National Park Service
U.S. Department of the Interior

Natural Resource Stewardship and Science

Evaluation of Fisher (*Pekania pennanti*) Restoration in Olympic National Park and the Olympic Recovery Area

2014 Annual Progress Report

Natural Resource Data Series NPS/OLYM/NRDS—2015/804

ON THE COVER
Fisher visiting remote camera station in Olympic National Forest, National Park Service.
Photograph courtesy of the National Park Service.

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June 2015

U.S. Department of the Interior
National Park Service
Natural Resource Stewardship and Science
Fort Collins, Colorado

The National Park Service, Natural Resource Stewardship and Science office in Fort Collins, Colorado, publishes a range of reports that address natural resource topics. These reports are of interest and applicability to a broad audience in the National Park Service and others in natural resource management, including scientists, conservation and environmental constituencies, and the public.

The Natural Resource Data Series is intended for the timely release of basic data sets and data summaries. Care has been taken to assure accuracy of raw data values, but a thorough analysis and interpretation of the data has not been completed. Consequently, the initial analyses of data in this report are provisional and subject to change.

All manuscripts in the series receive the appropriate level of peer review to ensure that the information is scientifically credible, technically accurate, appropriately written for the intended audience, and designed and published in a professional manner. Data in this report were collected and analyzed using methods based on established, peer-reviewed protocols and were analyzed and interpreted within the guidelines of the protocols. This report received formal peer review by subject-matter experts who were not directly involved in the collection, analysis, or reporting of the data, and whose background and expertise put them on par technically and scientifically with the authors of the information.

Views, statements, findings, conclusions, recommendations, and data in this report do not necessarily reflect views and policies of the National Park Service, U.S. Department of the Interior. This paper has been peer reviewed and approved for publication consistent with USGS Fundamental Science practices (http://pubs.usgs.gov/circ/1367/). Mention of trade names or commercial products does not constitute endorsement or recommendation for use by the U.S. Government.

This report is available in digital format from the Olympic National Park website (http://www.nps.gov/olym/index.htm) and the Natural Resource Publications Management website (http://www.nature.nps.gov/publications/nrpm/). To receive this report in a format optimized for screen readers, please email irma@nps.gov**.**

Please cite this publication as:

Happe, P. J., K. J. Jenkins, T. J. Kay, K. Pilgrim, M. K. Schwartz, J. C. Lewis, and K. B. Aubry. 2015. Evaluation of fisher (*Pekania pennanti*) restoration in Olympic National Park and the Olympic Recovery Area: 2014 annual progress report. Natural Resource Data Series NPS/OLYM/NRDS—2015/804. National Park Service, Fort Collins, Colorado.

NPS 149/128760, June 2015

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Conversion Factors

Inch/Pound to SI

Multiply	By	To obtain
	Length	
foot (ft)	0.3048	meter (m)
mile (mi)	1.609	kilometer (km)

SI to Inch/Pound

Multiply	By	To obtain
	Length	
meter (m)	3.281	foot (ft)
kilometer (km)	0.6214	mile (mi)
	Area	
square kilometer (km^2)	247.1	acre
square kilometer (km^2)	0.3861	square mile (mi^2)
	Mass	
gram (g)	0.03527	ounce (oz)

Executive Summary

With the translocation and release of 90 fishers (*Pekania pennanti*) from British Columbia to Olympic National Park during 2008–2010, the National Park Service and Washington Department of Fish and Wildlife accomplished the first phase of fisher restoration in Washington State. Beginning in 2013, we initiated a new research project to determine the current status of fishers on Washington's Olympic Peninsula 3–5 years after the releases and evaluate the short-term success of the restoration program. Objectives of the study are to determine the current distribution of fishers and proportion of the recovery area that is currently occupied by fishers, determine several genetic characteristics of the reintroduced population, and determine reproductive success of the founding animals through genetic studies.

During 2014, we continued working with a broad coalition of cooperating agencies, tribes, and non-governmental organizations (NGO) to collect data on fisher distribution and genetics using non-invasive sampling methods. The primary sampling frame consisted of 157 24-square-kilometer hexagons (hexes) distributed across all major land ownerships within the Olympic Peninsula target survey area. In 2014 we expanded the study by adding 58 more hexes to an expanded study area in response to incidental fisher observations outside of the target area obtained in 2013; 49 hexes were added south and 9 to the east of the target area. During 2014, federal, state, tribal and NGO biologists and volunteers established three baited motion-sensing camera stations, paired with hair snaring devices, in 80 hexes; 69 in the targeted area 11 in the expansion areas. Each paired camera/hair station was left in place for approximately 6 weeks, with three checks on 2-week intervals. We documented fisher presence in 5 of the 80 hexagons, and identified 5 different fishers through a combination of microsatellite DNA analyses and camera detections. All fisher detections were in the target area. These 5 individuals included 2 of the original founding population of 90, 1 of the 2 rescued and rehabilitated kits that were released in 2010, and 1 new recruit to the population (1 individual was not identified). Additionally, we identified more than 40 other species of wildlife at the baited camera stations. We also obtained eight incidental fisher observations through photographs and carcass retrieval.

During 2015, we plan to sample 75 hexagons in the target area and 12 in the expansion area. We plan to sample all unsampled accessible hexes in the target area (26 hexes), and re-sample accessible hexes sampled in 2013 (49 hexes).

Acknowledgments

This project was funded principally through grants from the National Park Service Natural Resource Preservation Program (NRPP), and the U.S. Fish and Wildlife Service Recovery Program, and the USDA Forest Service-Olympic National Forest. Several agencies and Tribes, including the following, provided indispensable in-kind support for field work (biologist salaries, supplies, and vehicles): Lower Elwha Klallam Tribe, Makah Tribe, Olympic National Forest, Olympic National Park, Point-no-Point Treaty Council, Quileute Tribe, Skokomish Tribe, Washington Department of Fish and Wildlife, Washington Department of Natural Resources, U.S. Geological Survey, Jefferson Land Trust.

This project would not have been as successful in 2014, without the help of many people. Over one-third of the sampling in 2014 was completed by project partners. We want to thank (in no particular order) S. Murphie from the Makah Tribe; B. Tropp and S. Miller from the Skokomish Tribe; W. Michaelis, J. Skriletz, A. McMillan, B. Murphie, R. Nagel, and S. Ament from WDFW; T. Cullinan from Point-no-Point Treaty Council; S. Horton and J. Hanawalt from WDNR; B. Howell from ONF; G. Rasmussen from the Quileute Tribe; K. Sager-Fradkin, D. Manson, S. Cendejas-Zarelli, K. Kaufman, and K. Turrey from the Lower Elwha S'Klallam Tribe; C. Clendaniel, K. Cook, C. Battersby, D. Bahls, J. Joyce, D. Rugh, D. Stockment, and S. Pensler from the Jefferson Land Trust; T. Kay, R. Bakerian, E. Gordon, J. Herndon, A. Hokit, E. Kohler, M. Rohde, S. Gremel, and S. Yuncevich, from the NPS crew. We would also like to thank Tom Goetz, Mardell Richmond, and Mike Leavitt from the Rayonier Corporation for allowing us to follow up on incidental fisher observations on their property. Big thanks go out to Betsy Howell for providing up-to date maps for access on National Forest lands, and for arranging housing for the crew in the USFS Bunkhouse. We thank Jody Tucker, USFS Rocky Mountain Research Station (RMRS), for consulting on several aspects of this study. We would also like to thank the staff at NPS Diagnostics, and John Bryan in particular for performing necropsies on recovered fishers. Lastly, we would also like to thank the communications, ranger, and trail crew (packer) staffs at Olympic National Park for providing so many necessary logistical and safety supports of our field operations.

Background and Study Objectives

The fisher, *Pekania pennanti*, once occupied coniferous forests at low to middle elevations throughout much of the Western United States, but was extirpated from Washington State during the last century. It was listed as a State endangered species in October 1998, and the West Coast Distinct Population Segment of fishers was proposed for listing as threatened by the U.S. Fish and Wildlife Service (USFWS) in 2014 (U.S. Fish and Wildlife Service 2014). In 2006, Washington State developed a Fisher Recovery Plan, with a goal of establishing multiple self-sustaining fisher populations in Washington (Hayes and Lewis 2006).

In 2007, the National Park Service (NPS) and Washington Department of Fish and Wildlife (WDFW) completed a Fisher Reintroduction Plan and Environmental Assessment for Olympic National Park (National Park Service 2007). The goals of that effort were to restore fishers to Olympic National Park (ONP) and Washington State. The project was designed to take 10 years to complete, and to be conducted in two phases. During Phase 1, 90 fishers were translocated from central British Columbia to the Olympic Peninsula from 2008 to 2010, and the initial success of the reintroduction was monitored by radio-tracking translocated fishers (2008–2011). Data were collected on post-release survival, movements, home-range establishment, and reproduction. Initial findings indicate that survival was highly variable among release years (Lewis 2014). In addition, wilderness constraints prevented the reliable determination of breeding success for most of the released females, creating additional uncertainties about the current status of reintroduced fishers on the Olympic Peninsula.

The need for a second monitoring phase, consisting of non-invasive surveys of fisher distribution, was identified in both the State and Federal fisher recovery planning efforts (Lewis 2006; National Park Service 2007). The goal of Phase 2 of the fisher monitoring in the Olympic Recovery Area is to evaluate the current status of reintroduced fishers on the Olympic Peninsula (that is, 2013–2016). Specific objectives are to:

1. Determine the proportion of potential habitat occupied by fishers on the Olympic Peninsula,
2. Determine the genetic diversity and effective population size of the reintroduced fisher population,
3. Determine the minimum number of fishers known to be alive on the Olympic Peninsula,
4. Estimate the reproductive success of the released fishers, and
5. Determine if the population has experienced a genetic bottleneck.

Results of the first year of the study, the 2013 field season, were summarized in Happe et al. 2014 (http://wdfw.wa.gov/publications/01646/, accessed 20 May 2015).

Research Accomplishments, 2014

Sampling design and methods followed those contained in the protocol developed during Phase 1 and finalized in 2013 (Jenkins and Happe 2013), and used during the 2013 field season (Happe et al. 2014). Prior to the start of field season, we polled wildlife biologists working for State, Federal and Tribal agencies on the Olympic Peninsula to determine who was still interested in participating in the project. Biologists from Olympic National Forest (ONF), WDFW, Washington Department of Natural Resources (WDNR), Makah Tribe, Quileute Tribe, Lower Elwha Klallam Tribe, Point no Point Treaty Council, Skokomish Tribe, and Jefferson Land Trust indicated that they would like to participate in the field sampling effort. We reported the results from the 2013 field season, reviewed and modified the protocol, and made plans for 2014 during the annual meeting of Olympic Peninsula Wildlife Technical Group. In addition, we held two field training sessions for new cooperators in the expansion area. Throughout the year we continued to coordinate sampling efforts, provide most of the equipment (with the exception of bait and batteries), collate and process data, and process all samples.

Study Area

Our study area consisted of a target survey area and an expansion area, including all accessible lands less than 4,700 ft (1,435m) in elevation. In this study, “accessible” is defined as lands that can be safely accessed on foot, as well as private and tribal lands where access is permitted by the landowner. The target survey area consists of lands on Washington’s Olympic Peninsula, excluding the Quimper Peninsula in the northeast and areas south of the USFS boundary (Figure 1). The target area corresponds with the area where most of the translocated fishers established home ranges following their release. The expansion areas were defined as lands where the fisher population could have colonized if the population expanded, and included the Quimper Peninsula and other lands to the east and lands south of Olympic National Forest. In 2013, funding and logistical considerations limited our sampling to the target area.

