Olympic Fisher Reintroduction Project: 2008 Progress Report

Prepared in cooperation with the U. S. Geological Survey

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Photo by Coke Smith

The 2008 progress report is a summary of the reintroduction, monitoring, and research efforts undertaken during the first year of the Olympic fisher reintroduction project. Jeffrey C. Lewis of Washington Department of Fish and Wildlife, Patti J. Happe of Olympic National Park, and Kurt J. Jenkins of U. S. Geological Survey are the principal investigators of the monitoring and research program associated with the reintroduction.

Disclaimer

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Background

Historically, the fisher (*Martes pennanti*) occurred throughout much of the coniferous forests of Washington. However, the fisher was extirpated from Washington within the last century, largely as a result of historical, unregulated trapping and loss of forests in older age-classes at low and mid-elevations. A status review completed in 1998 by the Washington Department of Fish and Wildlife (WDFW; Lewis and Stinson 1998) documented these findings and prompted the listing of the fisher as a state endangered species by the Washington Fish and Wildlife Commission in October of 1998. The fisher was also listed as a federal candidate species by the U. S. Fish and Wildlife Service after the proposed listing of its west coast population as endangered was deemed warranted but precluded by higher-priority listing activities (U. S. Fish and Wildlife Service 2004).

The listing of the fisher in Washington prompted considerable interest in restoring the species to its historical range within the state, as well as the development of a fisher recovery plan (Hayes and Lewis 2006). Recovery efforts throughout much of the fisher's North American range have relied heavily on reintroductions and the fisher has proven to be one of the most successfully reintroduced carnivores (Berg 1982, Powell 1993, Breitenmoser et al. 2001, Lewis 2006). Due to the extirpation of fishers, the lack of nearby fisher populations to support recovery through recolonization, and the past success of reintroductions elsewhere, efforts to restore fishers in Washington focused on reintroductions (Hayes and Lewis 2006).

A reintroduction feasibility study was initiated in 2002 by WDFW and Conservation Northwest, a non-profit conservation organization. The study concluded that fishers could be successfully reintroduced to the Olympic Peninsula and to the Cascades of Washington (Lewis and Hayes 2004), and that the most suitable location for a reintroduction was within Olympic National Park (ONP). Biologists with ONP had long been interested in the status of fishers in the Park. The preliminary results of the feasibility study prompted ONP to join the reintroduction partnership with WDFW and Conservation Northwest. Ultimately, WDFW and the National Park Service (NPS)

developed a reintroduction implementation plan (Lewis 2006), and an environmental assessment/reintroduction plan (National Park Service et al. 2007) pursuant to the National Environmental Policy Act. With the approval of the environmental assessment and reintroduction plan by the NPS, and with other coordination and preparations in place, the proposed reintroduction was initiated in the fall of 2007.

The intent of the Olympic fisher reintroduction project is to reestablish a self-sustaining population of fishers on the Olympic Peninsula. To achieve this goal, 100 fishers will be reintroduced to the Olympic Peninsula over three years. An important part of the reintroduction process is the implementation of a monitoring and research program, which will evaluate reintroduction success, inform the adaptive management process, and investigate key biological and ecological traits of the reintroduced fisher population. WDFW and ONP are the co-leads for the reintroduction efforts, while WDFW, U. S. Geological Survey (USGS) and ONP are the leads for the research and monitoring program associated with the reintroduction. In this report, a preliminary summary is provided of the progress made during the first year (Fall 2007 – Fall 2008) of the 3-year reintroduction, monitoring, and research project.

Acknowledgments

Reintroduction planning and implementation depended on the assistance of the British Columbia Ministry of Environment, who supported our efforts to undertake a translocation of British Columbia fishers to the Olympic Peninsula. Members of the British Columbia Trappers Association from central British Columbia captured fishers for the reintroduction.

Funding for the project has come from a number of sources including the U. S. Geological Survey, U. S. Fish and Wildlife Service, Washington Department of Fish and Wildlife, Doris Duke Foundation and the Wildlife Conservation Society, National Park Service, and Washington's National Parks Fund.

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Progress to Date

Preliminary planning for the Olympic fisher reintroduction project was initiated in early 2007 to obtain and transport fishers from British Columbia, develop a contract with a trapping coordinator/captive facility manager, and coordinate release and monitoring approaches. Final planning and coordination did not occur until November 2008, after the National Environmental Policy Act process was completed. In year 1 of the project, 18 fishers were successfully captured, transported to Washington, and released in ONP. These fishers were monitored for approximately 10 months and the data collected over this period will be used to evaluate the success of the reintroduction.

Reintroduction Process

There were four main aspects of the reintroduction process: (1) the capture, housing, and care of fishers; (2) the preparation of fishers for reintroduction; (3) transporting fishers to Washington; and (4) releasing fishers in ONP.

A private organization was contracted by the project to coordinate trapping activities with British Columbia trappers, provide a facility for housing captive fishers, care for captive fishers, and assist with processing fishers for reintroduction. The contractors instructed and assisted participating British Columbia trappers, and obtained captured fishers from these trappers. During year 1 of the project, trapping began on 4 December, 2007 and continued until 29 February 2008. The contractors brought captured fishers to the captive facility, placed fishers in individual housing units (Figure 1), and provided care for each fisher. Care included the provision of straw bedding, a litter box, ad libitum water, and a diet that promoted weight-gain, which consisted of venison, beaver meat, road-killed snowshoe hares and squirrels, eggs, and hamburger.

