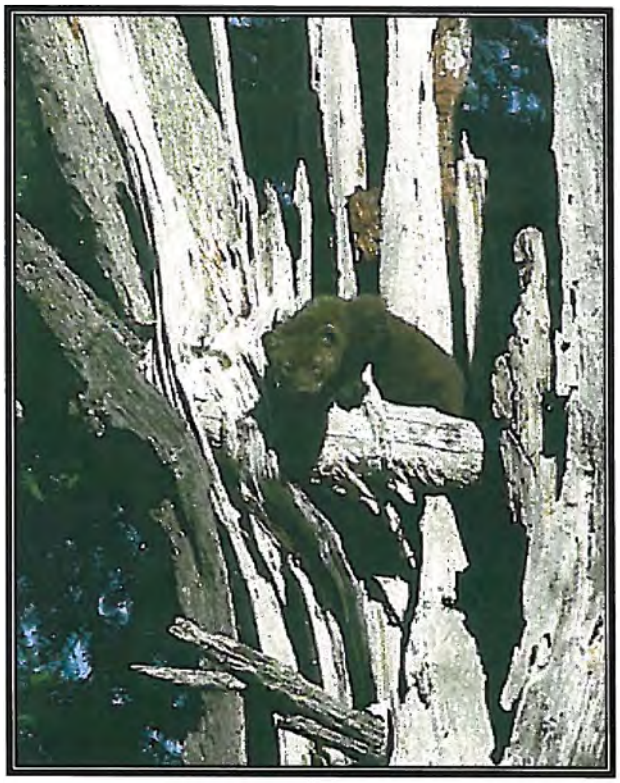
Ecological Characteristics of Fishers in the Southern Oregon Cascade Range

Final Progress Report: June 2002



USDA Forest Service – Pacific Northwest Research Station
Olympia Forestry Sciences Lab
3625 93rd Ave. SW, Olympia, WA 98512

PREFACE

The following is the final progress report on the research activities of the Rogue River Fisher Study being conducted by the Wildlife Ecology Team, USDA-Forest Service, Pacific Northwestern Research Station. The Wildlife Ecology Team is located at the Olympia Forestry Sciences Lab, 3625 93rd Ave. SW, Olympia, WA 98512.

The report and data summaries were prepared by Catherine Raley (Lead Wildlife Biologist). For more information on the Rogue River Fisher study please contact:

Dr. Keith Aubry	**or**	Catherine Raley
360-753-7686		360-753-7686
kaubry@fs.fed.us		craley@fs.fed.us

An abbreviated version of this report, as well as annual reports from past years, can be found on the Olympia Forestry Sciences Laboratory's website under Wildlife Ecology Team: www.fs.fed.us/pnw/olympia

Key to Photographs on Front Cover

Top left: adult female fisher resting in the top of a large snag (T.J. Catton, PNW Research Station).
Top right: adult female fisher that has been immobilized and fitted with a radio-collar (PNW Research Station).
Center right: adult male fisher that has been immobilized; note porcupine quill in jaw area (PNW Research Station).
Bottom left: 5 month old kit at a rest site (T.J. Catton, PNW Research Station).
Bottom right: hind foot of a juvenile female; patches of coarse hair on center pad are associated with glands (PNW Research Station).

Ecological Characteristics of Fishers in The Southern Oregon Cascade Range

Final Progress Report: June 2002

Dr. Keith B. Aubry (Principal Investigator) and Catherine M. Raley (Lead Wildlife Biologist). USDA Forest Service, Pacific Northwest Research Station, Olympia, Washington.

Field personnel during 2001: Timothy J. Catton (Wildlife Technician), Gregory W. Tomb (Wildlife Technician), and Michelle Jeffers (Student Intern).

Cooperators

Partial funding and support for this study were provided by Boise Cascade Corporation, PacifiCorp, Oregon Department of Fish and Wildlife, USDI Fish and Wildlife Service, and the Butte Falls Resource Area of the USDI Bureau of Land Management. Additional support and services have been provided by the Rogue River National Forest, Prospect and Butte Falls Ranger Districts.

Status of Study

We initiated this research study in the spring of 1995 and, except for some minor data collection planned for the spring of 2002, we completed the field-work portion of the project in October 2001. Currently, we are entering field data into a computer database in preparation for conducting analyses on the characteristics of den and rest sites, and home range size.

Study Objectives

Determine the current distribution and conservation status of fishers in Oregon.

Determine whether fishers occurring in the southern Oregon Cascade Range represent a reintroduced or native population.

