR44ES35	Pend Oreille	12 July	1978	Sighting	R. Waitt	4	Aubry & Houston
Colville N.F., T37NR44ES12	Pend Oreille	16 Oct	1978	Sighting	T. Burke, L. Dubbels	4	Aubry & Houston
Colville N.F., T38NR43ES12	Pend Oreille	10 July	1978	Sighting	R. Waitt	4	Aubry & Houston
N. Cascades N.P., T38NR13ES36	Whatcom	1 Dec.	1978	Tracks	T. Buller	5	Aubry & Houston
2 mi. SW of Port Angeles, T30NR6WS16	Clallam	-	1978	Sighting	B. Adamire	3	Aubry & Houston
Gifford Pinchot N.F., T14NR10ES31	Lewis	July	1979	Sighting	P. Miller	4	Aubry & Houston
Okanogan N.F., T38NR20ES9	Okanogan	-	1979	Sighting	J. Hook	4	Aubry & Houston
Lake Chelan Nat. Rec. area,T34NR16ES21	Chelan	22 Aug.	1980	Sighting	R.C.& S.Williams	4	Aubry & Houston
N. Cascades N.P., T34NR14ES14	Chelan	12 Aug.	1980	Sighting	S. Budelier	4	Aubry & Houston
Olympic N.F., T22NR5WS9	Mason	-	1980	Sighting	D. Laney	-	WDFW-NHDB

Appendix B. Fisher sighting, tracks, and trapping records (Cont'd)

Location	County	Date	Year	Type[a]	Reported by	Rel.[b]	Reference[c]
Colville Indian Res., T33NR35ES33	Ferry	Summer	1981	Sighting	R. Lawrence	6	Aubry & Houston
Olympic N.P., T29NR6WS1	Clallam	June	1981	Sighting	J. O'Neil	-	WDFW-NHDB
Stickney Ridge, NE of Sultan, T28NR9ES14	Snohomish	Nov.	1981	Sighting	B. Graham	6	Aubry & Houston
N. Cascades N.P., T35NR16ES34	Chelan	10 Jun.	1981	Sighting	M. Zichlinsky	4	Aubry & Houston
Kaniksu N.F., T37NR45ES3	Pend Oreille	Jan.	1982	Tracks	M. Cook	5	Aubry & Houston
Makah Indian Reservation, T33NR15WS15	Clallam	Aug.	1982	Sighting	M. Tupper	3	Aubry & Houston
Kaniksu N.F., T38NR45ES22	Pend Oreille	Nov.	1982	Sighting	L. Lyons	4	Aubry & Houston
Weyerhaueser's High Yield Forest Near Eatonville, T16NR5ES16	Pierce	Oct.	1983	Sighting	B. Murray	6	Aubry & Houston
Olympic N.P., T24NR11WS20	Jefferson	29 Oct.	1983	Sighting	H. Beecher	3	Aubry & Houston
Olympic N.F., T24NR4WS21	Mason	30 May	1983	Sighting	D. Spiker	3	Aubry & Houston
Olympic N.P., Boundary, T24NR11WS22	Jefferson	4 Nov.	1983	Sighting	D. Busco	3	Aubry & Houston
Wenatchee N.F., T18NR12ES10	Yakima	Sept.	1983	Sighting	B. Horton	4	Aubry & Houston
Olympic N.P., T27NR11WS5	Jefferson	Apr.	1983	Sighting	K. Smith	4	Aubry & Houston
Okanogan N.F., T37NR17ES18	Whatcom	18 Oct.	1984	Tracks	K. Williams	5	Aubry & Houston
Crown Zellerbach Co. Lands, T9NR7WS9	Wahkiakum	Jan.	1984	Sighting	K. Niemi	4	Aubry & Houston
Colville N.F., T65NR44ES30	Pend Oreille	3 Feb.	1984	Sighting	R. Fosback	3	Aubry & Houston
Weyerhaeuser's High Yield Forest Near Eatonville., T16NR5ES16	Pierce	July	1984	Sighting	B. Murray	6	Aubry & Houston
Gifford Pinchot N.F., T10NR7ES33	Skamania	Nov.	1984	Tracks	J. Dobbins	5	Aubry & Houston
Mt. Baker/Snoqualmie N.F., Ruth creek rd., .8 km E. of Mt. Baker Hwy.	Whatcom	15 Aug.	1984	Sighting	D. Naas	4	Aubry & Houston

