National Park Service
U.S. Department of the Interior

Natural Resource Stewardship and Science

Cascades Fisher Reintroduction Project

Progress Report for December 2015 to March 2017

Natural Resource Report NPS/PWR/NRR—2017/1486

ON THE COVER
Fisher release at Longmire, Mount Rainier National Park, December 17, 2016
Paul Bannick, Conservation Northwest

Cascades Fisher Reintroduction Project

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Abstract

Fishers (*Pekania pennanti*) were extirpated from Washington as a result of over-trapping, habitat loss, and predator eradication programs. A mid-sized member of the weasel family, fishers occurred in the coniferous forests of Washington until the early and mid-1900s. We established a partnership between federal, state, and non-profit organizations with the goal to restore fishers to their former range in Washington. This partnership reintroduced 90 fishers from British Columbia to Olympic National Park from 2008 to 2010, and we are now in the second year of a reintroduction project to restore fishers to Mount Rainier National Park (MRNP), Gifford Pinchot National Forest (GPNF) and the larger South Cascade Ecosystem. In Year 1 of the project, we released 23 fishers (11 F, 12 M; each with a radio-transmitter) at a single release site on the GPNF and we monitored their movements and survival via aerial and ground telemetry. In Year 2, we released an additional 46 fishers (27 F, 19 M; each with a radio-transmitter), with 16 fishers released at one site in MRNP and 30 released at one site in GPNF. We have relocated individual females using telemetry an average of 19 times (range 2-30, standard deviation 8.6) and males 12 times (range 5-22, standard deviation 6.5). We documented an apparent survival rate of 78.3% (5 deaths of 23 released) in the Year 1 cohort, and surviving individuals appear to have localized. We did not document reproduction in Year 1, however nearly all released animals were age 0-1 in that time period. Year 3-5 of the project aims to release 80 fishers in the North Cascade Ecosystem, with continued monitoring across both restoration areas.

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Introduction

Fishers (*Pekania pennanti*) are a mid-sized member of the weasel family (Mustelidae) that historically occurred in the dense coniferous forests of Washington (Powell 1993, Lewis and Stinson 1998). Unregulated harvest, loss and fragmentation of habitat, and predator control campaigns beginning in the late 1800s collectively resulted in the decline and extirpation of fishers from Washington by the mid-1900s. Consequently, the fisher was listed as an endangered species in the state and recovery actions have been outlined to restore fishers in Washington (Lewis and Hayes 2004, Hayes and Lewis 2006).

Given the success of reintroductions for restoring fisher populations (Lewis et al. 2012), Washington Department of Fish and Wildlife (WDFW), the National Park Service (NPS), and Conservation Northwest (CNW) teamed-up to plan, implement, and monitor the success of fisher reintroductions on the Olympic Peninsula (Lewis et al. 2012, Lewis 2014, Happe et al. 2016) and the Cascade Range in an effort to restore fishers in the largest portions of their historical range in Washington.

Planning for the Cascades fisher reintroduction project began in 2013 with WDFW's Implementation Plan for Reintroducing Fishers to the Cascades Range in Washington (Lewis 2013). Mount Rainier National Park and North Cascades National Park Service Complex led the National Environmental Policy Act process and completed a Fisher Restoration Plan / Environmental Assessment in May 2015 (NPS 2015). Project partners worked with the British Columbia Ministry of Forests, Lands and Natural Resource Operations (FLNRO), British Columbia Ministry of Environment (MOE) and the Tsilhqot'in, Secwepemc, and Dakelh First Nations to obtain an approved capture and transport permit for the capture and translocation of up to 160 fishers over five years to Washington. Planning efforts also required contracting with organizations to 1) coordinate trapping efforts with licensed British Columbia trappers, 2) house and care for captive fishers, and 3) provide veterinary services for health inspections and preparing fishers for release. These planning efforts were completed by October of 2015.

Our goal is to re-establish a self-sustaining fisher population in both the southern (Figure 1) and northern portions of the Cascade Recovery Area as outlined in the fisher recovery plan for Washington State (Hayes and Lewis 2006). To accomplish this goal, we have the following objectives for each portion of the Cascade Recovery Area:

- **Objective 1**: Capture a founder population of 80 fishers (~40 F and ~40 M) from central British Columbia and release them in the southern portion of the Cascade Recovery Area (Figure1) over 2-3 years, followed by another 80 fishers in the northern portion over 2-3 years.

- **Objective 2**: Release fishers at few (2-3) locations at each of the two portions of the Recovery Area to increase the likelihood of fishers interacting, i.e., finding mates, and learning habitat suitability from previously released fishers.

- **Objective 3**: Release as many fishers as possible before January 1, so that the stress of the reintroduction process occurs well before the active gestation period of female fishers (from late-February to late-April), which is expected to improve reproductive success.

- **Objective 4**: Monitor post-release movements, survival, home range establishment, and reproduction to evaluate initial success of the reintroduction project during the 3-4 years when we track fishers with functioning radio-transmitters.