The captive facility had the capacity to hold 18 fishers. Consequently, when the number of captive fishers reached 12, arrangements were made to process and transport captive fishers to the Olympic Peninsula before exceeding the capacity of the facility. Processing fishers for translocation involved chemically immobilizing each fisher, evaluating its

health and condition, vaccinating it for distemper and rabies, treating it for ectoparasites and endoparasites, taking measurements and photos, obtaining tissue samples, and equipping it with a pit-tag and a radio-collar (see processing data form in Appendix 1). Three male fishers had radio-transmitters surgically implanted in their abdomens instead of being equipped with a radio-collar. The processing team included biologists from WDFW, USGS and NPS; the British Columbia Ministry of Environment veterinarian; a local veterinarian; volunteers, and the contractors. The team veterinarians provided a health certificate for all healthy fishers to allow their export from British Columbia to Washington.

Figure 1. Each fisher was placed in a housing unit, which includes an enclosed plywood box, an attached wire run, and a stand. A fisher transport box is located underneath the housing unit in this photo.

Specialized plywood boxes were designed and built to transport fishers (Figure 1). Food, water, and bedding were placed in each of these transport boxes, and each transport box was secured in the bed of a pick-up truck with a canopy for the 10-12 hour drive to Port Angeles, Washington. Three pieces of documentation were required to import fishers into Washington: a health certificate completed and signed by the attending veterinarian,

an exportation permit from the British Columbia Ministry of Environment, and a declaration of wildlife importation approved by the U. S. Fish and Wildlife Service. At the Sumas, Washington border crossing, inspectors with the U. S. Fish and Wildlife Service and Department of Homeland Security reviewed permits and passports, and conducted a momentary inspection of the trucks and cargo. Upon arriving at Port Angeles, each fisher was given more water and food, and was kept in its transport box until it was released the next morning. Fishers were released at pre-determined sites within ONP, typically in groups of two (male and female) or three (male and 2 females).

Eighteen fishers (12 females: 6 males) were captured in central British Columbia (Figure 2; Appendix 2). Each was healthy and suitable for reintroduction in Washington. These 18 were processed for reintroduction, transported, and released in two groups. A group of 12 was processed on 24 and 25 January 2008, and a group of six was processed on 29 February 2008. One female processed on 25 January was kept in captivity for surgery and treated for an infection. She was subsequently radio-collared on 29 February and was transported to Washington with the six fishers processed on 29 February.

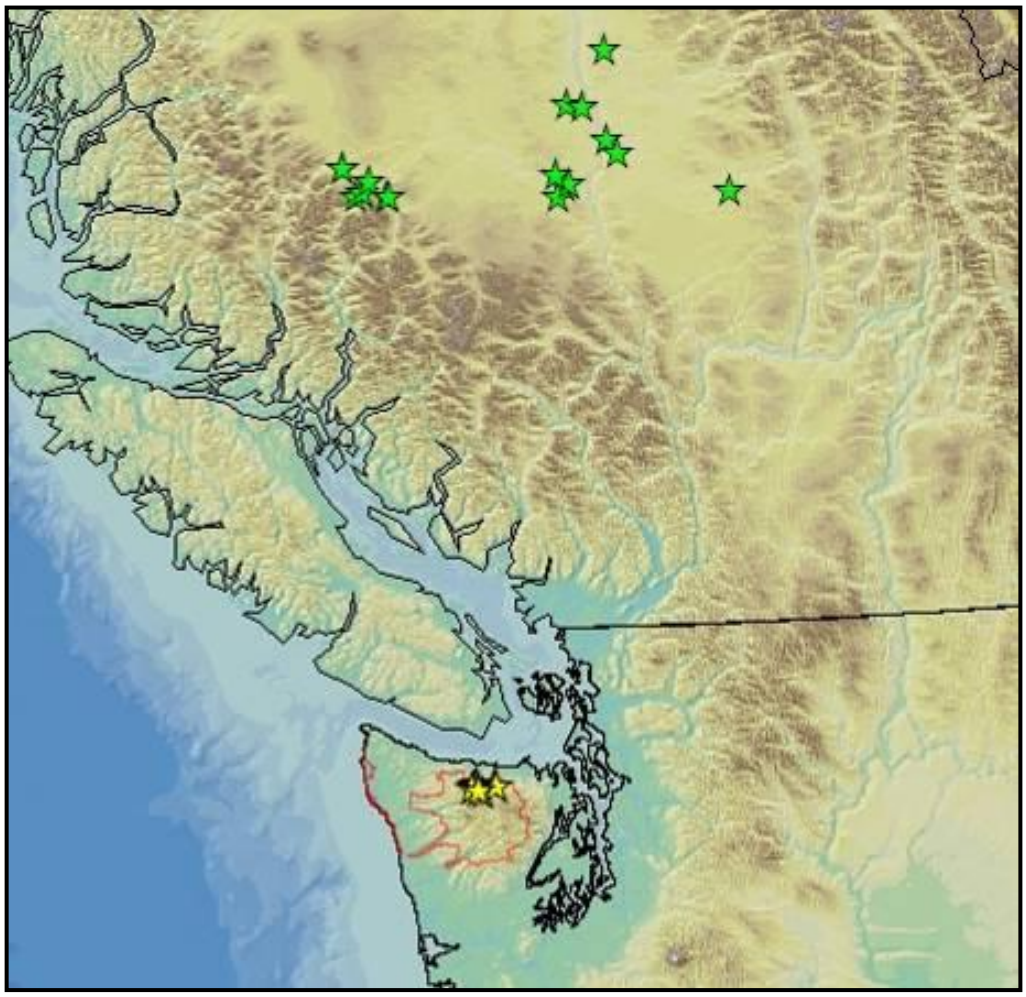

Figure 2. Capture (green) and release (yellow) locations for 18 fishers released in Olympic National Park in January and March of 2008.