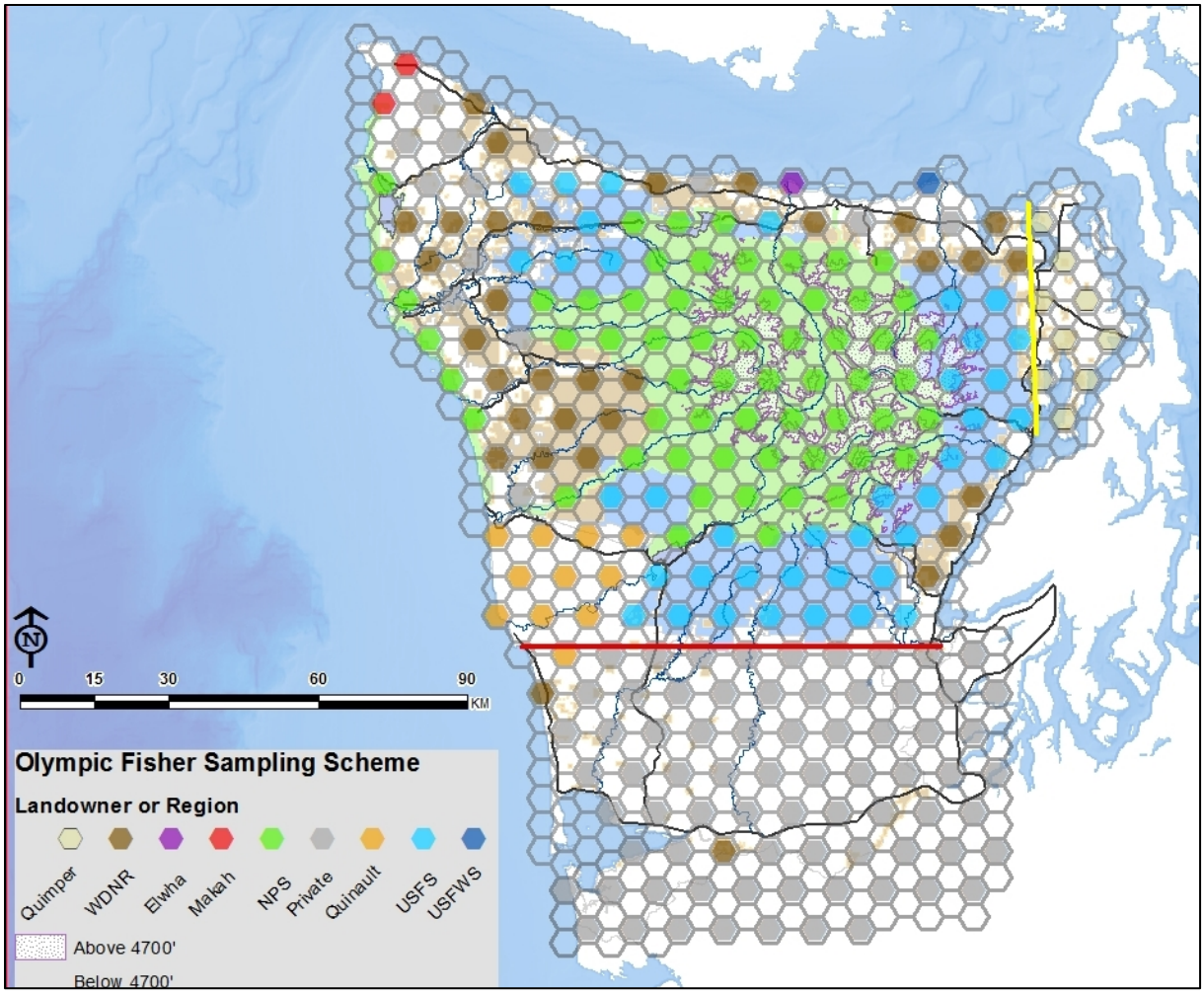

Figure 1. Sampling frame depicting 24-km^2 hexagons where fisher occupancy and genetic characteristics are being sampled on the Olympic Peninsula. The target survey area includes the Olympic Peninsula (lands north of the horizontal red line) and excludes the Quimper Peninsula and other lands on the northeast (lands east of the vertical yellow line). The expanded survey area, designed to detect population expansion outside the target area, includes lands south of the horizontal red line and east of the vertical yellow line.

The primary sampling units are 24-km^2 hexagonal cells (hexes) [approximately the size of a core area used by female fishers in the study area (Lewis 2014)]. Using a randomly selected starting point, we selected every other hex, resulting in 241 hexes out of 775 selected for sampling; 157 selected hexes are in the target area, and 84 are in the expanded survey areas (75 south of the target area, and 9 on east (Figure 1). Within the target area, hexes occur entirely or predominantly on lands managed by ONP (n=60), ONF (n=39), Washington State (n=30), Native American Tribes (n=14), private landowners (n=13), and the U.S. Fish and Wildlife Service (n=1). In the expansion area lands are primarily private.

We used a Generalized Random Tesselation Stratified (GRTS) sampling scheme to assign a random sampling order for each hex (U.S. Environmental Protection Agency 2011). Each partner selected the grouping of hexes in their area that they would try to sample from 2013-2016. Following that

selection, each partner was given the firing order for their hexes, based on the random sampling order assigned to that hex by GRTS.

Methods

Within each hex we established three sampling stations in suitable fisher habitat (Jenkins and Happe 2013), with each station preferably at least 1 km apart (Figure 2). Suitable fisher habitat was defined as mid- to late-seral forests, or forested stands that most closely matched those conditions within each hex. Each station contained a motion-sensing camera and a hair-snaring device for collecting DNA. Our primary camera was the Bushnell® Trophy Cam HD, with a black LED flash. The hair snaring device was a triangular cubby box baited with a chicken drumstick and equipped with six gun-brushes attached to the inside walls, three near each entrance. The camera was focused on both the chicken bait affixed to a tree and the triangular cubby box (Figure 3). On the back of the bait tree we placed a scent call lure (in 2014 we used approximately 2 teaspoons of a gusto and lanolin mixture). Following set up, each station was visited three times, with 14-day intervals between visits, resulting in it taking 6 weeks for a complete sampling of a hex. This design resulted in a hex being sampled for nine, 14-day intervals (that is, three intervals for all three stations or nine station/visit events total for each hex). The study design allowed for three 6-week sampling sessions (spring, summer, and fall) between May 27 and November 5, 2014. Hexes assigned to the 2014 sampling year were allocated to one of the 3 sampling session, based on seasonal accessibility constraints and logistical efficiencies (Jenkins and Happe 2013).

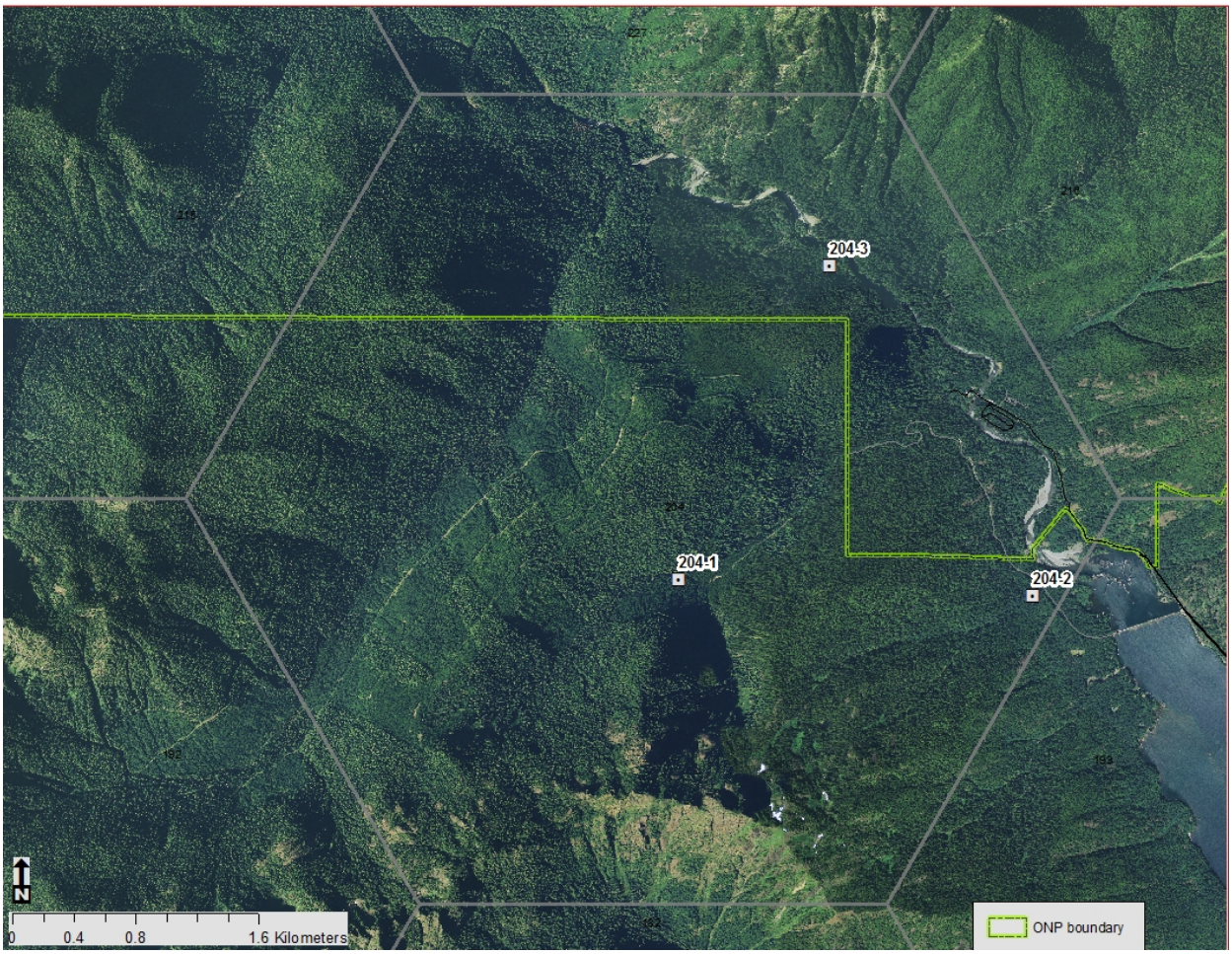

Figure 2. Example of locations of stations in a hex. Fishers were detected in this hex in 2014.

Figure 3. Members of a field crew setting up a station within Olympic National Park (Hex 239). Note camera (circled in red) on left of frame is pointing to tree bait (yellow circle) and baited cubby (blue circle) box on the right of the frame.

Sampling Effort

Fourteen of the 157 hexes within the target area were removed from the sampling frame in 2014. Ten hexes were removed from consideration on the Quinault reservation, as we do not have permission to work in that area. Four hexes were removed due to access and habitat limitations (2 that include portions of Mt Olympus and have very little forested habitat below 4700 feet that is safely accessible, 2 on private lands near Sequim which do not contain enough fisher habitat to put in 3 stations). In 2014 we sampled 69 (48%) hexes in the target area. Two of the 69 hexes were sampled in 2013 and repeated in 2014 due to incomplete sampling effort in 2013 (Figure 4).

During 2014, in response to incidental fisher observations obtained in 2013 and the addition of more partners, we added in hexes from some of the expansion areas. We added all 9 hexes to the east and on the Quimper Peninsula (Figure 4). In 2014, staff and volunteers from Jefferson Land Trust sampled two hexes in the eastern expansion area, and NPS crews sampled one.

To the south of the target area we added 49 hexes between ONF and State Highway 12. The southern area encompasses all incidental fisher observations obtained in 2013, all lands where male fishers established home ranges in 2008-2011, and the area that partners believed they could realistically sample by 2016. Two hexes were dropped from the southern expansion area during 2014, due to

either not enough fisher habitat from housing development, or our inability to obtain permission for access. State and tribal partners sampled nine hexes in the south in 2014.