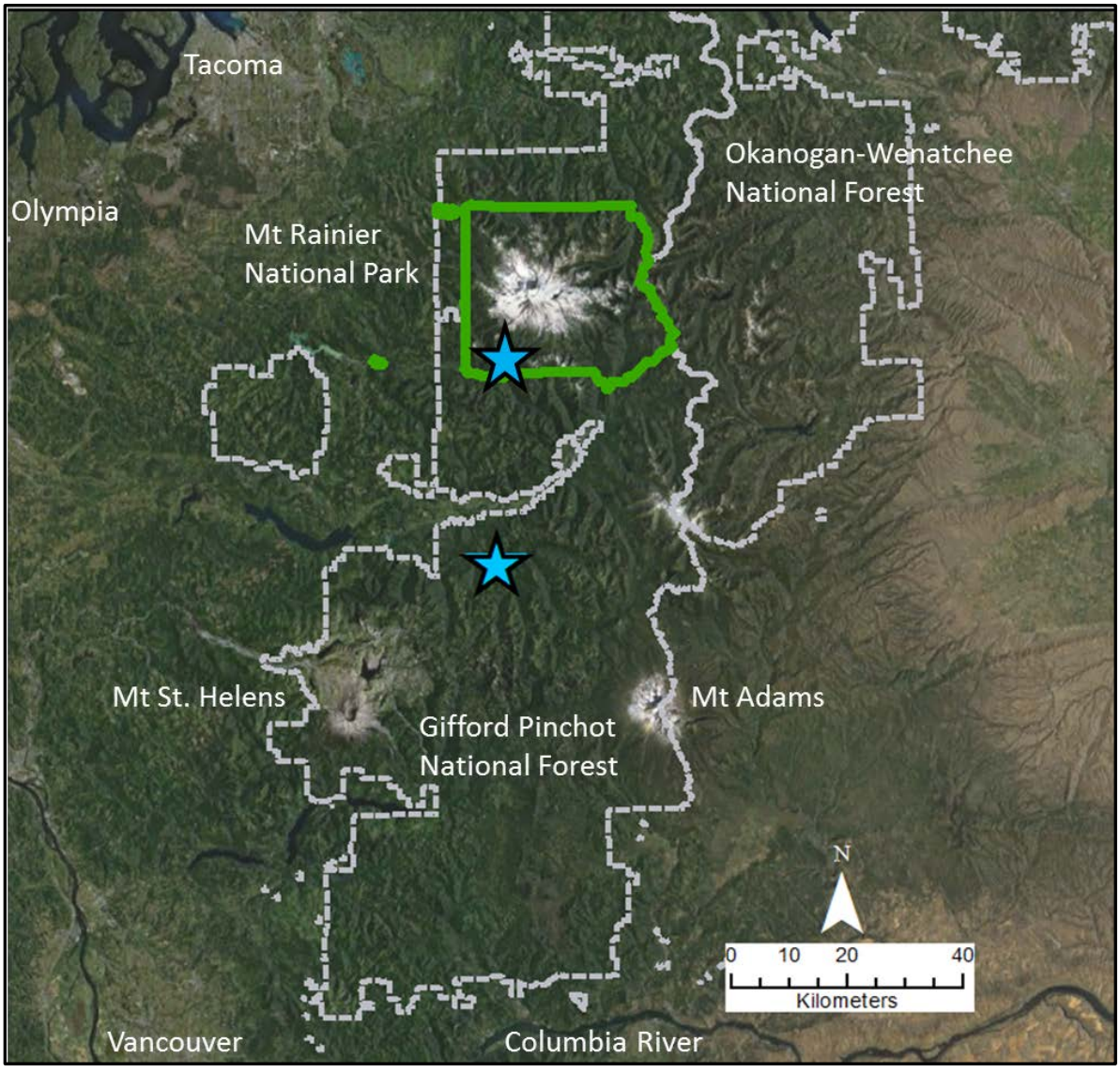

Figure 1. A map of the southern portion of Cascade Recovery Area. The blue stars indicate the two locations where fishers were released during the project. The northern star indicates the Longmire release location in Mount Rainer National Park and the southern star indicates the Cispus Learning Center on the Gifford Pinchot National Forest.

In this report we provide background information, methodologies used, and progress made during the first 1.5 years of the fisher reintroduction project in the southern Cascade Range in Washington.

Reintroduction Process

There are four main aspects of the reintroduction process: (1) the capture, housing, and care of fishers; (2) the preparation of fishers for reintroduction; (3) transportation of fishers to Washington; and (4) release of fishers in the southern portion of the Cascades Recovery Area (Figure 1). Following reintroduction, both short-term and long-term monitoring efforts are essential for determining the success of the restoration effort.

Conservation Northwest (CNW) developed contracts with individuals to coordinate trapping activities with British Columbia trappers, and to provide a captive facility and captive care for captured fishers. Contractors communicated project goals and objectives to local trappers, recruited participating trappers, provided trappers with box traps and transport boxes, retrieved fishers from trappers, and compensated trappers for fishers that were approved for translocation.

Fishers were captured during the fisher trapping season in British Columbia, which occurs from November 1 to February 15 each year. Within the captive facility, captured fishers were placed within individual housing units (Figure 2). Each fisher was also provided straw bedding, a litter box, ad libitum water, and a diet that promoted weight-gain, which consisted of venison, moose, beef and beaver meat.

The captive facility had the capacity to hold up to 14 fishers. When the number of captive fishers reached a minimum of five, arrangements were made to process and transport captive fishers to the Southern Cascades Recovery Area to minimize time in captivity. Processing fishers for translocation involved chemically immobilizing each fisher, evaluating health and condition, vaccinating for distemper and rabies, treating for ectoparasites and endoparasites, taking measurements and photos, obtaining tissue samples, and equipping each animal with a pit-tag and a VHF radio-transmitter, which was surgically implanted in the abdomen. The processing team included biologists from WDFW, NPS, CNW, FLNRO, the local fisher contractors, and the contract veterinarian and veterinary technicians. The veterinary team provided a health certificate for all healthy fishers to facilitate their export from British Columbia to Washington.

For transport, we built specialized transport boxes and provided food, water, and bedding (Figure 2). Each transport box was secured in the bed of a pick-up truck with a canopy. 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 our documentation and conducted an inspection of the trucks and cargo. Upon arriving at the release site, each fisher was given more water and food, and was kept in its transport box until it was released the following morning. Fishers were released at two pre-determined sites within the southern portion of the Cascade Recovery Area: the Cispus Learning Center south of Randle, WA and at Longmire in Mount Rainier National Park (Figure 1).

Figure 2. A photo of a fisher housing unit on a stand, and a fisher transport box underneath. The housing unit is composed of a 2-chambered wooden compartment (24” x 24”x 48”) with bedding, litter box, and water container, and a wire-cage run (24’x 48” x 60”) with logs, branches and bedding.

Progress to Date

Objective 1 - Capture a founder population of 80 fishers (~40 F and ~40 M) from central British Columbia and release them in the southern portion of the Cascade Recovery Area over 2-3 years.