Appendix B. Fisher sighting, tracks, and trapping records (Cont'd)

Location	County	Date	Year	Type[a]	Reported by	Rel.[b]	Reference[c]
W. Branch Wynoochee R.,T23NR7WS21	Grays Harbor	July	1985	Sighting	J. Webster	3	Aubry & Houston
N. Cascades N.P., below skagit queen camp on Thunder Creek Trail	Skagit	15 July	1985	Sighting	L. Smith	4	Aubry & Houston
Olympic N.P., T26NR7WS35	Jefferson	23 Aug.	1985	Sighting	R. & J. Bentley	6	Aubry & Houston
S. Fork of Skokomish R., T21NR4WS9	Mason	Fall	1985	Sighting	S. Graham	4	Aubry & Houston
Colville N.F., T39NR44ES30	Pend Oreille	5 Aug.	1985	Sighting	D. Horn	4	Aubry & Houston
On Hwy. 101 on canal side between Lilliwaup and Eldon	Mason	30 Aug.	1986	Sighting	E. Ballsmith	6	Aubry & Houston
Salmon River, T24NR12W	Jefferson	Fall	1986	Sighting	A. Boom	6	Aubry & Houston
Dickey River, T28NR14WS6	Clallam	Oct.	1986	Sighting	J. Closner	6	Aubry & Houston
Olympic N.P., T28NR7WS13	Clallam	2 Oct.	1987	Sighting	M. Jensen	4	Aubry & Houston
Mt. Rainier N.P., Fryingpan Cr. Trail	Pierce	17 July	1987	Sighting	M. Beasley	4	Aubry & Houston
N. Cascades N.P., Macallister Camp	Skagit	May	1987	Sighting	A. Morke	3	Aubry & Houston
Olympic N.P., T28NR6WS18	Clallam	1 Oct.	1987	Sighting	M. Jensen	-	WDFW-NHDB
Mt. Baker/Snoqualmie N.F., T39NR7ES14	Whatcom	27 July	1987	Sighting	D. Jones	4	Aubry & Houston
Peterman Hill, S. Of Morton, T12NR4ES10	Lewis	-	1987	Trapping	S. Curry	2	Aubry & Houston
Wenatchee N.F., T28NR18ES34	Chelan	12 Sept.	1988	Sighting	M. Davis	4	Aubry & Houston
Colville N.F., T38NR44ES18	Pend Oreille	15 Sept.	1988	Sighting	Ralph	4	Aubry & Houston
Gold Hill Area, T38NR25ES9	Okanogan	Fall	1988	Sighting	P. Kelly	6	Aubry & Houston
Colville Indian Res., T34NR34ES32	Ferry	Aug.	1988	Sighting	unknown	6	Aubry & Houston
Skokomish Indian Res. T21NR4WS14	Mason	Fall	1988	Sighting	A. Carey	4	Aubry & Houston
Wenatchee N.F., T31NR19ES11	Chelan	15 Aug.	1988	Sighting	K. Carpenter	-	WDFW-NHDB

Appendix B. Fisher sighting, tracks, and trapping records (Cont'd)