Investigate the ecological relationships of fishers in the southern Oregon Cascades, with emphasis on determining:

- natal and maternal den site characteristics and associated habitats,
- rest site characteristics and associated habitats,
- effects of stand and landscape composition on habitat use and home range size and shape, and
- food habits.

Potential Benefit or Utility of the Study

Fisher populations in the Pacific States have been petitioned twice in the last 10 years for listing under the Endangered Species Act, and a third petition was delivered to the U.S. Fish and Wildlife Service in November 2000. The Forest Service's Conservation Assessment for Forest Carnivores identifies the Pacific Northwest as an area for which our knowledge of the ecological relations of fishers is almost totally lacking; and during the FEMAT/FSEIS process, the fisher was one of 4 mammal species (excluding bats) that was predicted to have <80% likelihood of maintaining long-term population viability under the Northwest Forest Plan. The few radio-telemetry studies that have been conducted on fishers in California indicate that fishers use large snags, live trees, and logs for birthing, denning, and resting, and are associated with dense-canopied, late-successional forests at relatively low elevations (<1200 m). Until now, however, no radio-telemetry studies of fishers have been conducted in either Oregon or Washington. Because of its rarity and apparent sensitivity to the effects of timber harvesting, the fisher is of significant concern to forest managers in this region. Information on the effects of forest management on fisher habitat at both the stand and landscape scales is urgently needed.

Study Area

Our study area is located in the upper Rogue River drainage on the west slope of the Cascade Range in southern Oregon. Lands within our study area are managed by the Prospect and Butte Falls Ranger Districts of the Rogue River National Forest, the Butte Falls Resource Area of the Bureau of Land Management, Boise Cascade Corporation, PacifiCorp, and other private land-owners. Our study area is primarily within the Mixed-Conifer Zone as described by Franklin and Dyrness (1984); common tree species include Douglas-fir (*Pseudotsuga menziesii*), true firs (*Abies grandis-A. concolor* species complex), Ponderosa, sugar, and western white pines (*Pinus ponderosa, P. lambertiana, P. monticola*), incense cedar (*Calocedrus decurrens*), western hemlock (*Tsuga heterophylla*), and golden chinquapin (*Castanopsis chrysophylla*). Within our core study area, elevations range from about 610-1,830 m (2,000-6,000 ft).

Research Accomplishments 1 January - 31 December 2001

1. Between November 2000 and mid-March 2001, we captured and radio-collared 3 juveniles (2 females and 1 male). We captured both of the juvenile females prior to dispersal, which typically starts in February. One of the juvenile females did not disperse from her natal area. The second juvenile female made her first long-distance movement away from her natal area in early February, and we located her as far as 26 km from her original trap location. Eventually, her movements settled in an area roughly 6 km NW of her original capture location. We captured the juvenile male in early March, thus he may have already left his natal area before we radio-collared him. However, by mid-April he had traveled as far as 28 km south of his capture location, and by the end of the year his movements appeared to settle in an area about 25 km SW of his original capture site.

2. Using fixed-wing aircraft, we monitored the movements of 2 radio-collared adult males during the 2001 breeding season. We located males, on average, every 3.8 days from early

February thru late April. During this 12 week period, the oldest male (≥6 years old) covered 10,060 ha (100.6 km^2; 100% minimum convex polygon [MCP]) and moved primarily within his nonbreeding-season territory with some excursions beyond his typical activity areas. The younger male (a 3-yr old that we have radio-tracked since he was a juvenile) covered 22,618 ha (226.18 km^2; 100% MCP) and made excursions far to the south of his nonbreeding-season territory. The maximum distance between successive locations (i.e., straight-line mapping distance which is less than the actual distance traveled by an animal) was 22.2 km for the older male and 17.6 km for the younger male. In both cases, these movements were made within 48 hours. The average distance between successive locations was 7.1 km for the older male and 5.7 km for the younger male.

A third adult male died in early February, thus we were unable to collect data on his activities during the 2001 breeding season. This male was at least 7 years old (originally captured in August 1995). Dr. Stan Snyder, at Oregon State University's Veterinary Diagnostic Laboratory, performed a necropsy and determined that the male died of a malignant testicular tumor that had metastasized into the left kidney and ureter, liver, spleen, and pelvic cavity.