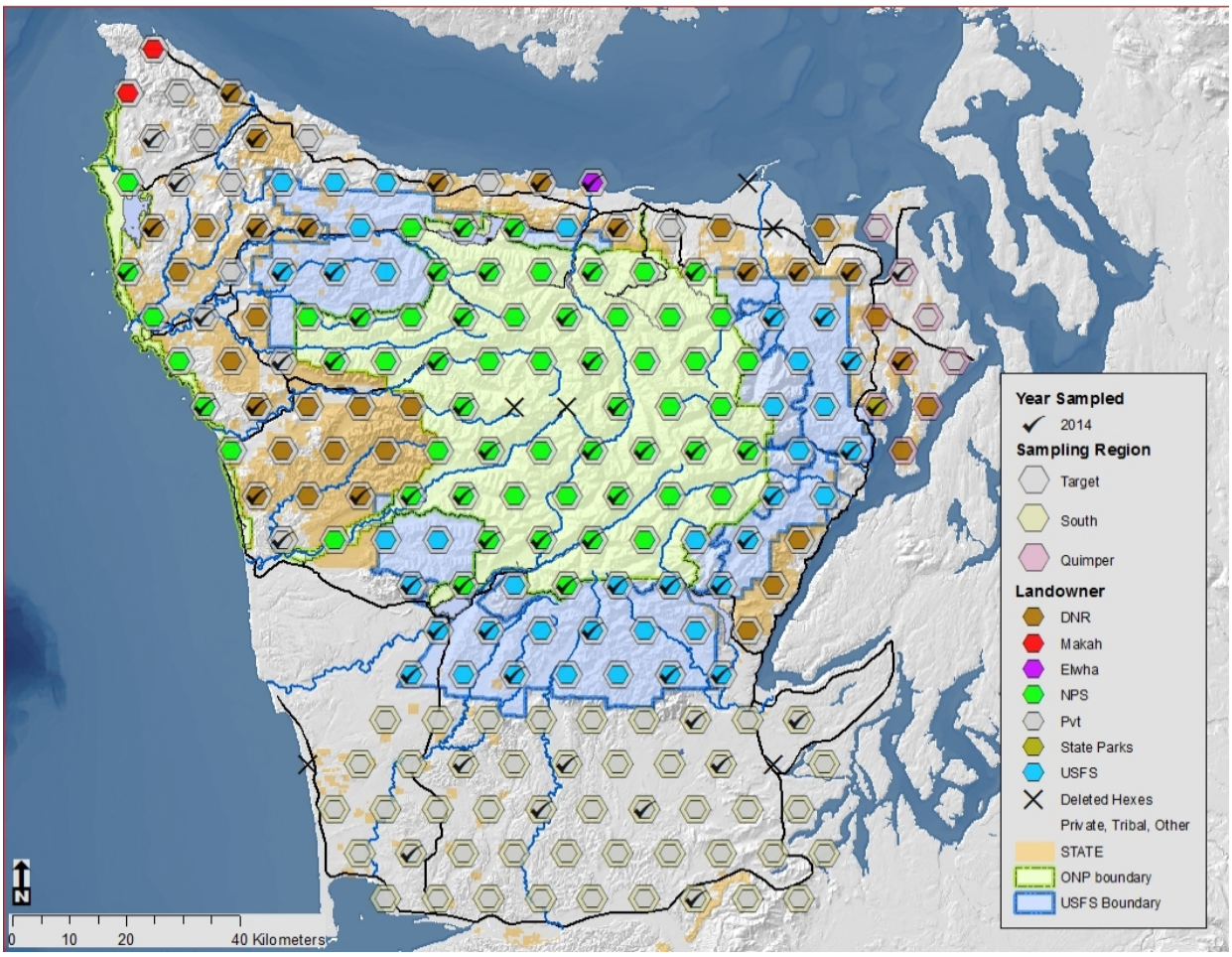

Figure 4. The sample frame and location of hexes sampled in 2014 (check marks) by primary landowner. Shown are hexes added to active sample frame in the south (tan hex outline) and east (pink hex outline).

Landownership of sampled hexes varied: 34 (43 percent) were on federal lands, 3 (4 percent) on a mosaic of federal and state lands, 8 (10 percent) on private lands, and the remainder on lands with mixed ownership, including private, tribal, and other state lands (Table 1).

Table 1. Landownership of hexes sampled in 2014.

Hex primary landownership	Number of hexes sampled
National Park Service (NPS)	19
NPS and Olympic National Forest (ONF)	6
NPS, ONF and State, Private or Tribal	3
NPS, Private, and Tribal	5
ONF	9
ONF and Washington Department of Natural Resources (WDNR)	1
ONF and private	4
ONF, WDNR, and private or tribal	9
WDNR	1
WDNR and private	11
WDNR and private, tribal, or other state	4
Private	8

In 2014 29 (36%) of the hexes were sampled by project partners; the remaining hexes were sampled by NPS crews (Table 2).

Table 2. Lead agencies and number of hexes they sampled, 2014.

Hex lead	Number of hexes sampled
Jefferson Land Trust	2
Lower Elwha Klallam Tribe	4
Makah Tribe	4
National Park Service[1]	51
Quileute Tribe	6
Skokomish Tribe	3
Washington Department of Fish and Wildlife	6
Washington Department of Fish and Wildlife and Point no Point Treaty Tribes	1
Washington Department of Natural Resources	3

Our sampling protocol specified a 14-day interval between sampling visits. Thus, with 80 hexes sampled, the total sampling effort should have been 720 station/visit events (80 hexes * 3 stations/hex * 3 visits/station). In 2014, we ended up with 726 sampling events (Table 3); the extra sampling events were due to some stations being sampled for a 4th time to compensate for camera malfunction, camera destruction, early bait loss, or incomplete sampling in visit 1 which required a 4^{th} visit to some stations.

Table 3. Station sampling intervals (days) for the 80 hexes sampled in 2014. n=726.

	Visit	Camera	Bait	Snare
Mean	14.40	13.99	12.99	12.81
Max	87	87	87	87
Min	11	0	0	0
Between 13 and 16 days	97%	93%	80%	73%

[Intervals reported for visits indicate the number of days between station checks. Intervals for camera, bait, and hair snare represent the number of days each device (or bait) was functional, if known, based on date stamps on camera images]

We averaged 14.4 days between station visits (Table 3). Although 97 percent of the sampling intervals were in our target range of 13–16 days, we did have some outliers. The minimum of 0 days was due to camera theft or malfunction. Intervals greater than16 days were due to challenges with crew scheduling; in the case of the 87-day sampling event, we continued sampling for 3 additional 2 week sampling bouts.

The average sampling interval for remote cameras was 13.99 working days per station/visit; 93 percent of the cameras were functional within our target range of 13–16 days. Fourteen cameras were functional for no days due to either theft (1), camera destruction by a bear (1), or malfunctioning for the entire interval (12). The causes of malfunctioning cameras included not being turned on (2), batteries died (2), batteries loose (1), no card (1) and unexplained malfunctions (6).

Baits placed on the trees (Figure 3) were functional for an average of 12.99 days; only 80 percent were functional for 13–16 days. At 20 percent of the sites, bait functionality was shortened due to consumption by black bears (*Ursus americanus*), spotted skunks (*Spilogale gracilis*), ravens (*Corvus corax*), turkey vultures (*Carthartes aura*), coyotes (*Canis latrans*), opossums (*Didelphis virginiana*), domestic dogs (*Canis lupus familiaris*), or fishers before the sampling interval was complete. In some cases, where a station had repeated visits by bears or ravens, we moved the station; in some situations, however, it was not possible to move a station.

Hair snares were functional for an average of 12.81 days; only 73 percent were functional for 13–16 days (however, during 44 intervals snare functionality was unknown due to either camera malfunction or unclear pictures). Snare functionality was shortened due to either destruction of the cubby box by bears or consumption of the bait in cubbies by bears, spotted skunks, or fishers before the sampling interval was complete.

In the majority of hexes, cameras, tree baits, and cubbies were functional for greater than 75 percent of the sampling interval. However, 7 (8.8 percent) hexes had cameras and/or tree baits functional for less than 66 percent of the time. One of those hexes was in the southern expansion area and will not be re-sampled. The remaining 6 will be re-sampled in 2016.

Fisher Detections

Remote Cameras

We detected fishers with cameras in five hexes (Table 4, Figure 5). Fishers with radio-collars (founders released between 2008 and 2010) were observed in two hexes. In one hex (202), two fishers were detected, one with a collar and one without. In one hex (204), fishers were detected at two stations, and in two hexes, fishers were detected on every visit. One fisher was detected five times (including detections at two stations on two visits). Three fishers, however, were detected only once. Finally, one fisher (M101) was detected at two hexes (202, 203). DNA from one fisher (in hex 202) did not amplify, and another fisher did not leave any hair samples (the bait was taken at the site by ravens before the fisher got there and the fisher did not go in the cubby).

Table 4. Fishers detected by cameras and DNA analysis, 2014.

Hex Number	Fisher on Camera	Hair Collected	DNA Amplified	Fisher ID	Gender	Founder	Collar Visible	Number Stations[1]	Number Station/ Visits[2]	First Visit[3]
170	yes	yes	Yes	M082	Male	Yes	Yes	1	2	1
202	yes	yes	Yes	M101	Male	No	No	1	3	1
202	yes	yes	No*	Unknown	Unknown	Yes	Yes	1	1	1
203	yes	yes	Yes	M101	Male	No	No	1	1	2
204	yes	yes	Yes	OPF_0747F	Female	No	No	2	5	1
232	yes	no	n/a	Unknown	Unknown	Unknown	No	1	1	1

1: Number of stations a fisher was detected (maximum=3).

2: Number of station (3) and visit (3) combinations a fisher was detected (maximum=9).

3: Visit number a fisher was first detected.

*: DNA sample was co-mingled with M101 and could not get individual ID.

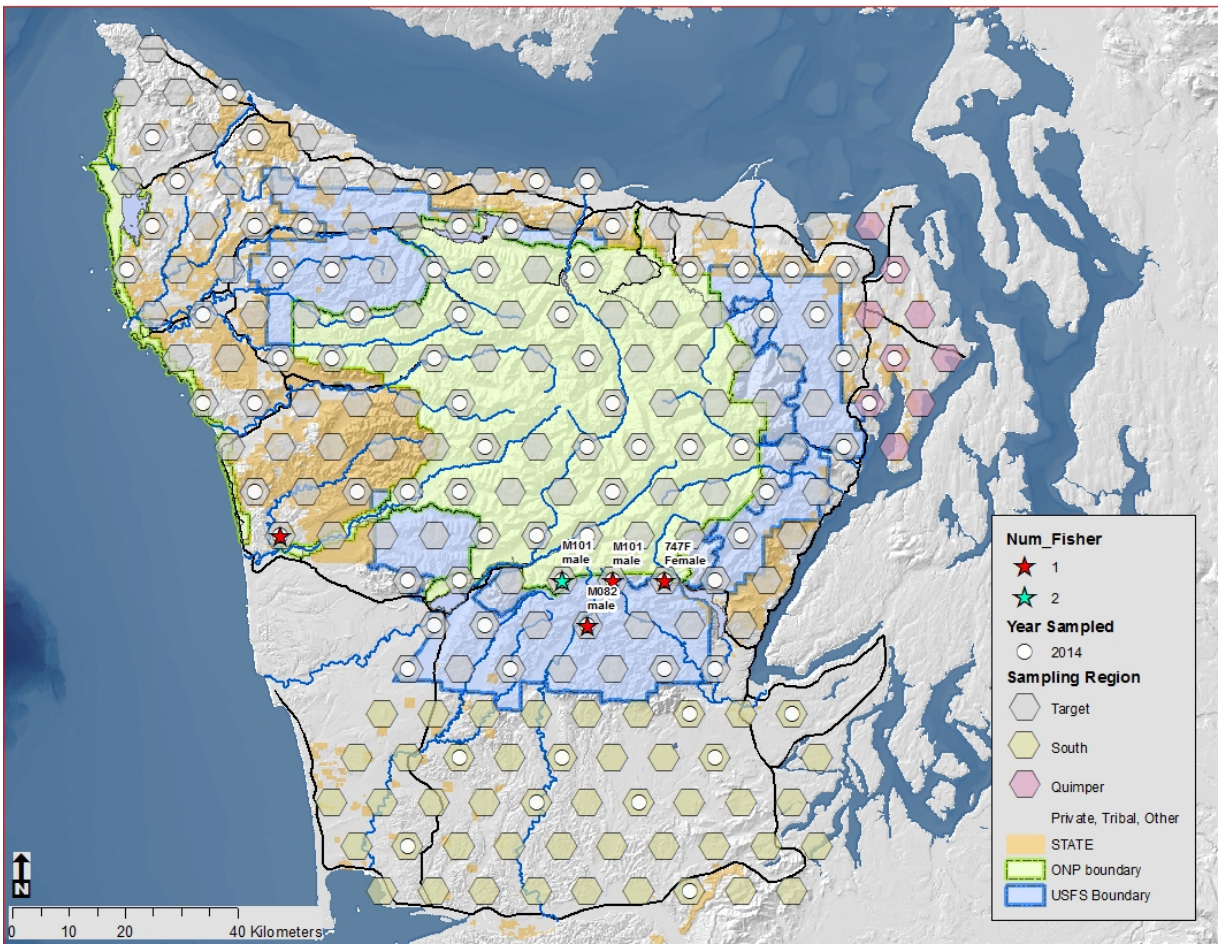

Figure 5. Location of fisher detections (stars) by cameras in hexes sampled in 2014 (white dots). In one hex (aqua star), two fishers were detected with the camera. Labels by the fisher detected with DNA are the animal ID number and gender. ID numbers that start with a number are recruits to the population.