Location	County	Date	Year	Type[a]	Reported by	Rel.[b]	Reference[c]
Junction of Middle and N. forks of Prince Creek	Chelan	15 Aug.	1988	Sighting	K. Carpenter	4	Aubry & Houston
Mt. Rainier N.P., Longmire, Along W. side of Shadows loop trail, near junct. with Rampart ridge trail	Pierce	1 Jun.	1988	Sighting	W. Ross	4	Aubry & Houston
Wenatchee N.F., T30NR20ES11	Chelan	Jun.	1989	Sighting	L. Moore	4	Aubry & Houston
Lundimo Meadows, T39NR33ES29	Ferry	20 Oct.	1989	Sighting	M. Thorniley	3	Aubry & Houston
Olympic N.P., T24NR5WS19	Mason	7 Apr.	1989	Tracks	B. Dalton	5	Aubry & Houston
N. Cascades N.P., Bridge Creek trail	Chelan	23 Sept.	1989	Sighting	J. Hughes	4	Aubry & Houston
Wenatchee N.F., T30NR20ES9	Chelan	Jun.	1989	Sighting	L. Moore	4	Aubry & Houston
Olympic N.P., T25NR5WS5	Jefferson	25 Jun.	1989	Sighting	M. Gracz	4	Aubry & Houston
Mcgregor Mt. USGS QUAD	Chelan	19 Jun.	1989	Sighting	L. Nothman	4	Aubry & Houston
Goode Mt. USGS QUAD	Chelan	31 July	1989	Sighting	J. Stant	4	Aubry & Houston
Olympic N.F., T28NR3WS32	Clallam	15 Jun.	1989	Sighting	C. Rodlend	4	Aubry & Houston
W. of Orting, T19NR4ES34	Pierce	11 Dec.	1990	Trapping	Brittell	-	WDFW-NHDB
Gifford Pinchot N.F., T11NR8ES7	Lewis	9 Jun.	1990	Sighting	L. Fitzner	4	Aubry & Houston
Wenatchee N.F., T26R18ES27	Chelan	1 Aug.	1990	Tracks	Rickman & Martin	5	Aubry & Houston
Near Bryan Butte, T30NR20ES2	Okanogan	1 Sept.	1990	Sighting	D. Humpfrey	4	Aubry & Houston
Wenatchee N.F., T30NR20ES2	Chelan	July	1990	Sighting	Moore & Belmont	4	Aubry & Houston
Wenatchee N.F., T21NR18ES8	Kittitas	23 July	1990	Tracks	T. Rickman & S. Martin	5	Aubry & Houston
Gifford Pinchot N.F., T14NR8ES16	Lewis	23 May	1990	Sighting	J. Kelso	4	Aubry & Houston
Mt. Rainier N.P., T15NR10ES4	Pierce	24 July	1990	Sighting	J. Swingle	6	Aubry & Houston
Mt. Baker/Snoqualmie N.F., T22NR10ES3	King	25 Aug.	1990	Sighting	A. Riley	3	Aubry & Houston
Gifford Pinchot N.F., T10NR9ES16	Skamania	14 July	1991	Sighting	L. Smathers	-	WDFW-NHDB

Appendix B. Fisher sighting, tracks, and trapping records (Cont'd)

Location	County	Date	Year	Type[a]	Reported by	Rel.[b]	Reference[c]
E. Fork Dickey River, T29NR14WS31	Clallam	Apr.	1991	Sighting	R. Lien	4	Aubry & Houston
Olympic N.P., T28NR15WS21	Clallam	3 Aug.	1991	Sighting	M. Butler	4	Aubry & Houston
Gifford Pinchot N.F., T13NR7ES35	Lewis	8 Feb.	1991	Sighting	C. Dick	-	WDFW-NHDB
Mt. Baker/Snoqualmie N.F.,	King	15 Aug.	1991	Sighting	M. Barry	-	WDFW-NHDB
Wenatchee N.F., T13NR11ES1	Yakima	11 Mar.	1991	Sighting	L. Caruso	3	Aubry & Houston
Quinault Indian Res., T23NR11WS7	Grays Harbor	1 Apr.	1991	Sighting	M. Barlow	4	Aubry & Houston
HWY 112 W. of Joyce, T31NR9WS35	Clallam	16 May	1991	Sighting	D. Byrne	3	Aubry & Houston
Gifford Pinchot N.F., T14NR10ES15	Lewis	9 Jan.	1991	Tracks	M. Wagner	5	Aubry & Houston
Kaniksu N.F., T34NR45ES36	Pend Oreille	14 Aug.	1991	Sighting	L. Hatzell & C. Dalgren	-	WDFW-NHDB
Tornow Branch of the Satsop River, T20NR7WS26	Mason	8 Jan.	1992	Sighting	A. Larson	3	Aubry & Houston
Tornow Branch of the Satsop River, T20NR7WS25	Grays Harbor	10 Jan.	1992	Sighting	A. Larson	-	WDFW-NHDB
Colville N.F., T37NR44ES11	Pend Oreille	10 Jan.	1992	Tracks	T. Holden	-	WDFW-NHDB
Colville N.F., T38NR45ES12	Pend Oreille	1 June	1992	Sighting	Unknown	-	WDFW-NHDB
Colville N.F., T37NR44ES33	Pend Oreille	12 July	1994	Sighting	T. Livle	-	WDFW-NHDB
Gifford Pinchot N.F., T14NR8ES6	Lewis	1 July	1994	Sighting	L. Fitzer	-	WDFW-NHDB
Collville N.F., T39NR45ES10	Pend Oreille	20 Sept.	1995	Sighting	G. Williams & K. Dean	-	WDFW-NHDB
Canyon Lake, T38NR6ES27	Whatcom	31 May	1995	Sighting	D. Weber	-	WDFW-NHDB
Canyon Lake, T38NR6ES26	Whatcom	31 May	1995	Sighting	D. Weber	-	WDFW-NHDB
On N. Fork of Snoqualmie Co. Rd. #57, T24NR8ES13	King	13 June	1995	Sighting	M. Armijo	-	WDFW-NHDB
Main fork of Nooksack River, T38NR6ES26	Whatcom	31 May	1995	Sighting	D. Weber	-	WDFW-NHDB