3. Two out of 4 radio-collared adult females were reproductive during 2001. One of the females raised at least 1 kit (i.e., only 1 kit was ever seen with the female at any given time). The second reproductive female was killed when her kits were about 8-weeks old (died from a gun shot wound to the left front leg). We retrieved her 2 kits from the natal den site and turned them over to the Oregon Department of Fish and Wildlife (ODFW) for placement in a wildlife rehabilitation facility. The rehab facility kept the kits until they were about 6 months old, at which time the ODFW released the kits back into their natal area. Several days before the release date in mid-October, we ear-tagged both of the juveniles, but only the female was close enough to adult size and weight to be fitted with a radio-collar (male juveniles continue to grow during the fall and early winter). ODFW personnel monitored the juvenile female and, in early January 2002, located her slipped radio-collar in a log.

4. During FY 2000, in collaboration with Drs. Samantha Wisely and Steven Buskirk of the University of Wyoming, we conducted genetic analyses of tissue samples collected from 18 of our study animals and 2 adult males that were trapped incidentally in the Siskiyou Mountains in southern Oregon (about 75 km southwest of our study area). For these analyses, we screened non-coding (microsatellite) DNA for 7 polymorphic loci. In 2001, we expanded the analyses to include 8 new animals from our study area, and 2 additional polymorphic loci.

5. We completed collection of telemetry data and habitat sampling at den and rest sites in October 2001. Currently, we are completing data entry and conducting preliminary analyses on home range size and characteristics of den and rest sites. Additionally, we are still monitoring several reproductive females this spring (2002) to gather additional data on natal den characteristics

Summary of Research Findings 1995 - 2001

Because we have not completed data entry, and are still collecting additional data on natal dens, the results and summaries presented here are preliminary and should be used cautiously.

1. We captured 22 individuals (13 females and 9 males) since we initiated the study in March 1995 (Figure 1). We ear-tagged all animals and during the process collected a small sample of ear tissue for genetic analyses. We radio-collared 21 fishers and were able to collect telemetry data for 20: we did not collar 1 adult male because he was captured near the end of the study, and 1 juvenile female slipped her collar before we could collect any data.

   Similar to other mustelid species, male fishers are larger than females. The average weight of adults captured during this study was 5.9 kg for males and 2.85 kg for females ($n = 7$ and $n = 9$, respectively). Juvenile females appear to reach adult size and weight sooner than juvenile males. The average weight of 7-9 month old juvenile females was only 0.27 kg less than an adult female (2.58 kg, $n = 4$), whereas the average weight of 8-month old juvenile males was 1.52 kg less than an adult male (4.38 kg, $n = 2$). Even at 11 months of age, juvenile males still weighed about 1 kg less than an average adult male (4.95 kg, $n = 2$).

2. All of the male fishers that we captured, both adults and juveniles, had evidence of interactions with porcupines (i.e., porcupine quills embedded in their skin, or quills in scats that were collected from trap boxes), and we identified several porcupine kill sites while radio-tracking males. We found no evidence that female fishers prey on porcupines. These results, however, are not conclusive as we have yet to analyze scats collected from den and rest sites. Scat analyses will be conducted during the summer and fall of 2002.

   We identified the following prey species from remains collected at den and rest sites: snowshoe hare, brush rabbit, California ground squirrel, Douglas' squirrel, northern flying squirrel, woodrat (probably dusky-footed), opossum, striped skunk, porcupine (male fishers only), bobcat (killed by an adult male fisher), deer, elk, Stellar's jay, pileated woodpecker, hairy woodpecker, common flicker, ruffed grouse, turkey (apparently killed by an adult female), berries, and yellow jackets.

3. We have collected >1600 telemetry locations: 51% at rest sites, 6% at den sites, 32% active locations, and 11% aerial locations. Typically, we only used aircraft to collect data on long-distance movements by dispersing juveniles and adult males during the breeding season, and on occasion, to locate an animal we could not find using ground-based telemetry. On the ground, we did not use triangulation methods to determine animal locations; instead, we located resting animals by walking-in and isolating their signal to a specific structure (e.g., tree, log). We tracked active animals by walking-in and circling around their signal until we could pinpoint their location to an area $\leq$0.4 ha (1 acre) in size. Using these methods we were able to collect measurements on structures used for resting, and better determine habitat types used for resting, hunting, and traveling.