DNA Analysis

Ninety-nine hair samples were collected and sent to the laboratory for DNA analysis. The samples came from 35 station-visit events (1–6 samples per cubby) distributed among 18 different hexes. Twenty four events (13 hexes) were from intervals in which the camera was not fully functional and no fisher pictures were taken; the samples were sent in for analysis in the event that a fisher was present but was undetected by the camera. Ten events were from stations and intervals in the four hexes where we did detect fishers with the cameras and collected hair. One event was from an interval where the camera was functional, but the image was not diagnostic.

We attempted to identify individual fishers using microsatellite DNA analysis. Samples that did not contain DNA for this analysis ("no amplification") were either hair from another species, or an inadequate sample from a fisher. In a subset of the samples where cameras were not working properly, species ID was determined on non-fisher samples. Other species identified through DNA included black bear (1 event), Douglas squirrel (1 event), spotted skunk (18 events), Virginia opossum (3 events), and vole (1 event).

Three individual fishers from four hexes were identified through DNA analysis (Figure 5). No fishers were detected at stations that had malfunctioning cameras for part of the sampling interval (Table 4).

We were not able to ID one radio-collared fisher from DNA because the sample from this individual was co-mingled with hairs from another un-collared fisher. The uncollared fisher later was detected on its own, and was determined to be M101.

We detected one new fisher (recruit to the population), two founders, and one offspring of a deceased founder (F088) that was rescued while still in the den, raised in captivity, and released as a sub-adult (M101, who shed his collar). The age of the founders detected ranged from 5–8 years old (Appendix A). The new recruit was the offspring of fishers released in 2008 (Table 5), and was most likely born prior to 2010 (Appendix B).

Table 5. Maternal and paternal assignments for the new recruit detected during the occupancy study through DNA analysis, 2014.

		Maternal			Paternal			Distance to maternal home range	Earliest possible birth year
Individual	Gender	Match	Release Year	Release age	Match	Release year	Release age		
OPF0747	Female	F007	2008	2	M009	2008	0		2009

Fishers were detected on multiple landownerships (Table 6). Most were detected in hexes comprised of mixed landownerships.

Table 6. Landownerships where fishers were detected in 2014.

Hex primary landownership	Number of hexes sampled	Number of Fishers
National Park Service (NPS)	19	
NPS and Olympic National Forest (ONF)	6	3
NPS, ONF and State, Private or Tribal	3	
NPS, Private, and Tribal	5	1
ONF	9	1
ONF and Washington Department of Natural Resources (WDNR)	1	
ONF and private	4	
ONF, WDNR, and private or tribal	9	
WDNR	1	
WDNR and private	11	
WDNR and private, tribal, or other state	4	
Private	8	

Other Species Detected

We collected more than 61,000 digital photographs of 40 wildlife species. Black bears were the most frequently detected species, and the most frequently detected carnivore; they were detected in 54 (67 percent) hexes and in 95 (18 percent) station/visit events (Table 7). Spotted skunks and bobcats were the next most frequently detected carnivores. We also obtained detections of potential fisher prey

with remote cameras; Douglas' squirrels (*Tamiasciurus douglasii*) and snowshoe hares (*Lepus americanus*) were detected most frequently (Table 7).

Two new species of note were detected in 2014. We detected mink at one station that was near a riparian area. We also detected Virginia opossum for the first time. Virginia opossum are not native to Washington State, and appear to be invading the Olympic Peninsula from the south. They were most prevalent on the southern and eastern sides of the study area (Figure 6). This is the first record of the species in the park.

Table 7. Number of times a species or species group was detected with remote cameras in 2014, by station/visit events and by hex. n=80 hexes and 726 Station/visits.

Station/ visits	Hexes	Species		Station/ visits	Hexes	Species
Carnivores				**Ungulates**		
128	54	Black Bear		94	47	Black-tailed Deer (*Odocoileus hemionus columbianus*)
145	48	Spotted Skunk		22	15	Elk (*Cervus elaphus*)
54	35	Bobcat (*Lynx rufus*)		**Rodents and Lagomorphs**		
64	26	Coyote		135	56	Douglas' Squirrel
21	18	Weasel[1] (*Mustela* spp.)		99	42	Mouse
13	13	Cougar (*Puma concolor*)		55	34	Snowshoe Hare
11	9	Raccoon (*Procyon lotor*)		58	32	Chipmunk (*Tamias* sp.)
14	8	Domestic Dog		54	31	Flying Squirrel (*Glaucomys sabrinus*)
12	5	***Fisher***		14	13	Mountain Beaver (*Aplodontia rufa*)
1	1	Mink		3	1	Bush-tailed Woodrat (*Neotoma cinerea*)
1	1	Domestic Cat		**Miscellaneous**		
Birds				41	14	Virginia opossum
121	79	Passerine[2]		24	17	Human
38	19	Jays [3]		**Unidentifiable**:		
44	15	Raven		64	37	Small mammal
13	12	Grouse[4]		19	16	Medium mammal
12	10	Turkey vulture		7	7	Large mammal
1	1	Pileated Woodpecker (*Dryocopus pileatus*)		44	31	Animal
4	4	Owl[5]				

1: Short-tailed Weasel (*Mustela eminea*), Long-tailed Weasel (*Mustela frenata*), or unidentifiable weasel (*Mustela* spp.).

2: Hummingbird, Dark-eyed Junco (*Junco hyemalis*), Hermit Thrush (*Catharus guttatus*), Varied Thrush (*Ixoreus naevius*), American Robin (*Turdus migratorius*), Pacific Wren (*Troglodytes pacificus*) or unidentifiable bird.

3: Gray Jay (*Perisoreus canadensis*) or Steller's Jay (*Cyanocitta stelleri*).

4: Sooty Grouse (*Dendragapus fuliginosus*), Ruffed Grouse (*Bonasa umbellus*), or unidentifiable grouse.

5: Saw-whet Owl (*Aegolius acadicus*) or Barred Owl (*Strix varia*), unidentified Strix owl, unidentified owl.

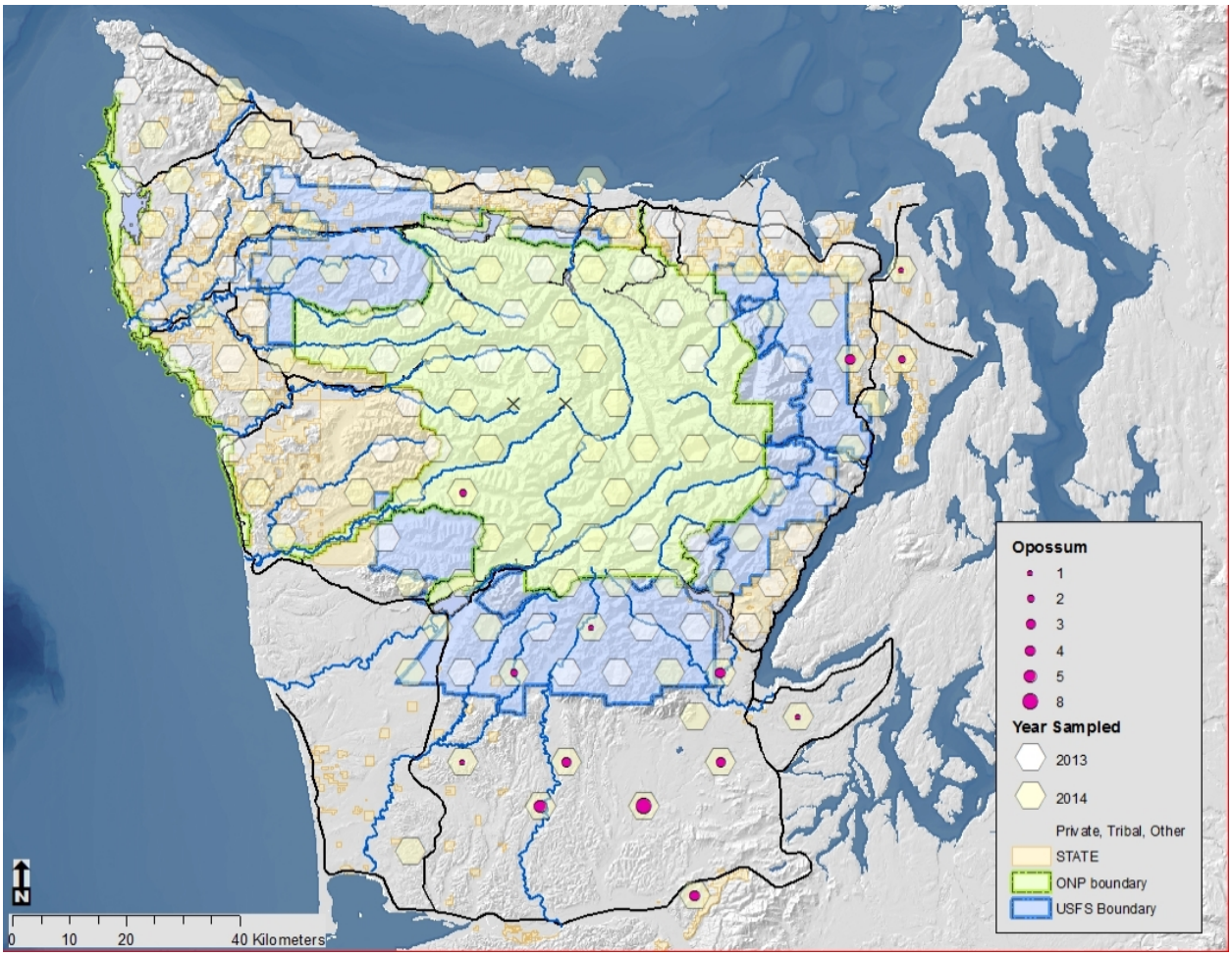

Figure 6. Location (pink dots) and number of station/visits events (scaled by dot size) of Virginia opossum detections collected in 2014. Also shown are hexes sampled in 2013 (white shade) and 2014 (yellow shade) where opossums were not detected.

Other Fisher Detections

In addition to fishers detected through formal survey procedures, eight other fishers were detected on the Olympic Peninsula from incidental detections or observations in 2014, seven in the target area and one in the expanded sample area on the Quimper Peninsula (Table 8, Figure 7). Three fishers were detected during the USFS marten project in the winter of 2014. After detecting fishers on cameras, the USFS crew deployed hair snares and we were able to get genetic ID on all 3 (M075, 747F, and 751F). M075 and 747F were detected during March in a hex that was scheduled to be sampled by project crews in 2014. 747F was later detected in the hex in June 2014, but not M075. We determined through genetic analysis that 751F is the daughter of 747F, and the first second-generation fisher documented on the Olympic Recovery Area (Appendix B).

Four fisher observations (OPF-0301M, F108, F109, F110) were reported to project personnel either via forwarded photographs (3) or reliable and consistent sightings in an area (1). Project personnel were able to follow up three observations with camera and hair snare stations, and fishers were verified in all three cases. One observation (OPF-0301M) was a re-capture of a fisher first detected in

2013 (Happe et al. 2014). A second observation (F108) was a follow-up from consistent sightings – we obtained a remote-camera photograph but the DNA did not amplify (F108). The third observation (F109) was a follow-up of a fisher-ish photograph taken using a cell phone. We confirmed that there was a fisher in the area through a remote-camera photograph, but the DNA is still being analyzed. The forth report (F110) was detected by a hiker who forwarded his picture of the animal to us several months after the encounter, and too late for us to follow up on the observation.

Only one fisher carcass was recovered in 2014. M079 was one of the two fishers detected north of Kalaloch during the study in October 2013 (Happe et al. 2014). He was recovered along highway 101 near his detection site in 2013. Necropsy results indicate that he was killed by a vehicle strike (Appendix C).

Table 8. Other fishers detected on the Olympic Peninsula, 2014.