On 26 January, 2008, 11 fishers (6 females and 5 males) were transported to Port Angeles, Washington and released on 27 January, 2008 at five locations in ONP (Figure 3). On 1 March, 2008, seven fishers (6 females and 1 male) were transported to Port Angeles and released on 2 March, 2008 at three locations in ONP (Figure 3).

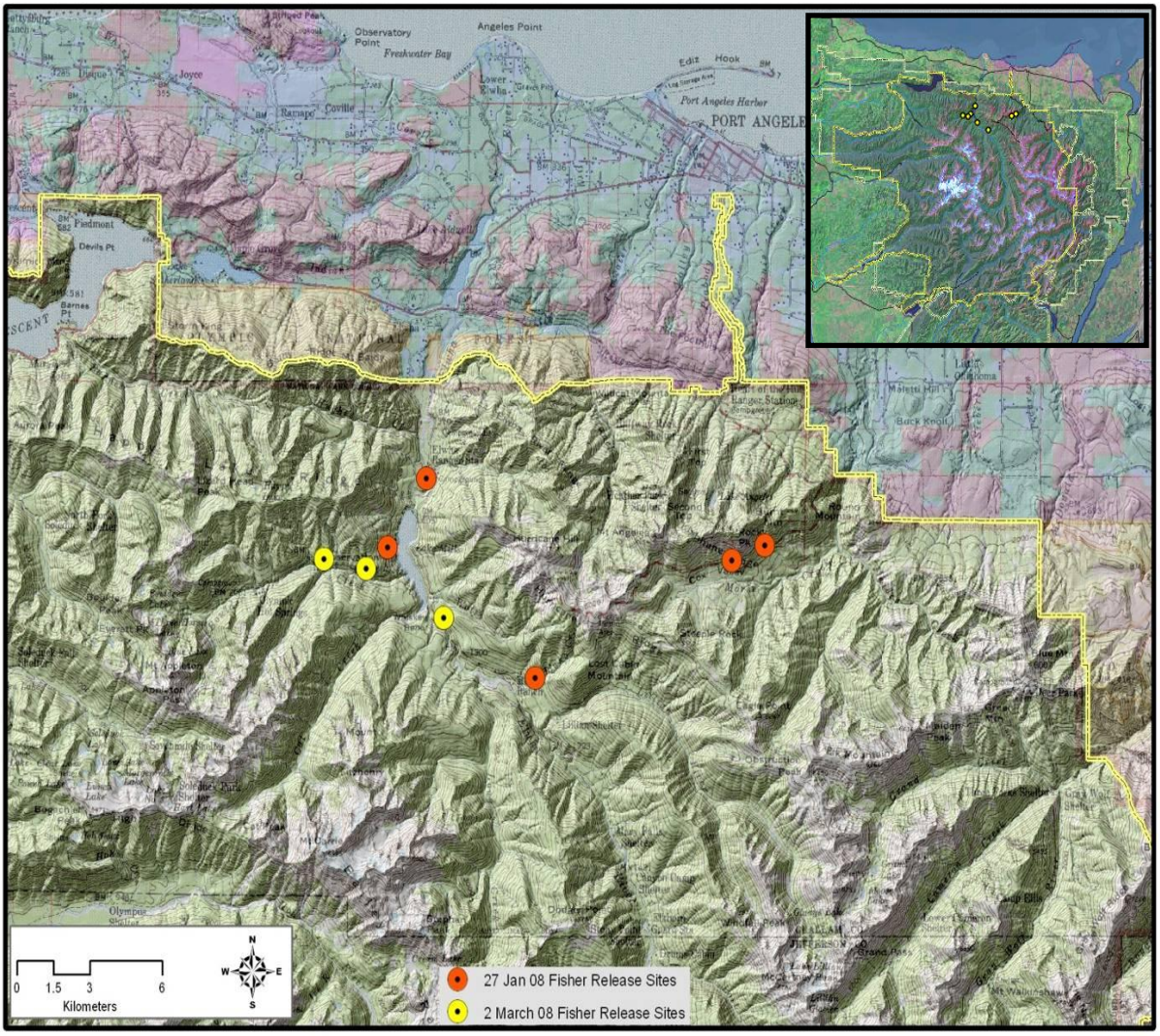

Figure 3. Release locations for fishers on 27 January, 2008 (11 fishers) and 2 March, 2008 (7 fishers) in the Elwha River drainage and along Hurricane Ridge Road in Olympic National Park. Inset illustrates the release site locations in relation to the entire extent of the Park.