In the first year of the project, 23 fishers (11F, 12M) were successfully captured in central British Columbia (Figure 3), transported to Washington, and released on four occasions from 3 December 2015 to 6 February 2016 near the Cispus Learning Center (Table 1). In the second year of the project, 46 fishers were captured (27F, 19M; Figure 3) and released on seven occasions: twice at Longmire at Mount Rainier National Park and on five occasions at the Cispus Learning Center (Table 1). Currently, we are 11 animals shy of meeting our objective of releasing 80 fishers in the southern Cascade Range.

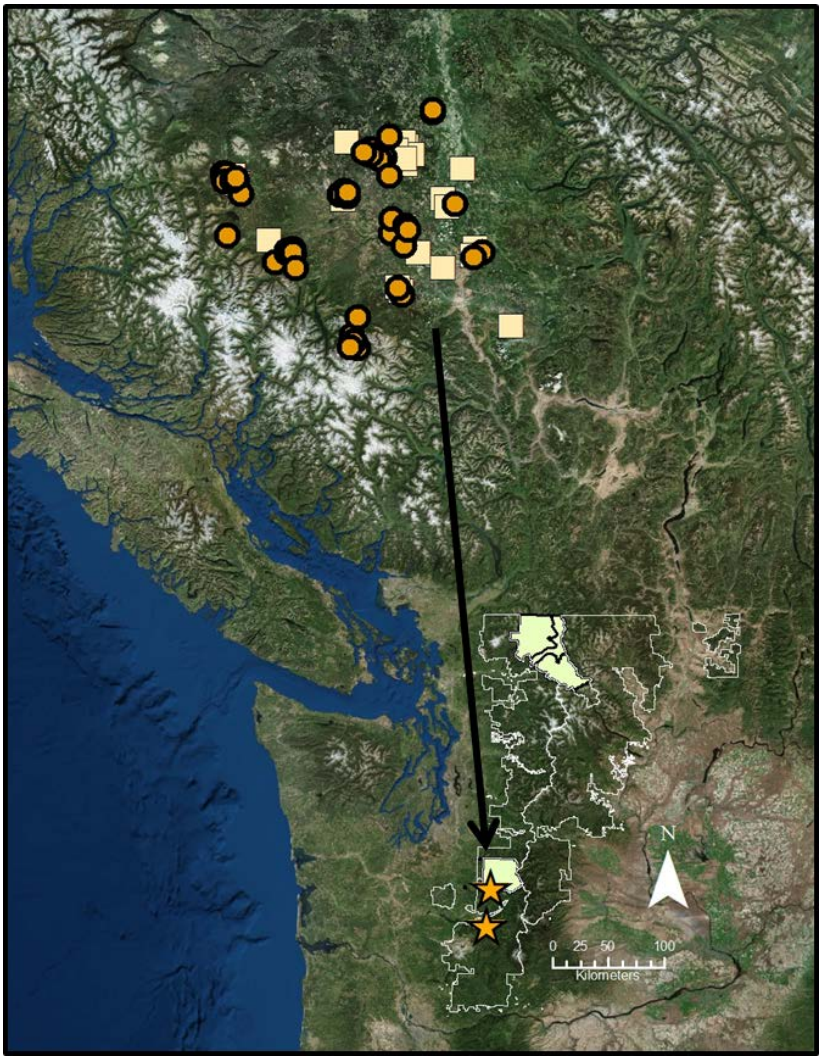

Figure 3. The capture locations of the 69 fishers captured in central British Columbia and the location of the southern portion of the Cascade Recovery Area in Washington (~650 km from center of the capture area to the Cispus release site). The tan squares indicate fisher capture locations during the 2015/2016 capture season (n=23), and the orange circles indicate the 2016/2017 capture locations (n=46).

Table 1. The number of fishers released at release events in the southern portion of the Cascade Recovery Area during the 2015/16 and 2016/17 capture and release seasons.

Location	Date	Fishers	Females	Males
Cispus Learning Center	December 3, 2015	7	4	3
Cispus Learning Center	December 23, 2015	4	1	3
Cispus Learning Center	January 16, 2016	6	2	4
Cispus Learning Center	February 6, 2016	6	4	2
Mount Rainier National Park	December 2, 2016	10	4	6
Cispus Learning Center	December 10, 2016	8	4	4
Mount Rainier National Park	December 17, 2016	6	4	2
Cispus Learning Center	December 31, 2016	6	2	4
Cispus Learning Center	January 13, 2017	7	4	3
Cispus Learning Center	February 3, 2017	4	4	0
Cispus Learning Center	February 20, 2017	5	5	0
Total Fishers Released		69	38	31

Objective 2 - Release fishers at few (2-3) locations to increase the likelihood of fishers interacting, i.e., finding mates, and learning habitat suitability from previously released fishers.

We met this objective by having released fishers at only 2 release sites (Table 1). While this objective was not difficult to achieve, we were not certain that the bulk of year-1 fishers would remain near the Cispus release site. If year-1 fishers had moved greater distances from the Cispus site, we would have wanted to use additional release sites so that we could release year-2 fishers in close proximity to them.

Objective 3 - Release as many fishers as possible before 1 January to facilitate reproductive success, by conducting the reintroduction process well before the active gestation period of female fishers.

In Year-1, we had poor capture success in November of 2015 (i.e., poor access to trap lines, and little snow for tracking), however we were still able to release 5 of 11 (45%) females before 1 January 2016. In year-2, capture success in November and December was much better and we were able to release 14 of 27 females (52%) before 1 January, 2017 (Table 1). Given the challenges of capturing fishers in November and December, we were fortunate to release 19 (50%) of our females prior to 1 January. For context, only 15 of the 50 females (30%) translocated during the Olympic fisher reintroduction project were released before 1 January (Lewis et al. 2011).

Objective 4 - Monitor post-release movements, survival, home range establishment, and reproduction to evaluate initial reintroduction success during the 3-4 years when we track fishers with functioning radio-transmitters.

Year 1 post-release monitoring indicated that 11 fishers (7F, 4M) appeared to have established a home range. No reproduction was detected, although most animals were too young to reproduce in the first year post-release. Seven mortality signals (3F, 4M) were detected in Year 1. Year 2 post-

release monitoring is underway. Movements, home range establishment, and reproduction findings are summarized in pages 7-12.