Fisher number	Date collected	How detected	DNA amplified	Fisher ID	Gender	Founder	Collar visible	Comments
F110	1/26/2014	Camera	Not collected	Unknown	Unknown	Unknown	No	Hiker saw and took picture.
747F	3/01/2014	Camera	Yes	747F	Female	No	n/a	Daughter of F007 and M009
751F	03/06/2014	Camera	Yes	751F	Female	No	n/a	Daughter of 747F and M032
M079	3/17/2014	Carcass	Not collected	M079	Male	Yes	Yes	Died of vehicle collision
M075	3/30/2014	Camera	Yes	M075	Male	Yes	Yes	
301M	9/06/2014	Camera	Yes	301M	Male	No	n/a	Recapture of fisher detected nearby in 2013
F108	10/17/2014	Camera	No	Unknown	Unknown	Unknown	No	
F109	11/21/2014	Camera	In analysis	Unknown	Unknown	Unknown	No	

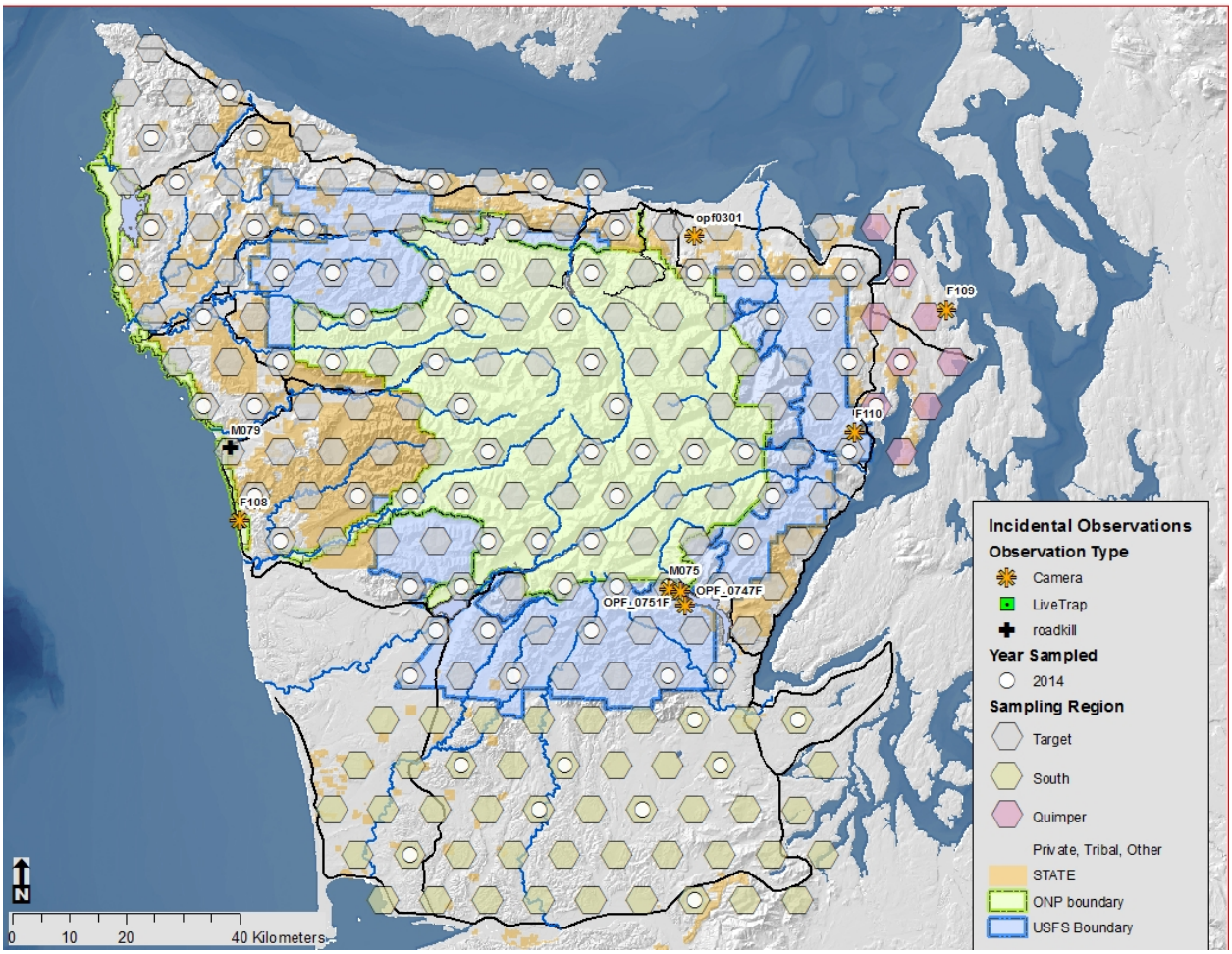

Figure 7. Location of incidental fisher detections on the Olympic Peninsula, 2014. Labels are animal numbers.

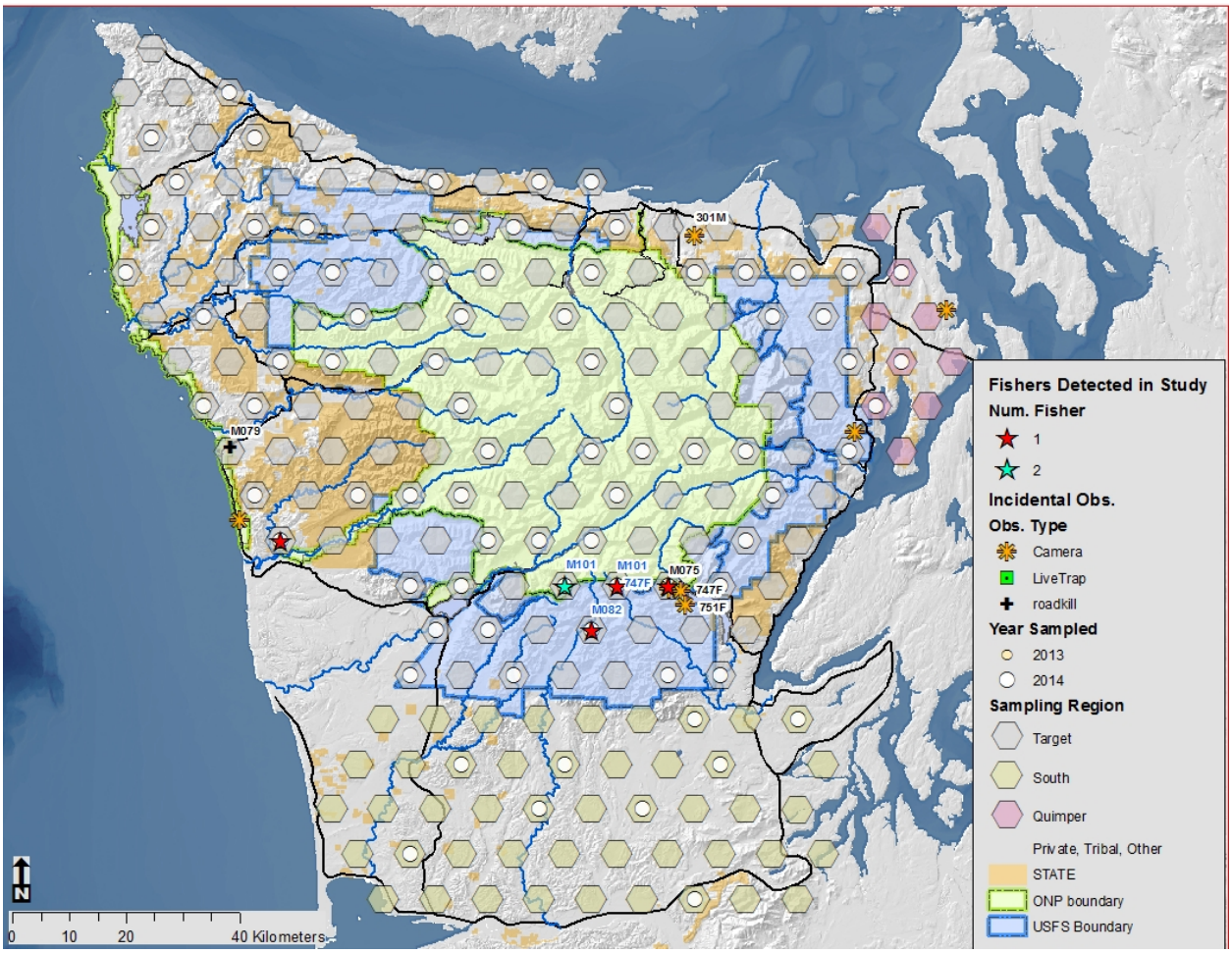

Figure 8. Location of all fisher detections on the Olympic Peninsula, 2014, including fishers not detected in the project. Labels are genetic ID's with blue labels for fishers detected during the occupancy study and black labels for incidental fisher detections.

Follow-up on 2013 results that were not resolved in the 2013 annual report:

We received the DNA analysis for F104, who was recovered in late 2013. As was the case for F102 and F103, she was the offspring of F004 and M009 (Appendix B). We also received the age determinations for F102, F103, and F104. They were from three different litters, and born in 2010, 2011, and 2012 respectively (Appendix B).

Plans for 2015

2015 will be year 3 of the 4-year study. We anticipate receiving full funding in 2015 from the NPS. With this support, in addition to the funding already in place from the USFS and the USFWS Recovery Program, assistance from our partners, and support for two interns received from SCA NPS Academy and the NPS Mosaics program, we will be able to fully implement our monitoring protocol in 2015. We plan to have a crew leader and 6–8 crew members who will sample 50-60 hexes on ONP and ONF and lend support to partners on non-federal lands.

We anticipate having all project partners participate again in 2014. Through our joint efforts in the target area we plan to sample all remaining unsampled hexes (26 hexes), and resample all accessible hexes sampled in 2013 that were not re-sampled in 2014 (49 hexes). Through this effort we will be able to examine fisher occupancy patterns across the Olympic Peninsula and examine changes in occupancy over the two-year interval from 2013-2015. This will permit the first analysis of the stability or turnover of fisher occupancy on the Olympic Peninsula. In the expansion areas south and east of the target study area we plan to sample 11-14 hexes, to further evaluate fisher colonization outside the primary (target) study area. In addition, we will continue to solicit incidental fisher observations and follow up on them when we are able. The incidental data provides valuable insights about fisher distribution and genetics.

Lastly, we will begin developing models of detection probability and occupancy patterns of fishers on the Olympic Peninsula. Final occupancy estimates will not be available until sampling in all target hexes has been completed, but preliminary estimates will be calculated from the partial data set.

Publications and Public Outreach Activities (2014)

Reports:

Happe, P. J., K. J. Jenkins, M. K. Schwartz, J. C. Lewis, and K. B. Aubry. 2014. Evaluation of fisher restoration in the Olympic National Park and the Olympic recovery area: 2013 annual progress report. U.G. Geological Survey Administrative Report. U.G. Geological Survey, Reston, Virginia.

Presentations:

Restoring Washington's fishers: a model of collaboration. USGS Webinar, August 2014.

Reintroducing the fisher to Washington: the Olympic Fisher Project. Presentation to Rayonier Corporation Employees and Contractors, December 2014, Lake Quinault, WA.

Funding (2014)

This project received $100,000 in funding from NPS-NRPP, $20,000 from Olympic National Forest, and $24,000 from USGS (through a grant provided by U.S. Fish and Wildlife Service Recovery Program). In addition, USFWS Recovery Program funding to USGS supported the DNA analysis, and will continue to support DNA analyses in FY2015. We have requested additional funding in FY2015 from the USFWS Recovery Program that would permit us to complete the resampling in 2016 of hexagons sampled in 2014. That would permit the analysis of occupancy dynamics from 2013-2016.

References Cited

Happe, P. J., K. J. Jenkins, M. K. Schwartz, J. C. Lewis, and K. B. Aubry. 2014. Evaluation of fisher restoration in the Olympic National Park and the Olympic recovery area: 2013 annual progress report. U.G. Geological Survey Administrative Report. U.G. Geological Survey, Reston, Virginia.

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Lewis, J. C. 2014. Post-release movements, survival, and resource selection of fishers (*Pekania pennanti*) translocated to the Olympic Peninsula of Washington. University of Washington Dissertation, University of Washington, Seattle, Washington.

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U.S. Fish and Wildlife Service. 2004. 12-month finding for a petition to list the west coast distinct population segment of the fisher (*Martes pennanti*). Federal Register 69(68):18770–18792.

U.S. Fish and Wildlife Service. 2014. Threatened species status for West Coast Distinct Population segment of fisher, proposed rule. Federal Register 79(194):60419-60443.

Appendix A. Founders detected in 2014

Animal ID	How Detected	Method	Hex	Release date	Age at Release	Age in 2014	Gender
M082	Study	Camera and DNA	170	Jan 21, 2010	0	5	Male
M075	Incidental	Camera and DNA	202	Jan 21, 2010	0	5	Male
M079	Carcass	Retrieval (3/10/2014)	309	Jan 21, 2010	3	8	Male

M082 was captured in British Columbia on 12 January 2010 and released on 21 January 2010 along Rugged Ridge on the west side of the Olympic Mountains (between the Bogachiel and Sitkum Rivers). He was 8 months old at the time of his release, and was radio-tracked for 21 months. Soon after his release M082 settled down along the coast near Kalaloch, and stayed there until we lost contact with him in September 2011 (presumably the batteries in his radio collar died). He was one of the animals in which test stations were deployed in the protocol development phase for this project in 2010 (see inset Figure 1A). He is the father OPF-0678 that was detected in 2013 (Happe et al. 2014). In 2014 he was detected in Hex 170, 62 km from his former home range, at 5 years of age.