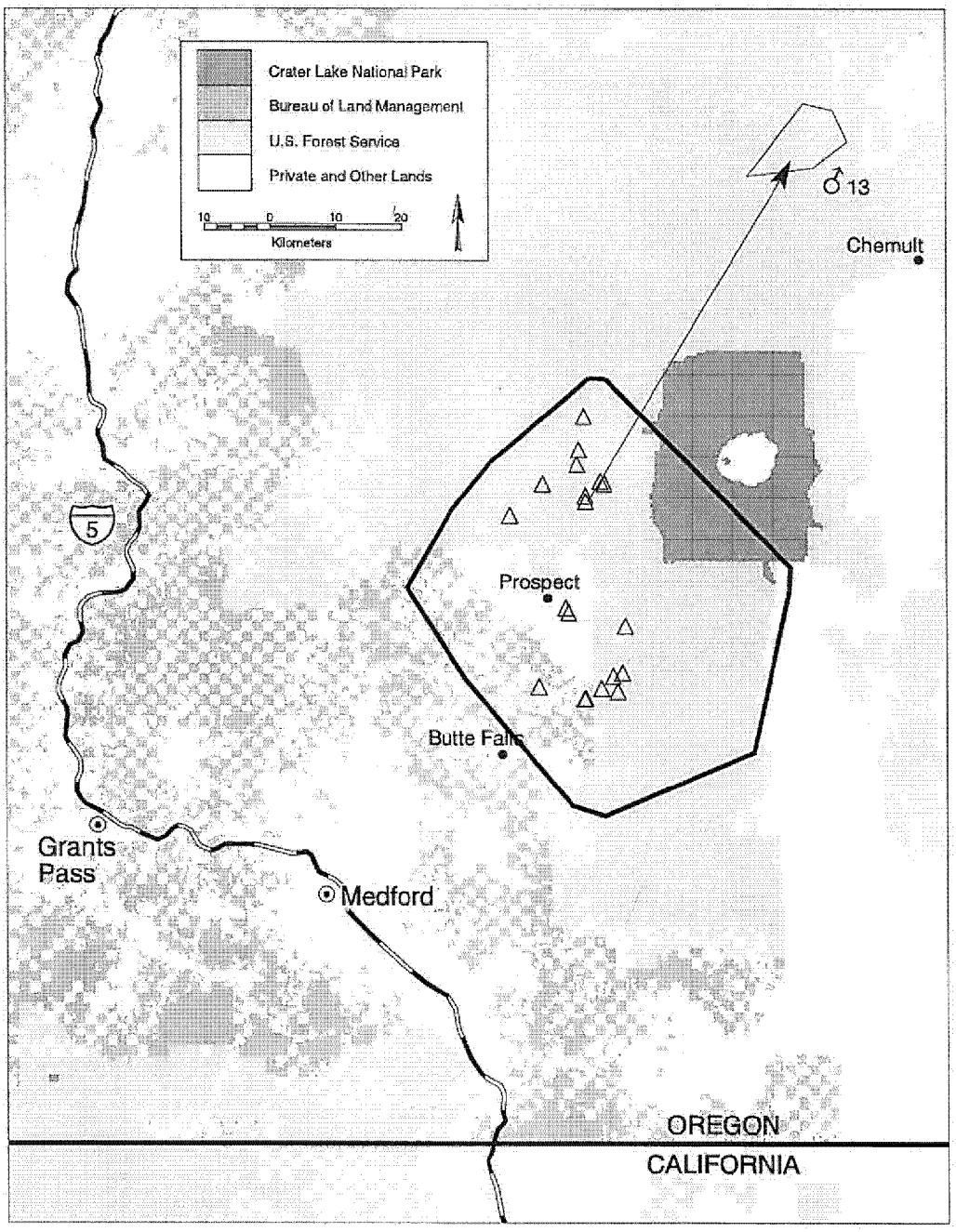


Figure 1. Open triangles are trap sites where 22 fishers were captured during the Rogue River Fisher Study in the southern Oregon Cascade Range, 1995-2001 (several animals were captured at the same site but at different times). The polygon (thick solid line) is the geographic extent of telemetry locations for fishers that were radio-tracked ($n = 20$) except for 1 juvenile male (#13) that dispersed ~55 km to the Big Marsh area on the Deschutes National Forest. The polygon represents ~2,331 km^2 (900 mi^2).

4. Because we monitored adult and juvenile fishers year-round, we have been able to document the timing of various activities associated with reproduction and juvenile dispersal (Figure 2).