Reintroduction Success Monitoring

Monitoring efforts in year 1 of the project focused on evaluating four measures of reintroduction success: movements, survival, home range establishment and reproduction. Because most of the released fishers were in areas that were relatively inaccessible to ground or vehicle-based telemetry, aerial telemetry has provided the bulk of the data for evaluating reintroduction success. Because of our reliance on aerial

telemetry, the consistent collection of relocation data is made difficult by inclement weather and poor flying conditions. While an attempt is made to locate each fisher every week, the goal is to locate each fisher no less than once per month. Locations have been obtained for more accessible individuals via ground telemetry, which will be instrumental for evaluating fisher food habits and investigating habitat selection at rest site and den site scales.

Movements

An assessment of fisher movements was important to determine if the features of the Olympic Peninsula presented barriers or impediments to fisher movements and to what degree potential barriers or impediments might affect reintroduction success or prompt an adjustment to the reintroduction approach.

Fishers gradually moved away from the release sites in the northern portion of ONP (Figures 4, 5, and 6). Male and female fishers made extensive movements between consecutive relocations including movements across rivers, over high-elevation ridges, and through the mountainous interior of ONP (Figures 4, 5, and 6). Maximum distances traveled from release sites ranged from 22 to 108 km for males (mean = 67.6 km) and from 16 to 71 km for females (mean = 33.9 km).

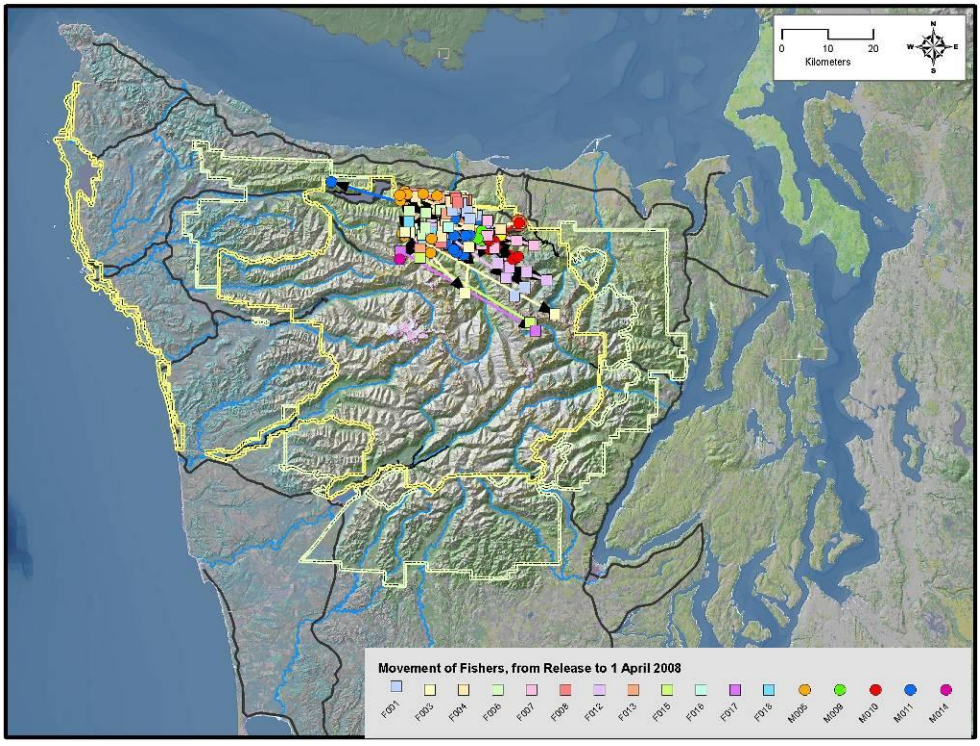

Figure 4. Movements of released fishers from 27 January to 1 April, 2008. Most locations are near the release sites in the northern portion of the Olympic Peninsula.

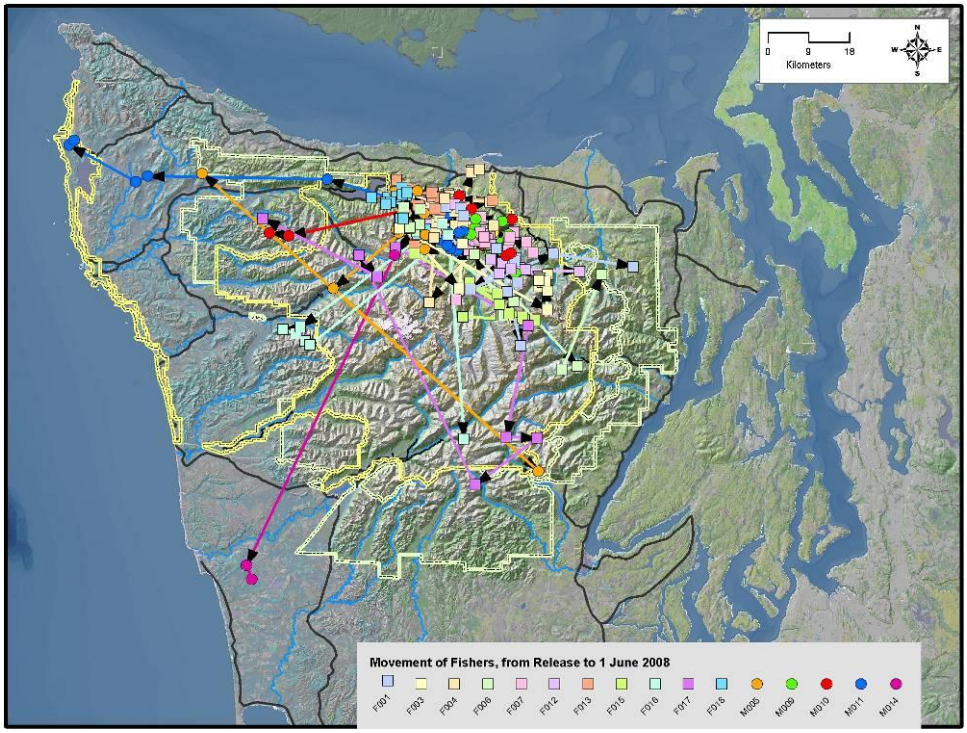

Figure 5. Movements of released fishers from 27 January to 1 June, 2008. Movements of several fishers have extended to areas distant from the release sites.