Monitoring Methods

Aerial telemetry was the primary method used to obtain most of the data to evaluate post-release movements, survival, home range establishment and reproduction. Our goal was to fly approximately 5 times per month to locate fishers using fixed-wing aircraft; however, our success at flying has been challenged by inclement weather in all but 2 months. To date, we have conducted 40 aerial telemetry flights (from 26 December 2015 to 11 April 2017; Figure 4), which included 161 hours of flight time, at a cost of $80,500. During these flights we obtained 445 locations (260 for females, 185 for males), for an average of 2.76 locations per hour and an average cost of $180.90 per location. During these flights, we determine fisher locations and survival status (live vs mortality signal), and we use these data to assess movements between locations and clustering of locations that may indicate home range establishment. We also used ground telemetry techniques to walk in to sites to investigate mortality signals and recover dead fishers to determine cause of death. We plan to use ground-based telemetry to locate potential fisher den sites and deploy remote cameras at these sites to document reproduction.

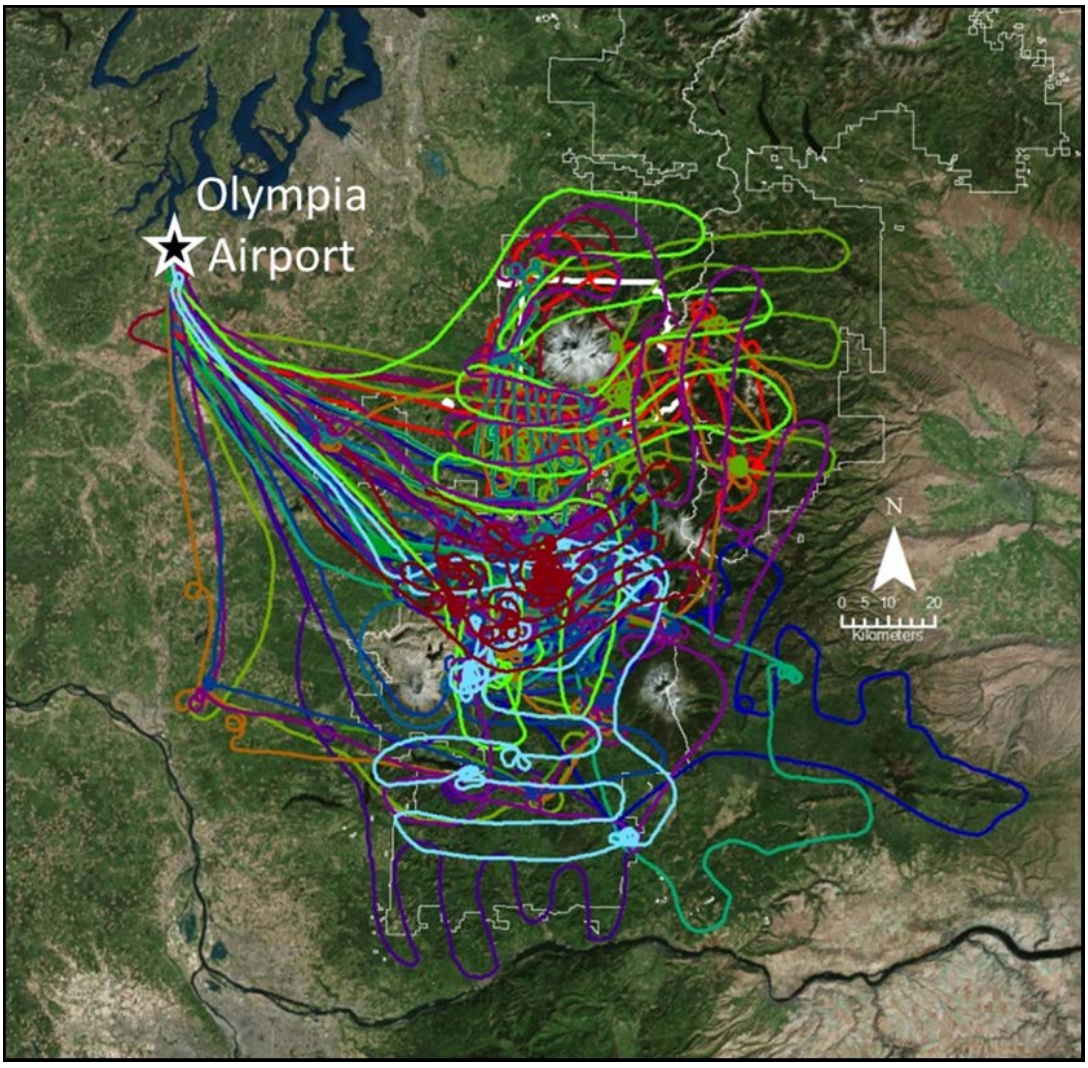

Figure 4. Flight lines for 30 of the 40 aerial telemetry flights conducted to locate radio-tagged fishers from December 2015 to March 2017.

Movements and Home Range Establishment

One goal of any reintroduction is to release individuals in landscapes dominated by high quality habitat. Post-release movements and home range establishment by released individuals can be used as indicators of how individuals perceive the suitability of the habitat where they are released. Home range establishment is defined here as the use of a localized area as indicated by ≥10 sequential locations. Given the limited amount of time we have had to monitor fishers released in year-2 of the project, we focus in this report on the movements and home range establishment of fishers released in year-1 (Figure 5).

Our initial analysis of movements indicated that the mean distance to all telemetry locations for male and female fishers released in year 1 was approximately 25 km from the Cispus release site. This mean distance (~25 km) indicates that many fishers are using landscapes relatively close to the Cispus release site, and this is an encouraging finding because extended movements away from a

release site are associated with greater mortality risks. The maximum distances we observed for movements were for male M026, which was located on two occasions near Snoqualmie Pass (108.5 km from Cispus), and for female F002, which established a home range east of Kelso, Washington (most distant point is 78.8 km from Cispus) (Figure 5).