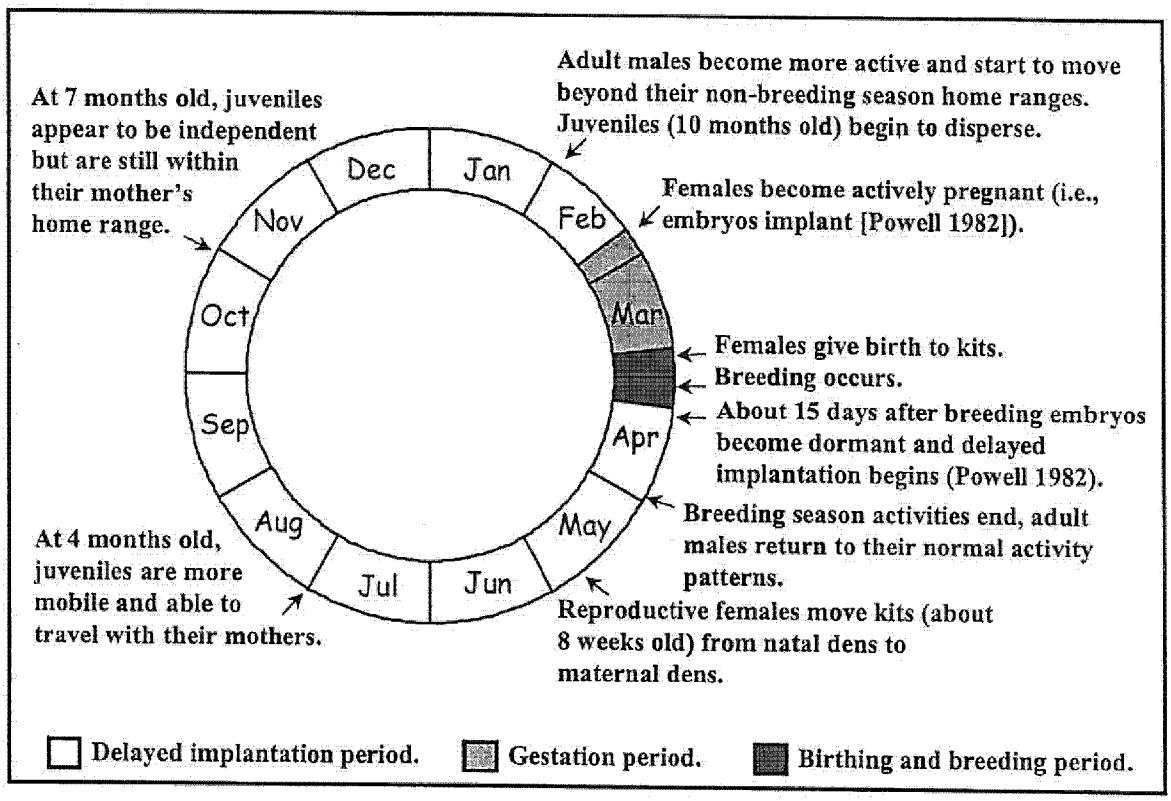


Figure 2. Seasonal activity of fishers in the southern Oregon Cascade Range. Timing of events is based on field observations of radio-collared adult and juvenile fishers from 1995 to 2001; length of gestation and delayed implantation periods are from Powell (1982).

We monitored 2-4 adult females each year from 1995 to 2001; 59.4% of the adult females gave birth to kits, but the average annual reproductive success was only 44%. We concluded that a female was reproductively successful if she had kits that survived into June (kits >2 months old). We observed litter sizes of 1-3 kits; however, litters of 3 were rare in our study area and in none of those cases did all 3 kits survive beyond ~2 months of age.

5. We have documented 7 juvenile dispersals (4 females and 3 males). Juvenile males dispersed further ($\bar{x}$ = 29 km) than juvenile females ($\bar{x}$ = 6 km), supporting the hypothesis of male-biased dispersal in fishers. Two of the 4 female juveniles did not disperse from their natal areas; these females appeared to establish home ranges adjacent to and slightly overlapping their mother's home range.

6. We used the computer program CALHOME to calculate 95% minimum convex polygon (MCP) home ranges for adult male and female fishers. Our estimates of home range size are

preliminary and may change during future analyses if we use a different estimator (e.g., adaptive or fixed kernel estimator) or different time periods.

In our study area, fishers begin to exhibit breeding behavior in February (Figure 2) thus, we considered 1 February thru 31 January of the following year to represent 1 annual cycle. However, because adult males typically ranged over a much greater area during the breeding season (presumably to search for receptive females), we used different criteria to describe the home ranges of adult males and females. We calculated female home ranges on an annual basis (1 February – 31 January), whereas we split male annual home ranges into breeding (February 1 – April 30) and non-breeding (1 May – 31 January) seasons. The average 95% MCP annual home range size for females was ~25 km^2 ($n = 7$). Male home ranges were substantially larger: ~147 km^2 ($n = 3$) during the breeding season, and ~62 km^2 ($n = 4$) during the non-breeding season.