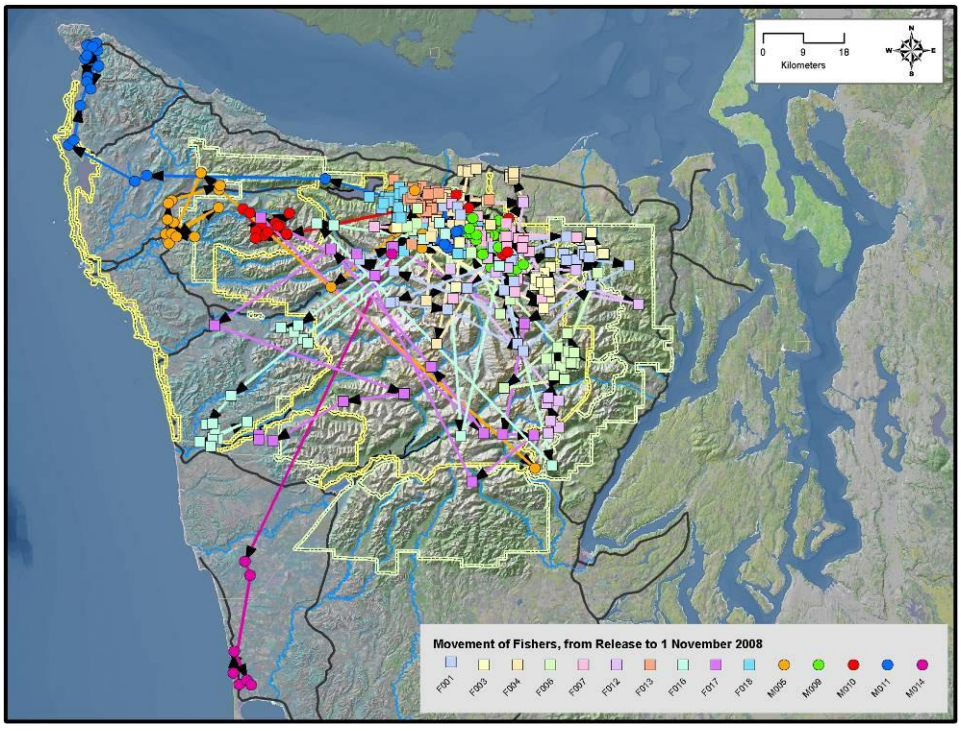

Figure 6. Movements of released fishers from 27 January to 1 November, 2008. Movements indicate the extent of fisher mobility from the release sites.

Survival and Causes of Mortality

Radio-telemetry is used to determine the location and status of each individual when it is located (e.g., whether an animal has moved away from its previous location, or whether a higher pulse rate [mortality mode] indicates an animal has died). Using this information, survival rates can be estimated for the entire population or subsets of the population (e.g., males, females). If a fisher's radio-signal cannot be located (e.g., radio failure, animal left the study area, animal was killed and its radio-transmitter was damaged in the process), it is unlikely that the fate of the animal will be known (i.e., information about that animal is censored; Figure 7).

Two males have been censored during the first 10 months of the project (Figure 7). Male M002 was not located after he was released in January because his radio-collar signal was continuously interfered with by a local radio signal. Male M009 was not located after September 2008, presumably because his implant transmitter malfunctioned. Male M009's transmitter switched to mortality mode earlier in the summer while he was alive and by September it had apparently depleted its battery power due to the higher pulse rate associated with mortality mode.

There were two known mortalities and one presumed-mortality during the first 10 months of the project. Female F008 was killed by a bobcat in April, 2008; cause of death was determined forensically with the identification of bobcat DNA at wound sites on her body. In May, 2008, female F015 was located in the interior of the park with her radio-collar emitting a mortality signal. Limited access prevented a walk-in visit to this location, and her status could not be confirmed. Male M005 was recovered on highway 101, north of Forks, by a Clallam County resident in October of 2008. He was recovered from this resident and will be sent to a pathologist who will conduct a necropsy and determine cause of death.

The survival status of 16 of the 18 released fishers released in year 1 could be determined. Thirteen of these 16 fishers (81.25%) survived through the first 10 months of the project; three of four males (75%) and 10 of 12 females (83.3%).

Fisher	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
F001										
F003										
F004										
F006										
F007										
F008				Mort						
F012										
F013										
F015					Mort					
F016										
F017										
F018										
M002		Cens	Cens	Cens	Cens	Cens	Cens	Cens	Cens	Cens
M005										Mort
M009									Cens	Cens
M010										
M011										
M014										

Figure 7. Survival status of individual fishers released in Olympic National Park in January and March, 2008 and tracked through October 2008. Blue fill indicates that a fisher survived that month. Red fill with "mort" text indicates the fisher died that month. Yellow fill with "Cens" text indicates that a fisher was not located that month and its status is unknown or "censored". White fill in January and February indicates that a fisher had not yet been released.