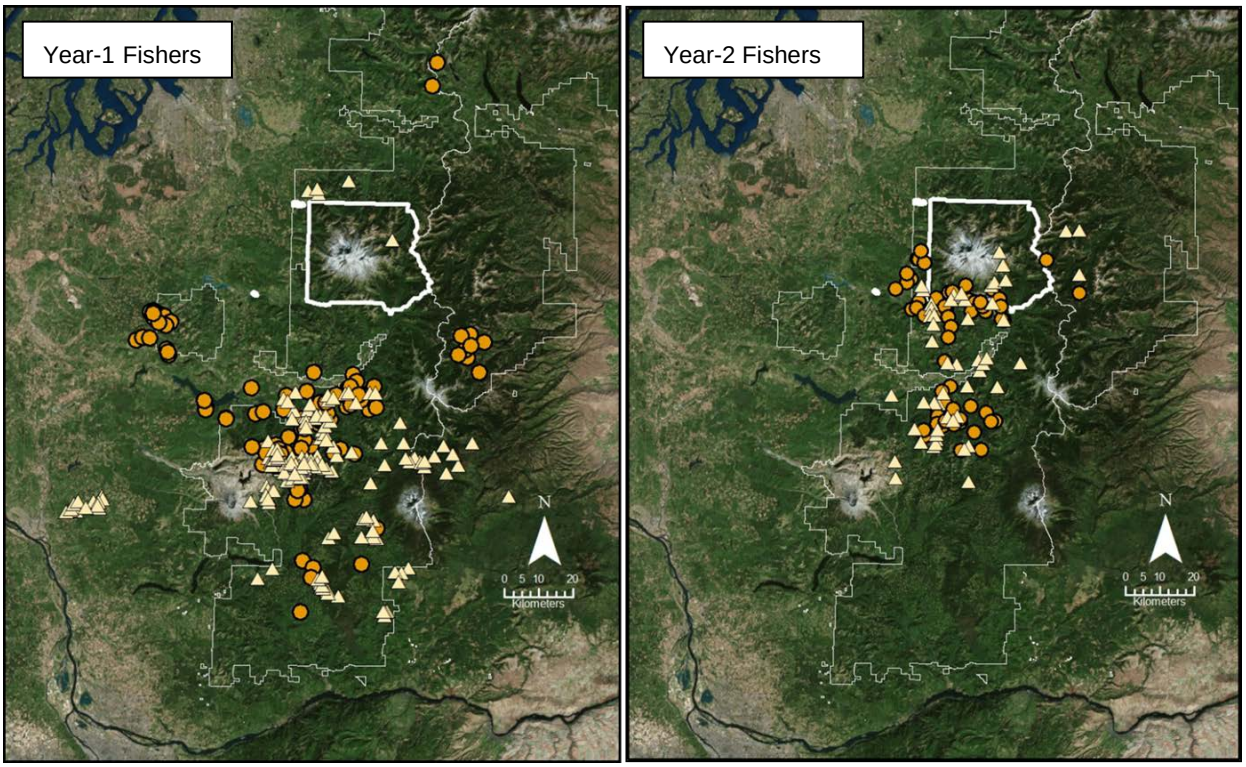

Figure 5. Telemetry locations of fishers released in year 1 of the project (325 locations in the left graphic; released from December 2015 to March 2016) and for those released in year 2 (120 locations in the right graphic; released from December 2016 to March 2017). Females are indicated by tan triangles and males by orange circles.

While telemetry locations are informative of general movement patterns, home range establishment provides an additional indication of habitat suitability for reintroduced fishers and we used it as an initial measure of reintroduction success. We used home range establishment by ≥50% of individuals following release, and home range establishment relatively close to the release site, as positive indications of habitat suitability and success. We identified seven of 11 females (64%) and four of 12 males (33%) that appeared to establish a home range. Four males from the year-1 cohort have not been located recently and one male died when we had only 9 sequential locations for it in a localized area, so our home range establishment estimate for males could be viewed as a minimum estimate. For context, among the fishers released during the Olympic fisher reintroduction project, 27 of 50 females (54%) and 21 of 40 males (46%) established home ranges in their first year (Lewis 2014).

Among the 11 fishers (7F, 4M) that appeared to have established a home range in the southern Cascade Range, the mean distance from the Cispus release site to the home range was 30.5 km for females and 25.2 km for males, however there was considerable variance among these distances

(Table 2). These estimates were similar for females on the Olympic Peninsula (i.e., 30.1 km, n=27), but smaller than those of males on the Olympic Peninsula (i.e., 44.5 km; n=21) (Lewis 2014).

Table 2. Mean and range of distances from the Cispus release site to all female and male telemetry locations for fishers released in year 1, and the mean and range of distances from the Cispus site to the home range centers of year-1 fishers that established home ranges.

Sample (n)	Mean distance (SE)	Range
Female telemetry locations (210)	26.8 km (1.4)	0.5 – 78.8 km
Male telemetry locations (129)	24.7 km (1.9)	0.2 – 108.5 km
Female home range centers (7)	30.5 km (9.1)	15.3 – 78.3 km
Male home range centers (4)	25.2 km (10.0)	12.1 – 55.3 km

Survival and Mortality

Our objective of releasing enough fishers in 2-3 years to establish a self-sustaining population depended on annual survival rates that were ≥50%, especially for females. If survival was less than 50% we would likely need to conduct an additional year(s) of releases to meet our founder population goals.

While we are unable to address the survival rates of year-2 fishers because releases were so recent, we have not yet observed mortality among those released in year 2. For year-1 fishers, we have observed seven mortality signals (3F, 4M); among those, we have recovered the remains of 5 (3F, 2M) (Table 3). Of the five fishers that we recovered, we have determined the cause of death for three: male M005 died from wounds and an infection following a fight (Figure 6), female F006 died of starvation following a skull/jaw injury, and female F021 was killed by a vehicle. We suspect predation as the cause of mortality for males M007 and M009. We cannot determine a cause of death for male M016, whose transmitter is in Riffe Lake and cannot be easily retrieved, or for female F004, whose transmitter was located without any remains (Table 3).

Table 3. Findings of investigations into the seven mortalities of fishers since December, 2015, including cause of death when it could be determined.