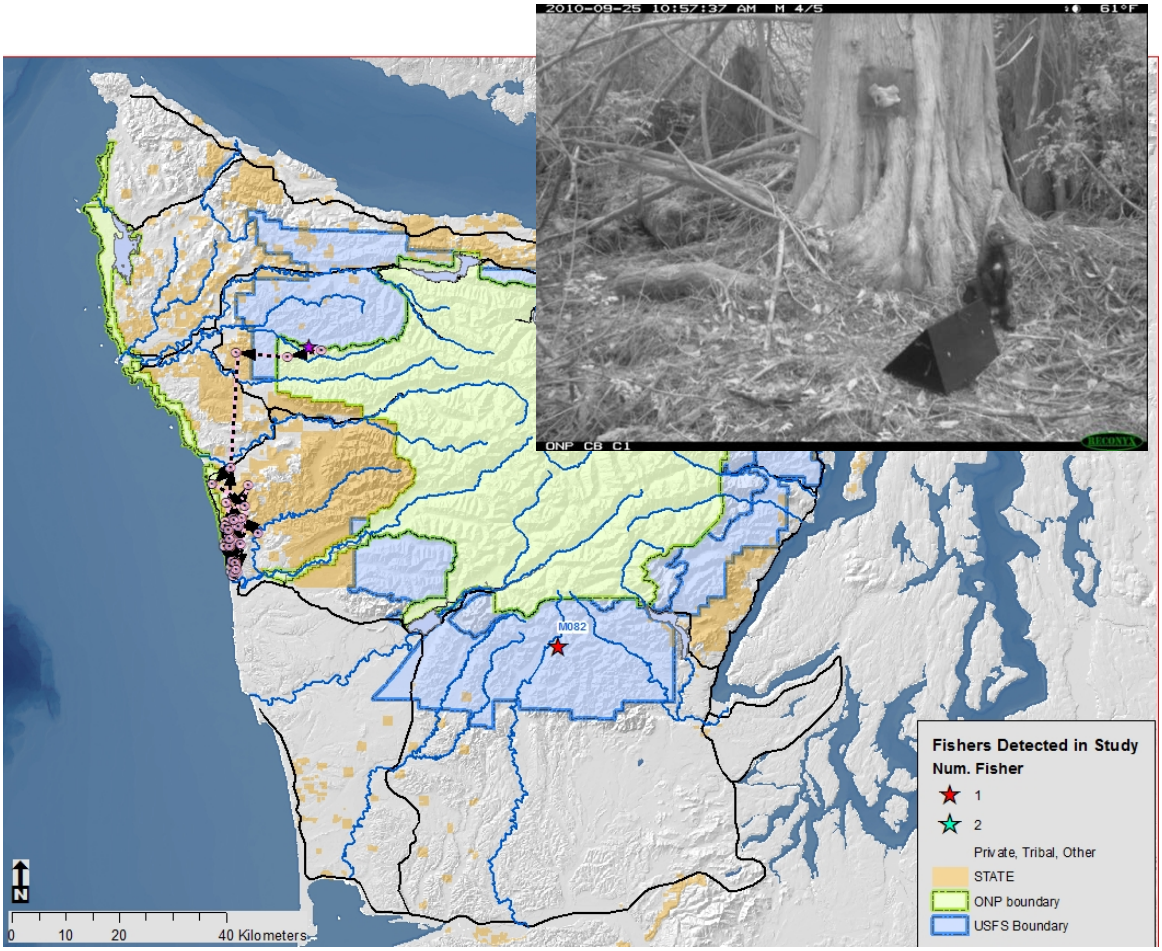

Figure A1. Release location (purple star) and movements of M082 from his release in 2010 through September 2011. The red start indicates where he was detected in 2014. Inset is photo of M082 from 2010.

M075 was captured in British Columbia on 24 December 2009 and released in the Quinault Valley on 21 January 2010. He was 8 months old at the time of release, and was radio-tracked for 23 months, until his signal was lost (presumably the batteries in his radio collar died). Although we radio-tracked his movements for almost two years, we do not have many telemetry locations due to his long-distance movements and difficulties radio-tracking. He is the father of OPF-0728, detected in 2013 (Happe et al. 2014). In 2014 he was detected in Hex 204 by the USFS Marten crew on 18 March 2014, but not detected by the study crews when the hex was sampled from May-July 2014. Since March is during the breeding season, this detection may represent a breeding season movement and not a location within his primary home range.

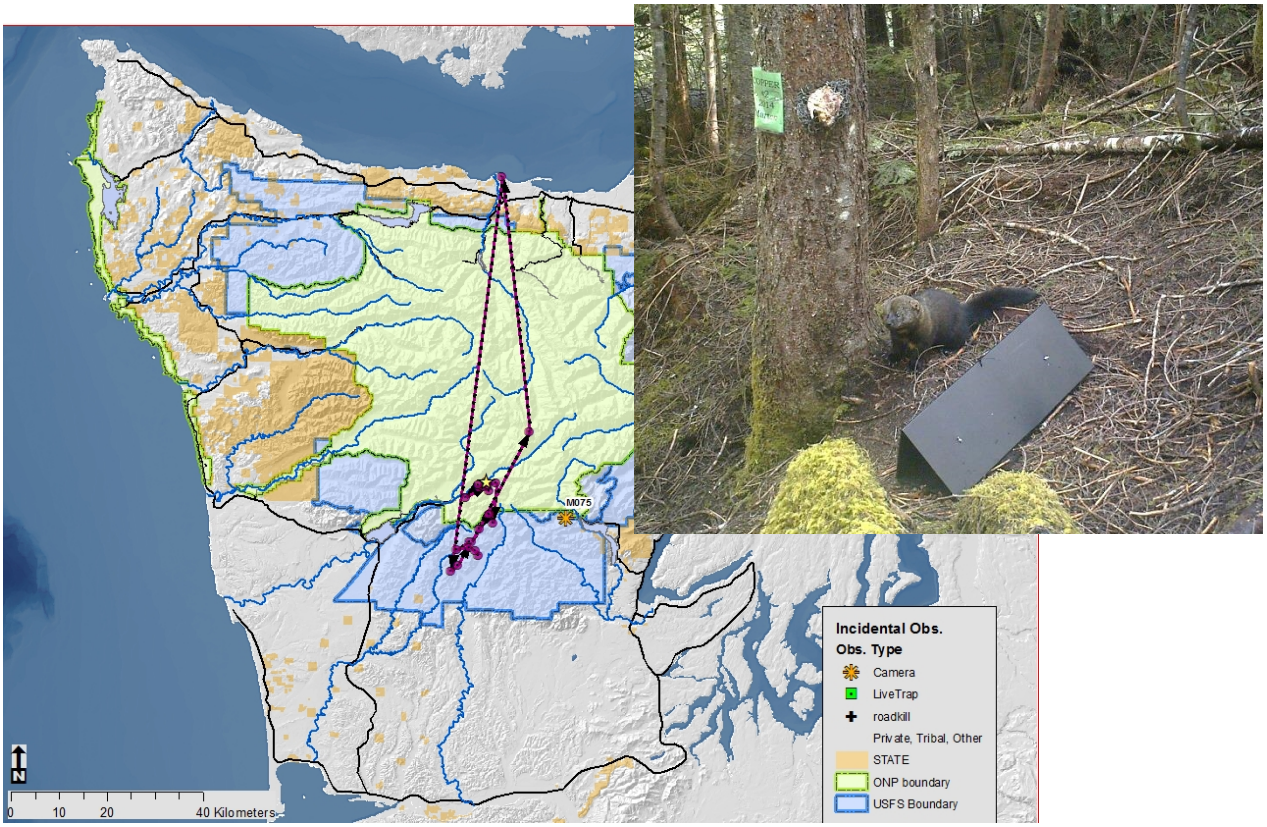

Figure A2. Release location (yellow star) and movements of M075 from January 2010 until November 2011. Also shown are where M075 was detected in March 2014, and a picture from that event.

M079 was captured in British Columbia on 2 January 2010, and released on 21 January 2010, in the Quinault Valley at Graves Creek. He was 3 years old at the time of release. He was equipped with an Argos collar that failed after only 3 months, so we had very little information on his movements, home range establishment, or fate. He was detected in the study only once, on the third visit and only at one station in Hex 309 in November 2013 (Happe et al. 2014). He was recovered along Highway 101 near that station in March 2015, when he was 8 years old. His carcass was submitted for necropsy and the cause of death was vehicle strike (Appendix C).

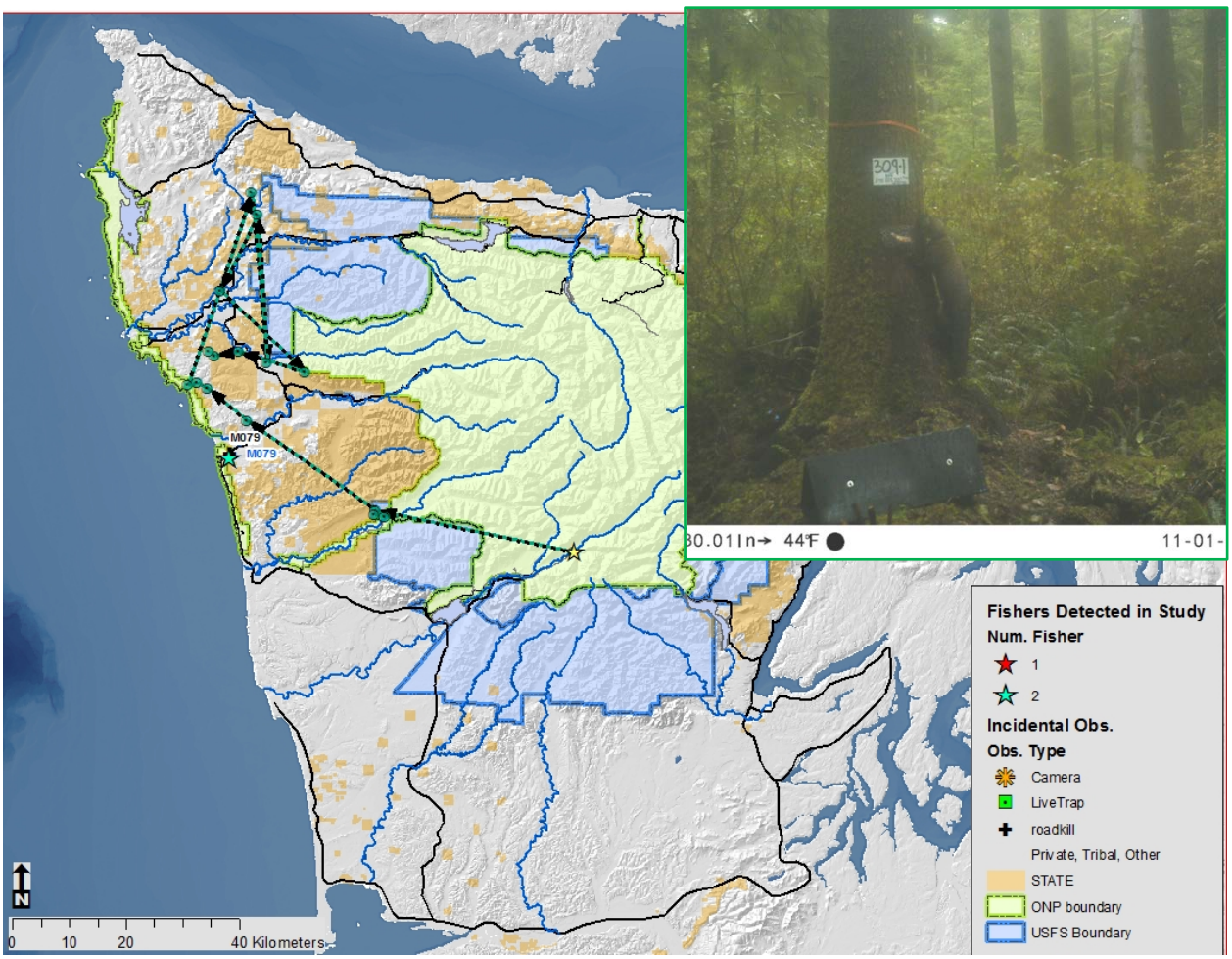

Figure A3. Movements of M079 from release until contact was lost in May 2010. Also shown are where M079 was detected in 2013 (aqua star) and recovered in 2014 (black cross). Inset is image of M079 captured in 2013 at Station 1 in Hex 309.