Appendix B. Fisher sighting, tracks, and trapping records (Cont'd)

Location	County	Date	Year	Type[a]	Reported by	Rel.[b]	Reference[c]
Colville N.F., T39NR43ES36	Pend Oreille	30 Jan.	1996	Tracks	J. Goldsmith	-	WDFW-NHDB
Olympic N.F., Quinault Ridge, T22NR10WS36	Grays Harbor	1 July	1996	Sighting	J. Anthony	-	WDFW-NHDB
Louie Way Gap T13N R14E S23	Yakima	3 June	1997	Sighting	R. Estes	-	WDFW-NHDB
Mt. Spokane	Spokane	January?	1998	Sighting	J. O'Donnell	-	

[a] Type: Trapping indicates a report of a trapped animal with no accompanying specimen or photo; Sighting indicates a visual observation by observer listed; Tracks indicates the observation of tracks that the observer believed to be made by a fisher.

b Reliability of observations in Aubry and Houston's (1992) is based on a scale from 1(highest reliability) to 6 (lowest), where:

1= museum specimens and photographs
2= observations are first person trapping accounts
3= observations are detailed visual sightings by an observer of known qualifications
4= observations are sightings by a person with undetermined or limited qualifications
5= observations are tracks
6= observations are those with insufficient or questionable description or locality data (Aubry and Houston 1992).

[c] References include: published literature; Aubry and Houston = Aubry and Houston (1992 and database provided to WDWF);; Washington Department of Fish and Wildlife- Natural Heritage Database (WDFW-NHDB) records; personal communications with individuals (e.g., B. Adamire); and museum specimens (acronym for the museum and a specimen number. Museum acronyms include: USNM = U.S. National Museum of Natural History (Smithsonian Inst.); FMNH = Field Museum of Natural History; UPSMNH = University of Puget Sound Museum of Natural History; UWBM = University of Washington Burke Museum).

Appendix C. Washington Administrative Codes.

WAC 232-12-011 Wildlife classified as protected shall not be hunted or fished.

Protected wildlife are designated into three subcategories: Threatened, sensitive, and other.
(1) Threatened species are any wildlife species native to the state of Washington that are likely to become endangered within the foreseeable future throughout a significant portion of their range within the state without cooperative management or removal of threats. Protected wildlife designated as threatened include:

Common Name	Scientific Name
Western gray squirrel	*Sciurus griseus*
Steller (northern) sea lion	*Eumetopias jubatus*
North American lynx	*Lynx canadensis*
Aleutian Canada goose	*Branta canadensis leucopareia*
Bald eagle	*Haliaeetus leucocephalus*
Ferruginous hawk	*Buteo regalis*
Marbled murrelet	*Brachyramphus marmoratus*
Green sea turtle	*Chelonia mydas*
Loggerhead sea turtle	*Caretta caretta*

(2) Sensitive species are any wildlife species native to the state of Washington that are vulnerable or declining and are likely to become endangered or threatened in a significant portion of their range within the state without cooperative management or removal of threats. Protected wildlife designated as sensitive include:

Common Name	Scientific Name
Gray whale	*Eschrichtius gibbosus*
Larch Mountain salamander	*Plethodon larselli*

(3) Other protected wildlife include:

Common Name	Scientific Name
Cony or pika	*Ochotona princeps*
Least chipmunk	*Tamius minimus*
Yellow-pine chipmunk	*Tamius amoenus*
Townsend's chipmunk	*Tamius townsendii*
Red-tailed chipmunk	*Tamius ruficaudus*
Hoary marmot	*Marmota caligata*
Olympic marmot	*Marmota olympus*
Cascade golden-mantled ground squirrel	*Spermophilus saturatus*
Golden-mantled ground squirrel	*Spermophilus lateralis*
Washington ground squirrel	*Spermophilus washingtoni*
Red squirrel	*Tamiasciurus hudsonicus*
Douglas squirrel	*Tamiasciurus douglasii*
Northern flying squirrel	*Glaucomys sabrinus*
Fisher	*Martes pennanti*
Wolverine	*Gulo gulo*
Painted turtle	*Chrysemys picta*
California mountain kingsnake	*Lampropeltis zonata;*