Fisher	Sex	Age at Release	Cause of Death	Date of mortality	Days since release
F004	F	2 (Adult)	Unknown - only transmitter recovered	~21 May 2016	~171
M005	M	0 (Juv.)	Mouth/head wounds and infection following a fight with another animal. Fresh carcass recovered.	~18 Mar 2016	~107
F006	F	2 (Adult)	Starvation following an injury to skull/jaw. Partially decomposed remains recovered.	~21 May 2016	~171
M007	M	3 (Adult)	Unknown – possible depredation. Transmitter and hair recovered.	~23 Jan 2017	~418
M009	M	0 (Juv.)	Unknown – possible depredation. Some bones and bone fragments recovered.	~12 Feb 2016	~72

Table 3 (continued). Findings of investigations into the seven mortalities of fishers since December, 2015, including cause of death when it could be determined.

Fisher	Sex	Age at Release	Cause of Death	Date of mortality	Days since release
M016	M	6 (Adult)	Unknown – not recovered (in Riffe Lake).	~7 Mar 2016	~65
F021	F	2 (Adult)	Vehicle collision on Hwy 7 North of Morton. Fresh carcass recovered.	19 Mar 2017	408

Figure 6. Photo of male M005 upon recovery (left) and a photo of its skull following a necropsy (right), where a large wound and fractures of the palate, upper-jaw, and teeth were apparent.

For the purposes of determining the annual survival rates for fishers released in year 1 of the project, we accounted for only those mortalities (n=5; 2F, 3M) that occurred from December 2015 to November of 2016. We used the staggered entry approach for survival rate estimation (Pollock et al. 1989) so that we could add fishers into the analysis as they were added to the population in each month (11 in December of 2015, 6 in January of 2016, and 6 in February of 2016; Table 1). With this approach, we estimated survival rates that exceeded 50% for both males and females (Table 4). While these estimates represent only the first annual survival rates for year-1 fishers, they are encouraging, and we hope to see similar survival rates for fishers released in year-2.

Table 4. Annual survival rates for fishers released in year-1 of the Cascades fisher reintroduction project. The analysis was completed for fisher survival from December, 2015 to November, 2016.

Population Segment	Number of fishers	Number of mortalities	Annual survival rate	95% CI for Survival rate
All fishers	23	5	0.77	0.59-0.95
Females	11	2	0.80	0.34-1.00
Males	12	3	0.75	0.38-1.00

During the Olympic fisher reintroduction project, we found that fishers kept in captivity for a greater period of time tended to have lower survival rates. Because of this finding, we changed our approach from translocating fishers when we had at least 10 that were ready to transport to Washington (Olympic reintroduction approach), to transporting fishers when we had at least 5 (Cascades reintroduction approach), and thereby reducing the time most fishers spent in captivity. The mean time of captivity for fishers (n=90) during the Olympic reintroduction project was 21 ± 12 (SD) days (Lewis 2014), whereas the mean time of captivity for fishers (n=69) during the Cascade reintroduction project was 12.9 ± 7.4 (SD) days. This approach has helped us substantially reduce the mean time in captivity (by ~39%) and we are hopeful that this difference will result in higher survival rates.

Reproduction

We did not document reproduction in the spring of 2016 for females that were released in year 1 of the project. Two females, F001 and F006, appeared to have localized movements during the early portion of the denning season; however, we were not able to determine if either female denned because F001 moved ~60 km to a new location (i.e., too far away to take kits) before we could locate her at a den site, and F006 died of starvation following an injury). We are hopeful that we will document denning by several released females in the spring and summer of 2017 given: 1) the survival of eight of the 11 females released in year-1, 2) the maturation of many of these eight to subadults and adults, 3) the likelihood that year-1 females mated with adult males in the 2016 breeding season (based on location proximities), and 4) the number of adult (n=8) and subadult females (n=6) we released in year-2 (Dec 2016-Mar 2017).

Research

Several research investigations will be associated with the Cascades fisher reintroduction project, and these include studies to assess survival, post-release movements and home range establishment, resource selection, disease exposure, parasite load, and food habits of released fishers, as available funding allows. Many of these studies will utilize telemetry data collected as we monitored released fishers, but other studies will require additional data collection and collaboration with other researchers and graduate students.

One of these studies involves an investigation of how fisher habitat use is influenced by prey and predator densities, and how these densities vary across forest conditions within the southern portion of the Cascade Recovery Area. This work is being done as a collaboration of project partners with University of Washington graduate student Mitchell Parsons and his major professor at UW, Dr. Laura Prugh. Mitchell has completed one summer and one winter field season and has preliminary findings for prey from 10 sampling grids and predator densities based on detections from 77 remote camera stations. In year 2 of his study (summer 2017 and winter 2017/2018), he will be expand his data collection to an additional 10-12 sampling sites and at additional camera stations before he begins his analyses and thesis.

Outreach

The project team has connected in a number of ways with project partners, supporters, cooperators, stakeholders, members of the scientific and conservation communities, and the public.

Release Events

Fisher release events are a great opportunity to involve kids and adults in the release process (Figure 7), and for us to share details about the project and fisher conservation in general. While we did not keep track of the number of attendees during the year-1 releases; in year-2, approximately 380 individuals participated in the 7 release events and watched fishers return to Washington.

Figure 7. A male fisher being released in Mount Rainier National Park, December 2, 2016. Photo by Paul Bannick.

Releases were frequently covered by media sources including the first release in year-1 at the Cispus Learning Center and the first release at Mount Rainier National Park. The first release at Cispus included a brief ceremony from the Cowlitz Indian Tribe, and participation by the Puyallup Tribe of Indians and the Confederated Tribes and Bands of the Yakama Nation. The first release in Mount Rainier National Park was hosted by the Nisqually Indian Tribe and included a welcoming ceremony that involved the participation of a number of representatives from the six tribes with treaties within park boundaries as well as the Tsilhqot'in, Secwepemc and Dakelh First Nations who traveled from central British Columbia to the release event. They traveled a great distance to participate in a ceremonial transfer of stewardship and to observe fishers from their territories take their first steps in Washington.

Presentations

- NPS Ecologist Tara Chestnut gave a presentation about the project at the Society for Northwestern Vertebrate Biology annual meeting (Feb 28-Mar 2, 2017) at Humboldt State University, Arcata, CA.