We did not include 3 adult fishers (2 males and 1 female) in estimates of home range size. Two males captured during the breeding season of 1996 did not have home ranges within our core study area. One of the males (#05) resided on the east side of the Cascade Crest during the non-breeding season and returned to our core study area each breeding season from 1996 to 1998. The second male (#06) resided to the southeast of our core study area and used areas on both the west and east-side of the Crest during the non-breeding season. Because of their wide-ranging movements beyond our core study area, we did not collect enough data to calculate reliable estimates of home range size. An adult female captured in November 2000 did not appear to have an established home range. We suspect that she may have been displaced and was exploring areas in an effort to establish a new home range. She traveled as far as 15 km north of her capture location and by late March 2001 settled in an area ~8 km south of her original capture site.

7. We identified 14 natal dens and 18 maternal dens. Natal dens are sites where females give birth to kits and nurse them until weaning at about 8 weeks of age. Maternal dens are sites used by adult females and kits during the period when kits are still dependant on the female for food, which lasts until late August or early September when the kits are about 5 months old. However, by August kits are becoming more independent and may start catching prey on their own. Thus, we used the following criteria to distinguish between maternal dens and rest sites: (1) from the time a female moves her kits from the natal den through July 31, we classified a site as a maternal den if the female exhibited site fidelity for $\geq$2 days, kits were seen or heard, or we found multiple scats and prey items at the site indicating prolonged use; 2) after July 31, we classified sites used by a female and her kits as rest sites.

For natal dens, adult female fishers used live ($n = 8$) or dead ($n = 6$) trees with openings that accessed hollows created by heartwood decay. Most of the openings used appeared to have been excavated by pileated woodpeckers (8/14); other openings included knot holes and small cracks in the bole. Natal den trees need to be fairly large to accommodate a cavity large enough for an adult female and kits. Of the natal den trees measured thus far ($n = 12$), the average dbh was 93 cm (range = 61–138 cm). Height of the cavity-opening may also be important for protection from potential predators; the average height of cavity-openings was

16.2 m (range = 4 – 46.5 m).

Sites used as maternal dens were more variable than those used as natal dens (Table 1), and included cavities in the lower bole or butt of live and dead trees, and large (>50 cm dbh) hollow logs.

Table 1. Characteristics of 18 maternal dens used by 4 female fishers in the southern Oregon Cascade Range, 1995-2001.

	Live trees $n = 8$	Snags $n = 5$	Logs $n = 5$
Woodpecker cavity	2	1	
Natural cavity	3	3	5
Cavity formed between bole of tree and sloughing bark		1	
Mistletoe broom	2		
Rodent nest	1		

We identified 2 additional sites used by adult females and kits in August and September, but we classified these as rest sites, not maternal dens. Tree species commonly used for natal and maternal dens included Douglas-fir, incense cedar, and true firs (Table 2).

Table 2. Tree species used for denning by 6 female fishers in the southern Oregon Cascade Range, 1995-2002.

	Natal dens $n = 14$		Maternal dens $n = 18$		
	live trees	snags	live trees	snags	logs
Douglas-fir	1		5	2	2
Incense cedar	3	1	2	1	2
White/grand fir	1	2	1	2	1
Western white pine	1	2			
Golden chinquapin	1	2			

8. We located 654 individual rest sites (Tables 3 and 4). Male fishers primarily used live trees for resting (190/270) and, to a much lesser extent, logs (42/270) and snags (16/270). Most of the female rest sites were also in live trees (224/384), but females used snags (74/384) more often than males did.

   In live trees, both female and male fishers used mistletoe brooms as resting platforms more than any other platform or micro-site. We verified use of mistletoe brooms as resting platforms for 22% of the live-tree resting sites (animal was seen) and suspected use for an additional 38% of the sites (animal was not seen but mistletoe brooms were the only obvious structures present). Rust brooms (caused by rust fungi) are not common in our study area; however, we documented 1 use of a rust broom in a live red fir tree. We verified use of rodent nests as resting platforms in 14% of the live trees used by male fishers, and suspected use in another 15%; however, one male accounted for 55% of these observations. Additionally, females used rodent nests in live trees only 5% of the time, suggesting that use of these structures may be related to different habitat conditions within the home ranges of 1-2 males. Limb clusters were the next most commonly used resting platform by both females and males (10% of all live trees used).

Table 3. Structures identified as resting sites for female (n= 12) and male (n=7) fishers in the southern Oregon Cascade Range, 1995-2001.

	% of total by sex					Total number of structures identified
	Live trees	Snags	Logs	Cull piles	Miscellaneous[1]	
Females	59	19	15	2	5	384
Males	70	6	16	3	5	270

[1] Includes rootwads, dense brush, natural and cut stumps, and rock outcrops.

Table 4. Species of live trees, snags, and logs used for resting sites by 12 female and 7 male fishers in the southern Oregon Cascade Range, 1995-2001.