All birds not classified as game birds, predatory birds or endangered species, or designated as threatened species or sensitive species; all bats, except when found in or immediately adjacent to a dwelling or other occupied building; mammals of the order *Cetacea,* including whales, porpoises, and mammals of the order *Pinnipedia* not otherwise classified as endangered species, or designated as threatened species or sensitive species. This section shall not apply to hair seals and sea lions which are threatening to damage or are damaging commercial fishing gear being utilized in a lawful manner or when said mammals are damaging or threatening to damage commercial fish being lawfully taken with commercial gear.

[Statutory Authority: RCW 77.12.020. 97-18-019 (Order 97-167), § 232-12-011, filed 8/25/97, effective 9/25/97. Statutory Authority: RCW 77.12.040, 77.12.020, 77.12.030 and 77.32.220. 97-12-048, § 232-12-011, filed 6/2/97, effective 7/3/97. Statutory Authority: RCW 77.12.020. 93-21-027 (Order 615), § 232-12-011, filed 10/14/93, effective 11/14/93; 90-11-065 (Order 441), § 232-12-011, filed 5/15/90, effective 6/15/90. Statutory Authority: RCW 77.12.040. 89-11-061 (Order 392), § 232-12-011, filed 5/18/89; 82-19-026 (Order 192), § 232-12-011, filed 9/9/82; 81-22-002 (Order 174), § 232-12-011, filed 10/22/81; 81-12-029 (Order 165), § 232-12-011, filed 6/1/81.]

232-12-014 Wildlife classified as endangered species.

Endangered species include:

Common Name	Scientific Name
Pygmy rabbit	Brachylagus idahoensis
Gray wolf	Canis lupus
Grizzly bear	Ursus arctos
Sea otter	Enhydra lutris
Sei whale	Balaenoptera borealis
Fin whale	Balaenoptera physalus
Blue whale	Balaenoptera musculus
Humpback whale	Megaptera novaeangliae
Black right whale	Balaena glacialis
Sperm whale	Physeter macrocephalus
Columbian white-tailed deer	Odocoileus virginianus leucurus
Woodland caribou	Rangifer tarandus caribou
American white pelican	Pelecanus erythrorhynchos
Brown pelican	Pelecanus occidentalis
Peregrine falcon	Falco peregrinus
Sandhill crane	Grus canadensis
Snowy plover	Charadrius alexandrinus
Upland sandpiper	Bartramia longicauda
Spotted owl	Strix occidentalis
Western pond turtle	Clemmys marmorata
Leatherback sea turtle	Dermochelys coriacea
Oregon silverspot butterfly	Speyeria zerene hippolyta
Oregon spotted frog	Rana pretiosa

[Statutory Authority: RCW 77.12.020. 97-18-019 (Order 97-167), § 232-12-014, filed 8/25/97, effective 9/25/97; 93-21-026 (Order 616), § 232-12-014, filed 10/14/93, effective 11/14/93. Statutory Authority: RCW 77.12.020(6). 88-05-032 (Order 305), § 232-12-014, filed 2/12/88. Statutory Authority: RCW 77.12.040. 82-19-026 (Order 192), § 232-12-014, filed 9/9/82; 81-22-002 (Order 174), § 232-12-014, filed 10/22/81; 81-12-029 (Order 165), § 232-12-014, filed 6/1/81.]

WAC 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 forseeable 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.

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

5.1.2 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.

5.1.3 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.

5.1.4 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:

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

6.1.2 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.

6.1.3 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:

7.1.1 Historic, current, and future species population trends.

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

7.1.3 Historic and current habitat trends.

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

7.1.5 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.

8.1.2 The agency will hold at least one public meeting in each of its administrative regions during the public review period.

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.

10.1.1 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.

10.3.1 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.

10.3.2 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:

11.1.1 Target population objectives.

11.1.2 Criteria for reclassification.

11.1.3 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.

11.1.4 Public education needs.

11.1.5 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.

11.2.1 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 five 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.

11.2.2 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.

11.2.3 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.

11.2.4 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:

12.1.1 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.

12.1.2 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 classified as protected are listed under WAC 232-12-011, as amended. [Statutory Authority: RCW 77.12.020. 90-11-066 (Order 442), § 232-12-297, filed 5/15/90, effective 6/15/90.]