- Tara participated in the Burke Museum "Meet the Mammals" event on Nov 5, 2016, staffed a table featuring mustelids and the fisher restoration project, and spoke with 107 museum visitors about the project.

- Tara also consulted with Klondike-Gold Rush National Historic Park on summer 2017 exhibit and their representation of the fisher project.

- The Mount Rainier National Park curatorial program funded the preparation of a fisher live-mount shared between WDFW and NPS for educational and outreach displays and events.
- WDFW Biologist Jeff Lewis gave a presentation about the project and its progress to date at the annual meeting of the Washington Chapter of the Wildlife Society in Yakima, WA, on 31 March 2017.
- NPS Biologist Jason Ransom gave a presentation about the project to ~200 students at University of Washington on Jan 9, 2017, as part of the university's Wildlife Science Seminar series.
- Jason also gave an interactive presentation on the fisher project to 4th grade students at Central Elementary School in Bellingham, WA.
- Jason and Tara gave a presentation about the project to the 2rd grade students at the Waldorf School in Bellingham, WA.

Fisher Project Website

With the assistance of project partners from the NPS and CNW, Washington Department of Fish and Wildlife provides information on fisher conservation, updates on the Cascades fisher reintroduction project, photos and videos from fisher releases, planning documents and project reports, and a list of the many project cooperators and supporters, on the agency's fisher web-page. The main fisher web page can be found at: http://wdfw.wa.gov/conservation/fisher/.

Mount Rainier National Park, North Cascades National Park Service Complex, and Conservation Northwest also host project websites that provide general and agency specific project information and provide links to the main project website hosted by WDFW. These websites are found at: https://www.nps.gov/mora/learn/nature/washington-fisher-restoration.htm, https://www.nps.gov/noca/learn/nature/washington-fisher-restoration.htm, and http://www.conservationnw.org/fisher.

Expectations for the Remainder of 2017 and 2018

In the remainder of year-2, project partners will continue aerial telemetry flights to obtain location data and to determine the survival status of released fishers. During the spring of 2017, our flights will focus on obtaining locations for adult and subadult females in an effort to document denning and reproductive success in year-2. We anticipate that several females will den in the recovery area this spring and summer, and that we will be in the field to deploy remote cameras at den sites and document females attending kits. As necessary, we will also attempt to recover mortalities when we detect a mortality signal during our aerial telemetry flights. The transmitters placed in year-1 fishers are expected to stop functioning at the end of 2017 or the beginning of 2018; however, our monitoring activities in the southern portion of the Cascade Recovery Area will continue through 2018 as we track our year-2 fishers until the end of 2018 or early 2019.

We started our preparations for the fall 2017 reintroductions in the northern portion of the Cascade Recovery Area. These preparations include: 1) working with other WDFW, USFS, and NPS biologists to identify specific sites for fisher releases in the fall and winter of 2017/2018, 2) working with our contractors and collaborators in British Columbia to prepare for the upcoming fisher capture season, and 3) preparing air and ground support for our monitoring activities. Our monitoring efforts for fishers released in the northern portion of the Cascades Recovery Area will commence when the first fishers are released and will follow the monitoring protocols established for the southern Cascade reintroduction project.

Literature Cited

Happe, P. J., K. J. Jenkins, T. J. Kay, K. Pilgrim, M. K. Schwartz, J. C. Lewis, and K. B. Aubry. 2016. Evaluation of fisher (*Pekania pennanti*) restoration in Olympic National Park and the Olympic Recovery Area: 2015 annual progress report. Natural Resource Report NPS/OLYM/NRR—2016/1274. National Park Service, Fort Collins, Colorado.

Hayes, G. E., and J. C. Lewis. 2006. Washington State recovery plan for the fisher. Washington Department of Fish and Wildlife, Olympia, Washington. 69 pp. Available online at: http://wdfw.wa.gov/wlm/diversty/soc/fisher/.

Lewis, J. C. 2013. Implementation plan for reintroducing fishers to the Cascade Mountain Range in Washington. Washington Department of Fish and Wildlife, Olympia. 29 pp. (at: http://wdfw.wa.gov/publications/01556/)

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

Lewis, J. C., T. Chestnut, J. Ransom, and D. Werntz. 2017. Cascade Fisher Reintroduction Project: Reintroduction Update-March 2017. http://wdfw.wa.gov/conservation/fisher/updates_cascade.html.

Lewis, J. C., P. J. Happe, K. J. Jenkins and D. J. Manson. 2011. Olympic fisher reintroduction project: 2010 progress report. Washington Department of Fish and Wildlife, Olympia.

Lewis, J. C., and G. E. Hayes. 2004. Feasibility assessment for reintroducing fishers to Washington. Washington Department of Fish and Wildlife, Olympia.

Lewis, J. C., K. J. Jenkins, P. J. Happe, D. J. Manson, and M. McCalmon. 2016. Landscape-scale habitat selection by fishers translocated to the Olympic Peninsula of Washington. Forest Ecology and Management 369:170-183.

Lewis, J. C., R. A. Powell and W. J. Zielinski. 2012. Carnivore translocations and conservation: insights from population models and field data for fishers (Martes pennanti). PLoS ONE 7(3): e32726.

Lewis, J. C., and D. W. Stinson. 1998. Washington State status report for the fisher. Washington Department of Fish and Wildlife, Olympia, Washington.

National Park Service. 2014. Mount Rainier National Park and North Cascades National Park Service Complex: Fisher restoration plan / environmental assessment. Available online at: https://parkplanning.nps.gov/document.cfm?parkID=327&projectID=46313&documentID=61450.

Pollock, K. H., S. R Winterstein, C. M. Bunck and P. D. Curtis. 1989. Survival analysis in telemetry studies: The staggered entry design. Journal of Wildlife Management 53(1):7-15.

Powell, R. A. 1993. The fisher: Life history, ecology, and behavior. Second edition. University of Minnesota Press, Minneapolis, Minnesota.

Appendix A. List of fishers released in the southern portion of the Cascade Recovery Area, and associated morphology, age and release data.