Home Range Establishment

The establishment of a home range is an indication that an area is suitable for occupancy by an animal. Consequently, home range establishment is a valuable measure of success for a reintroduction. Given the limitations of the data, an assessment of home range establishment was not possible. However, the movements of 15 of the 18 released fishers became localized during the first year (Figure 8); the movements of three of the 18 could not be evaluated due to loss of radio contact or mortality. The timing when fisher movements became localized varied by individual.

Fishers used a variety of landscapes from the mountainous interiors of ONP to coastal plains; and they have also used a variety of ownerships including federal, state, private, and tribal (Figure 8).

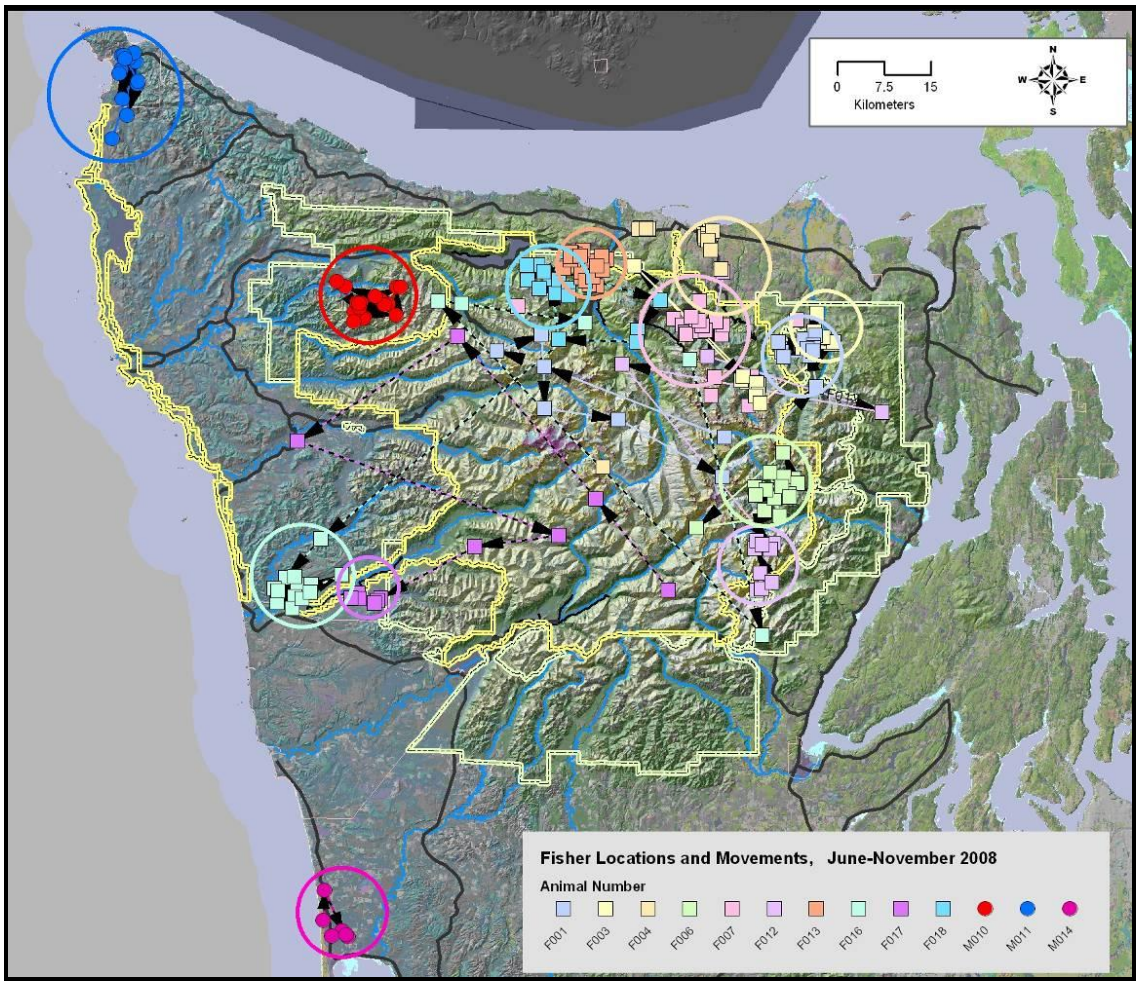

Figure 8. Areas where fisher movements were localized based on locations obtained from June to November of 2008. The boundary for Olympic National Park is bright yellow; the Olympic National Forest boundary is pale green.

Reproduction

Because the production and recruitment of young into a breeding population are critical to population persistence, reproduction is a critical measure of reintroduction success. Efforts to track reproduction included identifying areas where the movements of females were localized during the denning season (late March, April, May, June, and July), and assessing the spatial overlap of male and female locations during the breeding season (late March, April, early May) to assess potential mating opportunities. When females were found using localized areas, ground telemetry walk-ins were conducted to locate den sites. Similarly, baited camera stations were placed within these areas to photograph kits and document reproduction.

The movements of three reproductive-age females (F003, F007, and F018) were localized for >2 months during the denning season, however no den sites were located. Remote

camera stations were placed at two locations within an area used by female F003. While F003 was photographed visiting two remote-camera stations (Figure 9), no kits were detected.