References:

Happe, P. J., K. J. Jenkins, M. K. Schwartz, J. C. Lewis, and K. B. Aubry. 2014. Evaluation of fisher restoration in the Olympic National Park and the Olympic recovery area: 2013 annual progress report. U.G. Geological Survey Administrative Report. U.G. Geological Survey, Reston, Virginia.

Appendix B. Parentage of recruits identified by DNA in 2014 in the occupancy study and incidental detections.

Table B1. Parentage of fishers identified by DNA in 2014, Olympic Peninsula, WA.

Animal ID	How Detected	Method	Recapture	Where	Mother	Father	gender
OPF0747	Study and Incidental	Camera and DNA	Incidental - no Study - yes	Hex 204	F007	M009	Female
OPF0751	Incidental	Camera and DNA	No	Hex193	OPF0747	M032	Female
OPF0301	Incidental	Camera and DNA	Yes	Hex546	F072	M061	Male
M101	Study	Camera and DNA	No	Hex202, 203	F088	Unknown, in BC	Male
F104	Incidental	Carcass	No	Hex 432	F004	M009	Female

OPF0747 and OPF0751

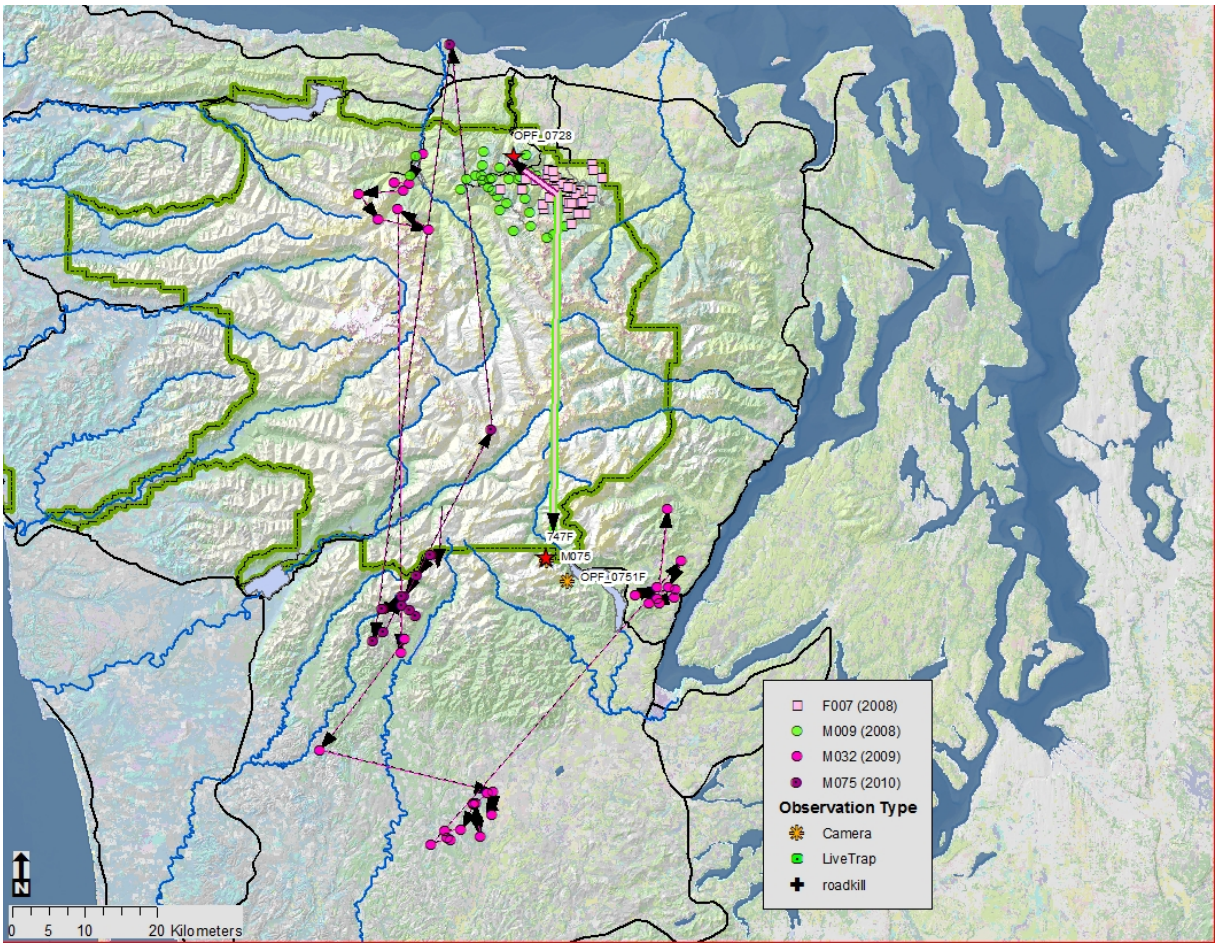

Figure B1. Movements of F007, M009. M032 and M075 post release. Also shown are detection locations of offspring of F007 and M075 (OPF-0728), F007 and M009 (OPF-0747) and OPF-0747 and M032 (OPF-0751).

Table B2. Summary of information known about parents of two new recruits identified by DNA in 2014, Olympic Peninsula, WA.

1) OPF0747 female		
Parental identification	Maternal: F007	Paternal: M009
Release year	2008	2008
Capture site separation		
Release age	2	0
Release site	Elwha	Elwha
Last heard	04/19/2010	9/17/2008
Fate	Unknown (shed collar)	Unknown (implant failure)
Home range determined	Yes	Yes
Home range area	NE: Maiden Creek	NE: Upper Morse Creek Drainage

2) OPF0751 female		
Parental identification	Maternal: OPF0747	Paternal: M032
Release year	Born in Washington	2009
Capture site separation	n/a	
Release age	n/a	0
Release site	n/a	
Last heard	n/a	9/29/2010
Fate	n/a	unknown
Home range determined	n/a	Not definitive
Home range area	n/a	SE

F007 was released in 2008 at age 2 in the lower Elwha Valley. We monitored her for 2.25 years and have extensive data on her movement patterns. She quickly established a home range just 10 km northeast of her release site in the Morse and Maiden Creek drainages (Figure B1). We were unable to confirm denning in 2008, and due to the timing of the occasional forays outside of her home range, we suspect that she did not den that year. However, we confirmed that F007 denned in 2009, when she was captured on camera while moving four kits from the den tree. We received a mortality signal from F007 on April 19, 2010, and upon investigation (on 6/18/2010) found a shed collar inside what we strongly suspect was a den tree due to abundant scat found at the site.

M009 was released in the Elwha at age 8 months, and soon after his release he settled down in the upper Morse Creek drainage (Figure B1). His implant failed in the fall of 2008, so our last location of him was in September 2008.

M032 was released in the Elwha on 21 December 2008 at age 8 months. He headed south after his release, and settled down south of the park in May 2009, below the target area. He moved out of that area during the breeding season in 2010, and was found northwest of Lake Cushman in June 2010. He stayed in that area until we lost contact with him in September 2010 (Figure B1).

Initially there were several possible parental candidates for OPF-0747 and OPF-751, but when the improbable parents were eliminated, the only possible parentage for OPF-0747 is F007 and M009. We know that F007 gave birth to a litter of kits in both 2009 and 2010, and had kit 0728 (with M075

as the father) in 2011 or later (Happe et al. 2014). It is likely that OPF-0747 is the offspring of F007 and M009, born in either 2009 or 2010.

OPF-0751 is the offspring of OPF-0747 and M032. The earliest OPF-0747 could have bred with M032 was in 2010, with OPF-0751 being born in 2011or later. She is the first documented second generation fisher in the state.

OPF-0301 was first detected in 2013 in Hex 563 (Happe et al. 2014). In September 2014 we were forwarded a picture from the backyard game camera of a resident that lives in a rural residential area between Port Angeles and Sequim. After obtaining the landowners permission, we deployed our standard station set up, verified the fisher detection, and got hair for DNA analysis. OPF-0301M was approximately 3 km from his closest detection site in 2013 (Figure B2).

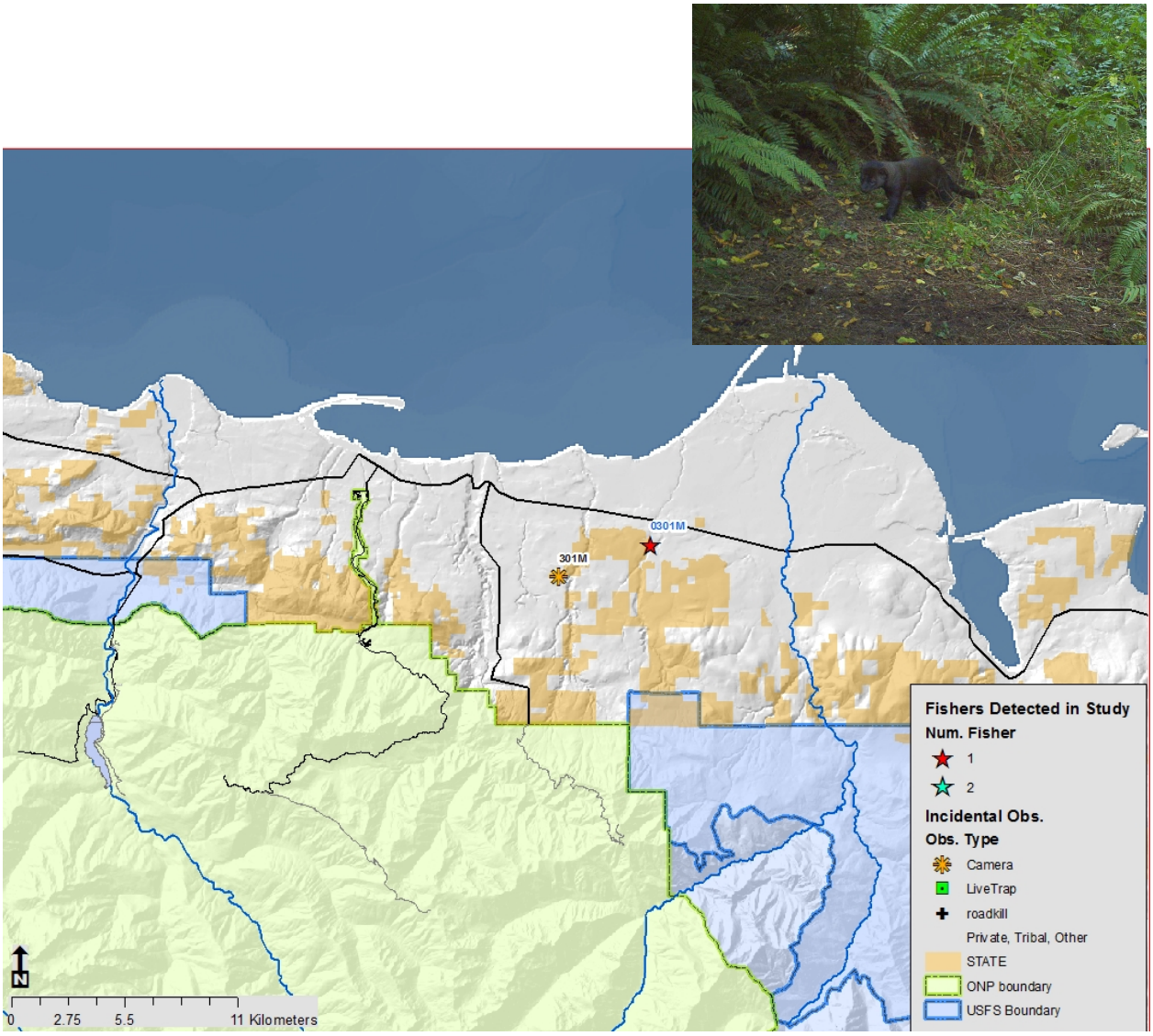

Figure B2. Location of detection of 301M in 2013 (red star) and 2014 (orange asterisk). Also show is one of the pictures forwarded to us by the reporting party.

M101 was one of the two kits born to F088 in 2010. F088 was a 3 year old female that was captured on 22 January 2010 in BC, and released into the park on 20 February 2010 in the Boulder Creek Drainage. She was pregnant at the time of her release, and quickly settled down and denned on DNR lands on the NE Peninsula by 5 April 2010. Her den site was closely monitored, and we documented that bobcats were frequenting the den tree. She was found dead on 8 June 2010 due to bobcat predation. We retrieved her two remaining kits on that day, and transferred them to Northwest Trek on 10 June where they were raised with minimal human contact. Following attainment of near mature size, and after they were observed to capture and kill live prey, they were released in to the Park on the road to Obstruction Peak on 15 October 2010. M101 was radio-tracked until 28 June 2011, at which time he shed his collar. He was detected in Hex 202 and 203, 47 km from his release site, in June 2014. He was 4 years of age at the time of his detection.