Structure type by sex	% of total for each structure type by sex						Number of structures
	Douglas-fir	Western hemlock	White/Grand fir	Incense cedar	Sugar pine	Miscellaneous[1]	
Live trees:							
Females	73	14	6	3	0	4	224
Males	37	31	26	0	0	6	190
Snags:							
Females	31	1	31	16	17	4	74
Males	69	6	13	6	0	6	16
Logs:							
Females	35	3	16	12	12	22	58
Males	40	0	17	21	5	17	42

[1] Includes lodgepole, Ponderosa, and western white pines, red fir, Engelmann spruce, golden chinquapin, madrone, Pacific yew and, for some snags and logs, unidentified species due to advanced decay conditions.

9. Each time an animal was located at a den, rest, or active site, observers made a visual determination of forest conditions within 0.4 ha (1 acre) around the animal's location. Overall, females were found in patches of unmanaged forest more frequently than males (Table 5). Males appeared to use a wider array of habitat conditions when resting or active compared to females.

Table 5. Assessment of general habitat conditions within 0.4 ha (1 acre) around radio-telemetry locations of female and male fishers in the southern Oregon Cascade Range, 1995-2001.

	Females			Males	
Habitat category	Den locations $n = 32$	Resting locations $n = 489$	Active locations $n = 274$	Resting locations $n = 342$	Active locations $n = 260$
Unmanaged forest [1]	56%	63%	40%	25%	25%
Managed forest: [2]					
1-33% of overstory trees removed	13%	8%	6%	5%	8%
34-66% of overstory trees removed	13%	6%	9%	7%	6%
>66 overstory trees removed	12%	8%	17%	14%	13%
Managed second-growth forest: [3]					
10-25 cm dbh trees	3%	4%	5%	23%	6%
26-50 cm dbh trees	3%	10%	21%	23%	36%
51-75 cm dbh trees	0	<1%	1%	1%	0
Non-forested habitats [4]	0	1%	1%	2%	6%

[1] No evidence of any past timber harvesting within 0.4 ha around location. Stand age varies from young to older forests.
[2] Some timber harvesting has occurred but the original forest has not yet been completely replaced.
[3] Areas that have a longer history of timber management and the original forest has been replaced.
[4] Includes wet meadows and upland shrub habitat conditions.

The category "unmanaged forest" only indicates that there was no evidence of timber harvesting and does not represent any particular age of forest. Additionally, these data represent use of general habitat categories at a small scale (0.4 ha), and should not be interpreted to indicate habitat selection. For example, we rarely located fishers in patches of managed second-growth forest with trees 51-75 cm dbh. However, we know that these habitat conditions are uncommon in our study area, therefore lack of use by fishers may merely reflect the scarcity of such patches. Likewise, frequent locations of female fishers in unmanaged patches may reflect the abundance of this habitat condition within female home ranges. These questions will be addressed when we begin analyses of habitat use vs. availability.

We will be conducting analyses of habitat use vs. availability at both the stand and landscape

scales. For stand-level analyses we will use detailed habitat data collected at den and rest sites and random points. These data include species composition and density of live trees, snags, and logs, canopy closure, cover by understory vegetation, and site characteristics such as elevation, slope, and aspect. We will use classified satellite imagery for landscape-level analyses.

10. In collaboration with Drs. Samantha Wisely and Steven Buskirk of the University of Wyoming, we conducted genetic analysis of tissue samples collected from 18 of our study animals (5 adult and 3 juvenile males, and 6 adult and 4 juvenile females) and 2 adult males that were trapped incidentally in the northern Siskiyou Mountains of southwestern Oregon (about 75 km southwest of our study area). We screened non-coding (microsatellite) DNA for polymorphic loci using PCR (polymerase chain reaction) on 19 primers developed for American marten, mink, ermine, badger, and black bear; 9 loci were polymorphic for our sample of fishers.

    Previous analyses of historical records, distribution patterns, and haplotype frequencies in mitochondrial DNA showed that fishers in the southern Oregon Cascade Range (our study area) represent a reintroduced population that may be geographically isolated from fishers occurring in the northern Siskiyou Mountains. Our microsatellite analyses show that fishers in these 2 areas are genetically distinct: the 2 male fishers from the Siskiyou Mountains in southwestern Oregon were homozygous at 2 loci for alleles that did not occur among fishers from the Oregon Cascade Range, and at a third locus, were homozygous for an allele that was rare among the fishers from our study area (Table 6).