A small percentage of male and female aerial telemetry locations overlapped spatially during the breeding season (i.e., late March, April, early May). Evidence of reproduction during the 2009 denning season will provide insight into the utility of spatial overlap of male and female locations during the previous breeding season as an indication of future reproduction.

Because of the difficulty of locating den sites and placing baited camera stations in the remote areas of ONP, an evaluation of a hair-snare technique to obtain DNA from fishers born on the Olympic Peninsula has been initiated. Hopefully this technique will be an efficient and cost-effective way to document and evaluate reproduction.

Figure 3. Radio-collared female F003 photographed on 23 September, 2008, visiting a baited camera station. While F003 was successfully detected at two camera stations, no kits were detected.

Food Habits

Prior to releasing fishers, a basic assumption was made that the diversity and abundance of prey on the Olympic Peninsula would be sufficient to support a reintroduced population (Lewis and Hayes 2004). The reintroduction provides an opportunity to

identify the prey species and other foods consumed by reintroduced fishers on the Olympic Peninsula. Using ground telemetry, fisher rest sites and den sites can be located, and fisher scats (feces) and prey remains can be collected at these sites. Valuable food habits data can also be obtained by investigating the contents of gastrointestinal tracts of fishers that are recovered during the study. Fisher scats, gastrointestinal tract contents and prey remains will be analyzed to identify prey species and other foods, and to determine their relative contributions to the diet.

Approximately 10 fisher scats have been collected from rest sites and a recaptured fisher, and the remains of a mountain beaver (*Aplodontia rufa*) was recovered at a rest site. Four fishers have also been found using active, mountain beaver burrow-systems as rest sites.

Funding is currently being sought to support a team of dog trainers and scat detection dogs, which can greatly increase the efficiency of scat collection efforts at rest sites and den sites (see MacKay et al. 2008 for techniques). Scat collection is expected to be much greater in year 2 of the project, as efforts to investigate fisher rest site and den site selection are expanded. Scats collected at den sites will also be used as a source of DNA to genotype fisher kits.

Genetic Analysis

Tissue samples collected from each reintroduced fisher provide DNA that is being used to genotype each fisher and to conduct a genetic analysis (e.g., diversity, relatedness) of the founding population. Genotyping of the founders will allow the identification of individuals from DNA in hair collected at hair-snare stations (see Kendall and McKelvey 2008 for techniques). Novel genotypes identified via the collection of DNA at hair-snare stations would indicate successful reproduction. This approach is likely to be the most efficient means of determining reproductive success of fishers that reside in the remote areas of Olympic National Park and wilderness areas on the Olympic Peninsula.

Expectations for Years 2 and 3 of the Project

In years 2 and 3, approximately 82 fishers will be released in ONP to meet our target of 100 fishers released over three years. Each released fisher will be radio-collared to determine its status, location, and behavior. In year 2 (Fall 2008 to Fall 2009), monitoring efforts will continue to track all surviving fishers released in year 1 as well as those released in year 2. While much of the monitoring effort will rely on aerial telemetry tracking, ground telemetry, remote camera stations, and remote hair-snare stations will be used to monitor movements, survival, home range establishment, and reproduction. These techniques will also be used to support research investigations of den site and rest site habitat selection, survival and food habits. During years 4 and 5 of the project, efforts will focus on data analysis and the preparation of manuscripts for publication.

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Appendix 1. Data form used when handling/processing a fisher for reintroduction.

FISHER CARE / IMMOBILIZATION FORM
Olympic Fisher Reintroduction Project 2009 v1.1

Fisher # (YYYY/S/###) **2009**/____/________ (__________) DATE: ____________ Time___________

Location: ____

Personnel (Vet and assistants): ____

IMMOBILIZATION AND OTHER DRUGS

INDUCTION TIME: Down Time (________) – Injection Time (________) = Total induction time of ______ minutes

RECOVERY TIME: Back in Box _______ Head Up: __________ Standing/ Walking: ___________

TIME	DRUG GIVEN	CONCEN.	VOLUME	ROUTE	INJECT. SITE	Comments
		mg/ml	cc	IV, IM, SUBQ		
		mg/ml	cc	IV, IM, SUBQ		
		mg/ml	cc	IV, IM, SUBQ		
		mg/ml	cc	IV, IM, SUBQ		
		mg/ml	cc	IV, IM, SUBQ		
		mg/ml	cc	IV, IM, SUBQ		
		mg/ml	cc	IV, IM, SUBQ		
		mg/ml	cc	IV, IM, SUBQ		
		mg/ml	cc	IV, IM, SUBQ		
		mg/ml	cc	IV, IM, SUBQ		
		mg/ml	cc	IV, IM, SUBQ		

Notes:

VITAL SIGNS

Monitor at least: in the beginning, 10 minutes later, and sporadically during process or when animals status appears to change

TIME	PARAMETER[1]	UNITS		TIME	PARAMETER[1]	UNITS	
		Min, °F, °C				Min, °F, °C	
		Min, °F, °C				Min, °F, °C	
		Min, °F, °C				Min, °F, °C	
		Min, °F, °C				Min, °F, °C	
		Min, °F, °C				Min, °F, °C	

[1]: HEART RATE, RESP. RATE BODY TEMP. (CRT) ANES. DEP. O_2

1 of 3

Appendix 1. Continued.