Fisher ID	Sex	Age at Release (y)	Weight (kg)	Capture Date	Release Date	Days in Captivity	Status as of Mar 16, 2017
F001	F	1	2.71	5-Nov-2015	3-Dec-2015	28	Active
F002	F	4	3.12	17-Nov-2015	3-Dec-2015	16	Active
M003	M	0	4.36	19-Nov-2015	3-Dec-2015	14	Active
F004	F	2	2.71	20-Nov-2015	3-Dec-2015	13	Dead
M005	M	0	3.70	28-Nov-2015	3-Dec-2015	5	Dead
F006	F	2	2.42	30-Nov-2015	3-Dec-2015	3	Dead
M007	M	3	4.78	30-Nov-2015	3-Dec-2015	3	Dead
M008	M	2	5.09	2-Dec-2015	23-Dec-2015	21	Active
M009	M	0	2.85	7-Dec-2015	23-Dec-2015	16	Active
M010	M	2	4.46	9-Dec-2015	16-Jan-2016	38	Active
F011	F	0	2.08	9-Dec-2015	23-Dec-2015	14	Active
M012	M	0	3.34	12-Dec-2015	23-Dec-2015	11	Active
F013	F	4	2.68	12-Dec-2015	16-Jan-2016	35	Active
M016	M	6	4.97	24-Dec-2015	16-Jan-2016	23	Dead
F017	F	0	2.32	24-Dec-2015	16-Jan-2016	23	Active
M019	M	2	4.90	8-Jan-2016	16-Jan-2016	8	Active
M020	M	0	3.68	11-Jan-2016	16-Jan-2016	5	Active
F021	F	2	3.19	14-Jan-2016	6-Feb-2016	23	Dead
F023	F	0	2.43	17-Jan-2016	6-Feb-2016	20	Active
M024	M	-	4.02	22-Jan-2016	6-Feb-2016	15	Active
F025	F	0	2.61	23-Jan-2016	6-Feb-2016	14	Active
M026	M	0	3.98	28-Jan-2016	6-Feb-2016	9	Active
F028	F	-	2.76	31-Jan-2016	6-Feb-2016	6	Active
M029	M	0	3.68	13-Nov-2016	2-Dec-2016	19	Active
M030	M	1	4.55	14-Nov-2016	2-Dec-2016	18	Active
F031	F	2	2.87	5-Nov-2016	2-Dec-2016	27	Active
F032	F	1	2.38	17-Nov-2016	2-Dec-2016	15	Active
F034	F	2	3.83	17-Nov-2016	2-Dec-2016	15	Active
M035	M	0	3.63	21-Nov-2016	2-Dec-2016	11	Active
M036	M	0	3.50	24-Nov-2016	2-Dec-2016	8	Active
M037	M	0	2.23	25-Nov-2016	2-Dec-2016	7	Active
F038	F	0	5.02	25-Nov-2016	2-Dec-2016	7	Active
M039	M	5	2.31	27-Nov-2016	2-Dec-2016	5	Active
M040	M	0	3.79	27-Nov-2016	10-Dec-2016	13	Active
F041	F	2	2.69	27-Nov-2016	10-Dec-2016	13	Active

Fisher ID	Sex	Age at Release (y)	Weight (kg)	Capture Date	Release Date	Days in Captivity	Status as of Mar 16, 2017
F042	F	0	2.55	28-Nov-2016	10-Dec-2016	12	Active
M043	M	0	3.58	30-Nov-2016	10-Dec-2016	10	Active
M044	M	0	3.06	1-Dec-2016	10-Dec-2016	9	Active
F045	F	0	2.54	3-Dec-2016	10-Dec-2016	7	Active
M046	M	4	5.08	5-Dec-2016	10-Dec-2016	5	Active
F047	F	2	2.47	6-Dec-2016	10-Dec-2016	4	Active
M048	M	0	3.76	6-Dec-2016	17-Dec-2016	11	Active
F049	F	1	2.53	7-Dec-2016	17-Dec-2016	10	Active
F050	F	1	2.38	7-Dec-2016	17-Dec-2016	10	Active
F051	F	1	2.74	7-Dec-2016	17-Dec-2016	10	Active
F052	F	-	2.56	10-Dec-2016	17-Dec-2016	7	Active
M054	M	1	3.76	11-Dec-2016	17-Dec-2016	6	Active
M056	M	0	3.17	22-Dec-2016	31-Dec-2016	9	Active
F057	M	0	2.22	22-Dec-2016	31-Dec-2016	9	Active
M058	M	0	3.70	22-Dec-2016	31-Dec-2016	9	Active
F059	F	0	1.95	23-Dec-2016	31-Dec-2016	8	Active
F060	F	2	2.66	24-Dec-2016	13-Jan-2017	20	Active
M061	M	0	3.93	24-Dec-2016	13-Jan-2017	20	Active
M062	M	0	3.82	24-Dec-2016	13-Jan-2017	20	Active
M063	M	0	3.81	26-Dec-2016	31-Dec-2016	5	Active
M064	M	0	3.46	26-Dec-2016	31-Dec-2016	5	Active
F065	F	3	2.71	1-Jan-2017	13-Jan-2017	12	Active
M066	M	0	3.70	1-Jan-2017	13-Jan-2017	12	Active
F067	F	0	2.94	4-Jan-2017	13-Jan-2017	9	Active
F070	F	0	2.58	6-Jan-2017	13-Jan-2017	7	Active
F072	F	0	2.40	11-Jan-2017	3-Feb-2017	23	Active
F073	F	1	2.83	14-Jan-2017	3-Feb-2017	20	Active
F075	F	0	2.25	17-Jan-2017	3-Feb-2017	17	Active
F080	F	1	2.44	30-Jan-2017	3-Feb-2017	4	Active
F082	F	0	2.79	2-Feb-2017	20-Feb-2017	18	Active
F084	F	0	3.22	4-Feb-2017	20-Feb-2017	16	Active
F085	F	0	2.19	6-Feb-2017	20-Feb-2017	14	Active
F086	F	2	2.61	13-Feb-2017	20-Feb-2017	7	Active
F088	F	3	2.90	15-Feb-2017	20-Feb-2017	5	Active

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