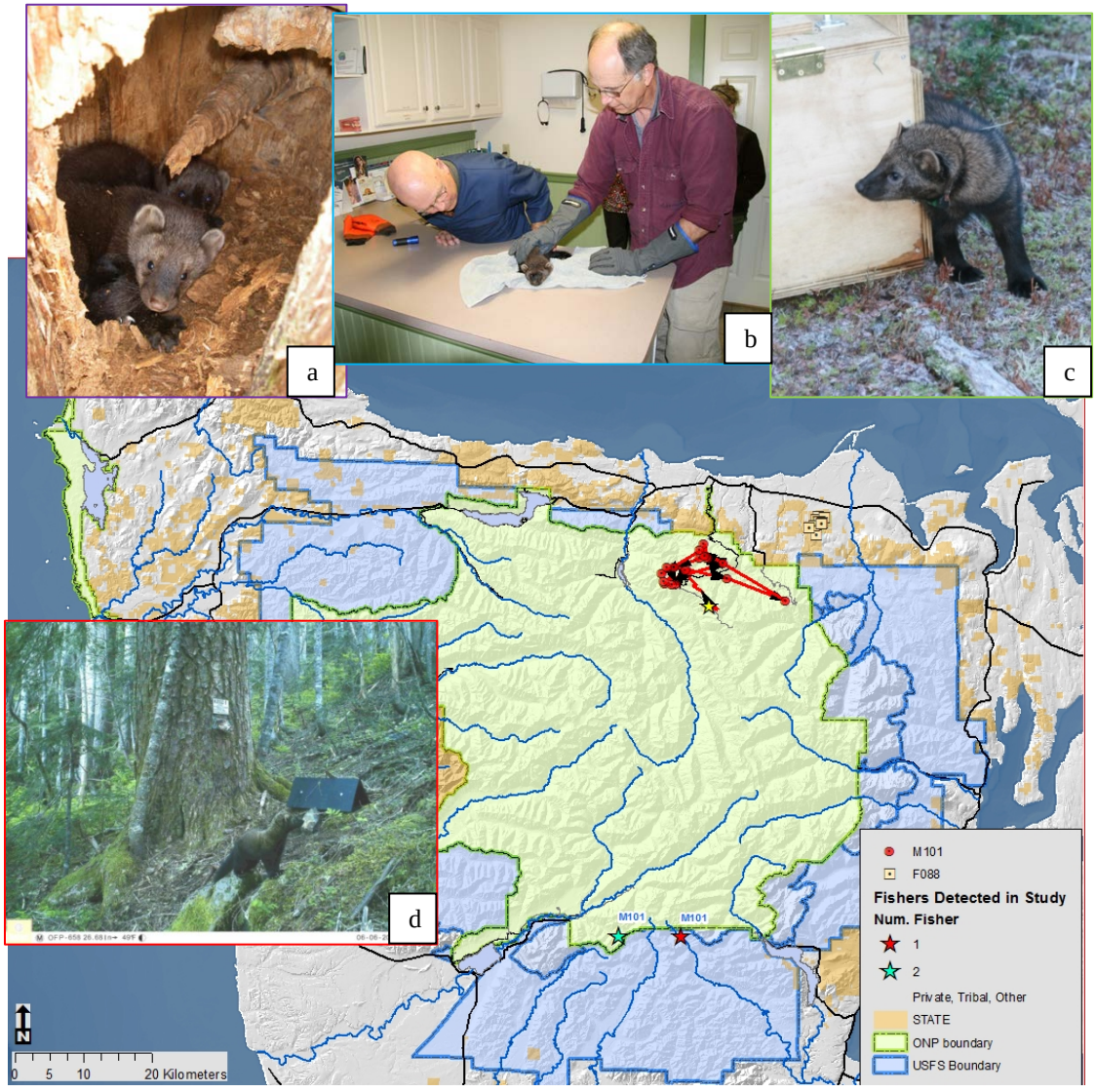

Figure B3. Den site location of F088 (2010), post- release movements of M101 (2010-2011), and location of detections of M101 in 2014. Also shown are a) M100 and M101 in the den, b) at the vets soon after rescue, c) M101 upon release in 2010, and d) detection in 2014.

F104 was a dead fisher that was retrieved in December 2013 on the Quimper Peninsula. Her necropsy was reported in the 2013 annual report (Happe et al. 2014), but at that time we did not have the results of the DNA analysis, or the age determination for F102, F103 or F104. Lab results indicated that, as was the case for F102 and F103, F104 was also the offspring of F004 and M009. Each animal was determined through dental analysis to be of a different age, and hence litter. The youngest was born in 2012, indicating that F004 lived until at least late summer 2012, and lived to be at least 7 years of age.

Figure B4. Locations of F004 (2008-2010) and M009 (2008) and retrieval sites of F102, F103, and F104. Also shown are a) F004 while in captivity in British Columbia and b) F004 with her 4 kits at the den tree in June 2010.

References:

Happe, P. J., K. J. Jenkins, M. K. Schwartz, J. C. Lewis, and K. B. Aubry. 2014. Evaluation of fisher restoration in the Olympic National Park and the Olympic recovery area: 2013 annual progress report. U.G. Geological Survey Administrative Report. U.G. Geological Survey, Reston, Virginia.

Appendix C. National Park Service necropsy reports

Colorado State University
VETERINARY DIAGNOSTIC LABORATORIES

300 West Drake Road
Fort Collins, CO 80523-1644
(970) 297-1281

Laboratory Report
Final

This report supersedes all previous reports for this case

Case #:	F1418874
Referral #:	NPS 14-046/OLYMM079
Date Collected:	03/10/2014
Date Received:	03/19/2014
Case Coordinator:	Dr. Terry Spraker
Owner:	Olympia National Park

Email To: npsdiagnostics@nps.gov
Technical Assistance for Veterinary Path
Dr. John Bryan
1644 Campus Delivery
Attn: Connie Heighes
FORT COLLINS, CO 80523-1644

Electronically Signed and Authorized By:
Dr. Hana Van Campen,
Dr. Terry Spraker
sent by Elaine Andersen
on 4/17/2014 9:12:55AM

Case Contacts

Bill To	Technical Assistance for Veterinary Pathology	9702975163	npsdiagnostics@nps.gov
Submitter	Bryan, John	970-267-2122	npsdiagnostics@nps.gov

Specimen Details

ID	Taxonomy	Sex	Age
NPS 14-046/OLYMM079	Fisher	Male	8.0 Years

Owner: Olympia National Park

Specimens Received: Body; Liver Tissue; Lung Tissue; Skin Tissue; Spinal Cord Tissue;

Clinical History

This 8-year-old male fisher was collared. It was found hit by a car on 3/9/14. It was frozen and submitted for necropsy.

Laboratory Findings/Diagnosis

HISTOPATHOLOGIC DIAGNOSIS: Skin of tail, thin epidermis: No evidence of inflammation except for a few focal areas of serosanguineous crusty material. No bacteria or parasites observed on histopathology.

REMARKS: The immediate cause of death in this 8-year-old fisher was being hit by a car. The skin of the tail that was showing alopecia was characterized by thin epidermis, but no evidence of inflammation, bacteria, or parasites. There are one or two small areas of accumulation of a serocellular debris on the surface of the epidermis. However, there is no evidence of inflammation associated with these areas.

GROSS NECROPSY: This animal was crushed very extensively; many bones are broken and the abdomen has been opened. The only lesion found is a degree of alopecia to the back and to the tail.

HISTOPATHOLOGY:
Slide 1.
Lung: There is an extensive amount of postmortem edema, but no evidence of pneumonia or inflammation is found in these two sections of lung.
Diaphragm: No significant lesions.

Slide 2.
Skeletal muscle: A few sarcocysts are found, but no evidence of inflammation is found around the sarcocysts. The sarcocysts are of the small merozoite type.
Liver: Two sections are examined; both are within normal limits.
Kidneys: No significant lesions.
Skin: This section of skin is from the tail. There are very few hair follicles in this region. The epidermis is relatively thin and

there is no evidence of inflammation within the dermis. There is no evidence of bacteria or parasites in this section of skin.
Adipose tissue: This section of adipose tissue is considered to be normal. The lipocytes are filled with lipid.

Slide 3.
Atrium: No significant lesions.
Heart: No significant lesions.

Slide 4.
Esophagus: No significant lesions.
Trachea: No significant lesions.
Testes: This is actually a section of epididymis. The epididymal tubules are filled with spermatozoa.

Slide 5.
Tail: Several cross sections of tail are examined. The epidermis is thin. There are both sweat and sebaceous glands. Many of the hair follicles do not contain hair shafts. There is no evidence of inflammation associated with these hair follicles. Bacteria or parasites are not found on the surface or within hair follicles. There are some areas where there is serocellular crusty material, but organisms are not seen in this crusty material.

3-19-14: Liver was sent to TVMDL for an Anticoagulant Screen--results negative.

Terry R. Spraker, DVM, PhD, DACVP

Prelim: 04/05/14 TRS
Full report: 04/08/14 lmj

Parasitology

External Parasite ID

Animal/Source	Specimen	Specimen Type	Result Date	Results
NPS 14-046/OLYMM079	3	Skin Tissue	07-Apr-2014	No mites or any other ectoparasites detected

Virology

Canine Distemper Virus (CDV) FA

Animal/Source	Specimen	Specimen Type	Result Date	Results
NPS 14-046/OLYMM079	4	Lung Tissue	26-Mar-2014	Negative

Rabies FA

Animal/Source	Specimen	Specimen Type	Result Date	Results
NPS 14-046/OLYMM079	2	Spinal Cord Tissue	20-Mar-2014	Negative

Necropsy

Necropsy Wildlife / Exotics Gross Examination Only

Animal/Source	Specimen	Specimen Type	Result Date	Results
NPS 14-046/OLYMM079	1	Body	17-Apr-2014	Complete

Referral Tests

Owner: Olympia National Park

Referral Lab Send Out Test

Animal/Source	Specimen	Specimen Type	Result Date	Results
NPS 14-046/OLYMM079	F1418874-01.0005	Liver Tissue	07-Apr-2014	Complete - See attached

Appendix - Report Related Images

Texas A&M Veterinary Medical Diagnostic Laboratory
1 Sippel Road
College Station TX 77843-4471
Phone: (979) 845-3414 Fax: (979) 845-1794

Report Date: 3/25/2014

Final Report

Date Received: 3/20/2014
Collection Date: 3/10/2014

Case Coordinator: Tam Garland, DVM, PHd, DABVT

Accession No: C140790280

ATTENTION: LISA
COLORADO STATE UNIVERSITY
VETERINARY DIAGNOSTIC LABORATORY
FORT COLLINS CO 80523

Phone: (303) 297-1281
Fax: (970) 297-0320
Email: nancy.ault@colostate.edu

Assodated Parties
Receives In State Pricing: Colorado State University (Account #: A09364)
Attn: Attention: Lisa, Veterinary Diagnostic Laboratory Fort Collins, CO Larimer 80523 (303) 297-1281
Owner: (F14-18874 NPS14-046 Fisher) NPS

Customer Requests
Specimens Submitted:
Liver (1 fresh labeled "F14-18874 NPS14-046 Fisher Liver")

Customer Test Request
Anti-Coagulant Screen

Animal Information
F14-18874 NPS14-046 Fisher; Male; 8 Years

History

/ga

Lab Findings

Toxicology

Specimen	Test Name	Anticoagulant Test
F14-18874	NPS14-046 Fisher - Male - 8 Years	
Fresh tissue - 1	Anticoagulant screen general (HPLC - Anticoagulants)	Anticoagulant Screen Negative
	No anticoagulant rodenticide compounds were detected in this sample. The General Anticoagulant Screen tests for coumarins (brodifacoum, bromadiolone, difenacoum, difethialone and warfarin) and indanediones (chlorophacinone and diphacinone). – Dr. Garland / pr	

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End of Report

The Department of the Interior protects and manages the nation's natural resources and cultural heritage; provides scientific and other information about those resources; and honors its special responsibilities to American Indians, Alaska Natives, and affiliated Island Communities.

NPS 149/128760, June 2015

National Park Service
U.S. Department of the Interior

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