FISHER CARE / IMMOBILIZATION FORM
Olympic Fisher Reintroduction Project 2009 v1.1

MARKING INFORMATION

Radio Frequency: _____ Radio Serial #: _____

Magnet Removed? Y / N Radio working? Y/N (*Make sure to check to see if frequency shifted or not)*

Pit-Tag ID #: _____ Pit Tag Location _____Pit Tag Checked? Y/N

Pictures: Front____ Back____ Right Side_____ Left Side_____ Face_____ Teeth_____

Abdominal/chest markings_____ Other: _____

PHYSICAL EXAM, MEASUREMENTS AND SAMPLE COLLECTION

Physical Condition *(suitable for reintroduction?, should be yes for all):*

- No broken bones ____
- ≥3 intact canines_____
- No debilitating wounds or injuries_____
- No missing limbs ____
- No feet with > 1 missing toe_____
- No apparent disabilities_____
- Not in poor condition_____
- No diarrhea_____
- No ocular or nasal discharge_____
- No significant unexplained hair loss_____
- No excessive tooth wear or signs of advanced age_____
- No heavy parasite infection (external)_____

Age Information (from teeth (top teeth), skull, baculum and teats):

	Middle Incisors	Outer Incisors	Canines	P1	P2	P3	P4	M1	M2
Wear									
Staining									

Wear: 1. Not flattened
2. Slightly flattened
3. Moderately flat, some dentin showing
4. Extremely flat, dentin obvious or enamel cracked
5. Some or all broken
6. Some or all missing

Staining: 1. White
2. Slightly yellowed
3. Moderately yellow
4. Extremely yellow or discolored

Tooth Notes (broken or missing teeth):_____

Sagittal crest (mm): length _____ height _____ **Baculum length**: _____

Anterior teat size (mm): **right** width _____ x height _____ = _____
left width _____ x height _____ = _____

Estimated age: Juvenile (<1yr) Subadult (>1<2 yr) Adult (>2yr): _____

Appendix 1. Continued.

FISHER CARE / IMMOBILIZATION FORM
Olympic Fisher Reintroduction Project 2009 v1.1

Biological Samples Taken (label with animal # and date):

Tooth collected? Y / N Ear plugs collected? Y / N Ear SampleID _____ Hair collected? Y / N External Parasites? Y / N Fecal? Y / N Blood samples: Red tops (1)_____ Lavender top (1)_____

Measurements:

- Weight (kg) _____ (fisher wt_____ - bag wt_____)
- Total Length (tip of nose to tip of tail, measured along dorsal contours) (mm)_____
- Ear length (mm) _____
- Tail length (mm) _____
- Hind foot length (mm) _____
- Neck circumference (measured at smallest point of the neck): _____ mm.

OVERALL ANIMAL CONDITION (Excellent, good, fair, poor), and why (if needed)

NOTES/ EMERGENCIES:

3 of 3

Appendix 2. Identification, capture, age and monitoring data for each of the 18 fishers released in January and March of 2008 in Olympic National Park, Washington.

Animal Number[a]	Sex	Capture Date	Release Date	Days Captive	Age	Age Class	Weight (lbs.oz)	Fate	# relocations as of 13 November 2008	Number Days monitored
2008F001	F	14-Dec-07	27-Jan	44	0	Juvenile	7.6	Alive	38	still active
2008M002	M	26-Dec-07	27-Jan	32	1	Sub-adult	9.8	Unk.	0	0
2008F003	F	27-Dec-07	27-Jan	31	2	Adult	3.14	Alive	44	still active
2008F004	F	29-Dec-07	27-Jan	29	2	Adult	5.7	Alive	53	still active
2008M005	M	5-Jan-08	27-Jan	22	4	Adult	11.15	Dead	34	259
2008F006	F	6-Jan-08	27-Jan	21	1	Sub-adult	6.2	Alive	34	still active
2008F007	F	6-Jan-08	27-Jan	21	2	Adult	6.5	Alive	50	still active
2008F008	F	7-Jan-08	02-Mar	55	3	Adult	5.4	Dead	15	37
2008M009	M	9-Jan-08	27-Jan	18	0	Juvenile	10.1	Unk.	37	234
2008M010	M	13-Jan-08	27-Jan	14	1	Sub-adult	8.8	Alive	29	still active
2008M011	M	13-Jan-08	27-Jan	14	1	Sub-adult	9.5	Alive	32	still active
2008F012	F	16-Jan-08	27-Jan	11	2	Adult	2	Alive	24b	still active
2008F013	F	25-Jan-08	02-Mar	37	0	Juvenile	6.12	Alive	51	still active
2008F016	F	15-Feb-08	02-Mar	16	1	Sub-adult	6.3	Alive	28b	still active
2008M014	M	13-Feb-08	02-Mar	18	1	Sub-adult	11.14	Alive	12c	still active
2008F015	F	14-Feb-08	02-Mar	17	>4	Adult	5.11	Dead	11	64
2008F017	F	23-Feb-08	02-Mar	8	0	Juvenile	6.5	Alive	21b	still active
2008F018	F	29-Feb-08	02-Mar	2	1	Sub-adult	5.11	Alive	34	still active

[a]Fishers with the animal number in bold are males that were implanted with a 41g radio-transmitter in their abdominal cavity. The other 15 fishers were equipped with radio-collar transmitters.