    We used microsatellite genotypes to examine all potential parental relationships among the adult animals captured during the study. There was only 1 possible parent-offspring relationship among the adult males in our study area; in contrast, many potential parental relationships were possible among adult females. These results, along with our telemetry data on juvenile dispersal, provide evidence of male-biased juvenile dispersal and female philopatry in fishers; i.e., females are more likely to be related than males because they are more likely to establish home ranges in proximity to their close relatives and breed with them.

Table 6. Allele combinations present at 3 loci in tissue samples collected from 18 fishers in the southern Oregon Cascade Range study area and 2 fishers incidentally trapped in the northern Siskiyou Mountains of southwestern Oregon.

	Mvis 002[1]	Mvi 39[b]	Mer 041[2]
Southern Oregon Cascade Range	220-220 220-228 228-228	142-144 144-144	175-177 177-177 177-179 177-181
Northern Siskiyou Mountains	224-224	152-152	181-181

[1] Primers developed for *Mustela vison* (Mvis002) and *Mustela erminea* (Mer041) by Fleming et al. (1999).
[2] Primer developed for *Mustela vison* by O'Connell et al. (1996).

Research Plans for 2002

1. For females that still have operating radio-collars, determine reproductive status and collect additional data on any natal dens located.

2. Complete data entry and preliminary analyses on den and rest site characteristics and home range size.

3. Complete analysis of scats collected at den and rest sites.

4. Complete additional genetic work that will expand the analyses conducted in 2000 from 18 fishers and 7 polymorphic loci to 26 fishers and 9 polymorphic loci.

Publications and Presentations 1 January 2001 – 31 May 2002

Publications:

Aubry, K.B., S.M. Wisely, C.M. Raley, and S.W. Buskirk. *In review.* Zoogeography, spacing patterns, and dispersal in fishers: insights gained from combining field and genetic data. *In* D. J. Harrison, A. K. Fuller, and G. Proulx, editors. Proceedings of the 3rd International *Martes* Symposium: Ecology and management of *Martes* in human altered landscapes. Corner Brook, Newfoundland. Publisher unknown.

Aubry, K.B. and J.C. Lewis. *In review.* Extirpation and reintroduction of the fisher in Oregon: implications for its conservation in the Pacific states. Conservation Biology.

Drew, R.E., J.G. Hallett, K.B. Aubry, K.W. Cullings, S.M. Koepf, and W.J. Zielinski. *In review.* Conservation genetics of the fisher (*Martes pennanti*) based on mitochondrial DNA-sequencing. Molecular Ecology.

Presentations:

Raley, C.M. and K.B. Aubry. 2002. Fisher ecology in southwestern Oregon: an ongoing field study near Crater Lake. Symposium on Forest Carnivores, Annual Meeting of the Society for Northwestern Vertebrate Biology. April 3-5, 2002. Hood River, OR. This talk was also presented by **C.M. Raley** at the Western Forest Carnivore Committee Meeting. May 1-2, 2002. Spokane, WA.

Aubry, K.B. and J. C. Lewis. 2002. Decline and reintroduction of the fisher in Oregon: implications for its conservation in the Pacific states. Symposium on Forest Carnivores, Annual Meeting of the Society for Northwestern Vertebrate Biology. April 3-5, 2002. Hood River, OR. This talk was also presented by **J.C. Lewis** at the Symposium on Forest Carnivores, Joint Annual Meeting of the Northwest Section and Washington Chapter of The Wildlife Society. April 17-19, 2002. Spokane, WA; and by **K.B. Aubry** at the Western Forest Carnivore Committee Meeting. May 1-2, 2002. Spokane, WA.

Buskirk, S.W., K.B. Aubry, **S.M. Wisely**, G.A. Russell, and W.J. Zielinski. 2002. Population genetic structure of the fisher (*Martes pennanti*) in the western contiguous United States: progress on a study using microsatellite DNA markers. Symposium on Forest Carnivores, Joint Annual Meeting of the Northwest Section and Washington Chapter of The Wildlife Society. April 17-19, 2002. Spokane, WA.

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Personnel from the Rogue River National Forest for assistance with administrative services, aviation planning, equipment and field work (remote cameras, snow machines, vehicles, trapping), GIS needs, housing of field crews, and office space (especially Jim Goode, Jeff von Kienast, Fred Wahl, Amanda McKinnis, Phil Cardin).

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The Chemult Ranger District of the Winema National Forest and the Crescent Ranger District of the Deschutes National Forest for their cooperation and assistance in locating and monitoring a juvenile male fisher that dispersed from our study area in 1999.

Jeff Lewis for initiating and conducting all of the trapping efforts in 1995.

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