



1301 Fifth Avenue Suite 2700
Seattle, WA 98101
(206) 224-5800 • greendiamond.com

March 4, 2019

Via Federal eRulemaking Portal: <http://www.regulations.gov>

Attention: FWS–R8–ES–2018–0105
United States Fish and Wildlife Service, Headquarters MS:BPHC
5275 Leesburg Pike
Falls Church, Virginia 22041-3803

**Re: Proposed Rule Listing West Coast Fisher as a Threatened Species;
Docket No. FWS–R8–ES–2018–0105**

To Whom It May Concern:

Green Diamond Resource Company (Green Diamond) is grateful for the opportunity to provide these comments on the U.S. Fish and Wildlife Service (FWS) proposed rule to list the West Coast fisher as a threatened species. The FWS decision to withdraw the proposed listing in 2016 is strongly supported by new information on reduced threats to fisher and substantial new developments in fisher conservation. Accordingly, we at Green Diamond urge the FWS to once again withdraw the proposed listing of West Coast fisher.

I. Green Diamond's Conservation Partnership with the U.S. Fish and Wildlife Service.

Green Diamond is a family-owned business established in 1890 in Washington State. For six generations, it has sustainably managed timberlands in California, Oregon, and Washington. Currently, Green Diamond owns and manages over 1.3 million acres of its own land with approximately 375,000 acres in California, 650,000 acres in Oregon, and 315,000 acres in Washington State. Green Diamond also manages 500,000 acres of timberlands in six southern states for Twin Creeks Timber, LLC.

Green Diamond was among the earliest of private timberland owners to collaborate with the FWS to voluntarily develop and implement long-term habitat and species conservation plans to guide the management of its forests. In 1992, the FWS approved Green Diamond's first habitat conservation plan (HCP) for the northern spotted owl on its California timberlands (the NSO HCP). In 2000, the FWS approved Green Diamond's HCP covering 51 species on its Northwest Timberlands. In 2007, the FWS approved Green Diamond's Aquatic HCP (AHCP) for its California timberlands, and the FWS approved amendments to the NSO HCP to address barred

owl management research essential for NSO conservation. Green Diamond's HCPs have also been assigned, in part, to other landowners resulting in three additional HCPs – the Yurok HCP (California 2011), the Cedar River HCP (Washington 2017) and the Hope Creek HCP (Washington 2018). Green Diamond is a champion for voluntary conservation planning on private lands to achieve the objectives of the ESA, as recommended by senior fish and wildlife professionals with experience implementing and enforcing the ESA.

Green Diamond is proud of its investment in conservation plans, conservation measures, and conservation capacity and expertise in its resource management staff. Green Diamond is proud of the many seasonal field technicians and graduate students who have worked on Green Diamond conservation projects and gone on to serve as conservation professionals in state and federal agencies and other companies. Green Diamond is proud of the original and applied research and conservation learning that has been produced by its scientists and resource management professionals and, most of all, by the conservation results for fish and wildlife species that thrive on Green Diamond forest lands. Green Diamond is grateful for the technical assistance and partnership of the FWS in these conservation efforts.

In keeping with a tradition of investment in conservation, Green Diamond is participating in range-wide commitments to conserve fisher in California, Oregon and Washington. Our efforts and those of other landowners and resource managers are significant, new developments in the conservation of fisher supporting the FWS decision not to list fisher as a threatened species.

II. New and Significant Developments in Fisher Conservation.

After the FWS withdrew the proposed listing of West Coast fisher in 2016, several new and significant developments in fisher conservation occurred throughout its range in California, Oregon, and Washington.

A. California

In California, the FWS approved Sierra Pacific Industries proposed Candidate Conservation Agreement with Assurances (CCAA) for Fisher covering 1.5 million acres of private timberlands in the northern Sierra Nevada and Siskiyou Mountains. The SPI CCAA built on SPI's successful Sterling Creek Fisher CCAA where SPI successfully reintroduced fisher on managed timberlands and pioneered cooperative research on their use of habitat and useful habitat elements for fisher conservation and recovery on private lands. The SPI CCAs complement the substantial conservation measures of the Northwest Forest Plan for management of federal forest lands for the benefit fisher and other species.

The largest native population of West Coast Fisher is found in northern California and southern Oregon where it thrives on private, managed timberlands as well as federal lands. Two of the largest private landowners in the region, Humboldt Redwood Company (HRC) and Green Diamond Resource Company, are conserving fishers under long-term commitments in habitat conservation plans. The HRC Habitat Conservation Plan, approved in 1998, covers fisher with enforceable forest management commitments. And, Green Diamond Resource Company has developed a new generation multi-species Forest Habitat Conservation Plan that specifically addresses the conservation needs of fisher along with the northern spotted owl and tree voles.

Green Diamond's California timberlands are inhabited by a large and healthy population of fisher that Green Diamond intends to maintain under a proposed Forest HCP, which was released for public comment in 2018 with a decision expected from FWS in early 2019. See 83 Fed. Reg. 34861 (July 23, 2018).

B. Oregon

In Oregon, the FWS developed a template CCAA for fisher that can be used by non-federal landowners to conserve fisher on managed forests. See 81 Fed. Reg. 15737 (March 24, 2016). In 2016, ten landowners representing over 3 million acres provided the FWS with letters of intent to complete ownership specific site plans for implementation of the template CCAA. In anticipation of completing those CCAAs, landowners have collaborated with researchers in additional fisher survey efforts and research to better understand fisher occupancy and use on managed timberlands in Oregon. The Oregon Forest Resource Institute and several landowners prepared a guidance document for landowners called Wildlife in Managed Forests: Fisher and Humboldt Marten (OFRI 2018), that describes the conservation measures that landowners can implement in managed forests to conserve fisher. A copy of the OFRI guidance document is submitted with these comments. Landowners are using this guidance to develop their site plans for fisher CCAAs.

Green Diamond is one of the landowners that submitted a letter of intent to pursue a fisher CCAA. For the past two years, Green Diamond has provided access and in-kind support for fisher survey and habitat research on Green Diamond's Oregon timberlands in Jackson, Klamath, and Lake Counties. Those efforts have already provided evidence that the range and population of fishers in the southern Cascades is expanding such that Oregon's southern Cascade population of fishers is now in contact with the northern California / Siskiyou population of fishers. Green Diamond's Oregon timberlands are located at the junction of the two populations. This connection allows for exchange of genetic material and a larger population distributed over a wide range, reducing the risk of species extinction due to catastrophic wild fire.

Another important finding from fisher survey efforts on Green Diamond's Oregon timberlands is the use of timber slash piles by a denning fisher. This finding is promising evidence that land owners can manage younger forests to create habitat structures and constituent elements that may be useful to fisher even in the absence of an abundance of older, decadent timber with den cavities. There are measures landowners can take to help fisher without waiting for decades to grow such habitat or old growth that will never be restored to an aboriginal abundance and distribution. More research and adaptive management experiments in slash management are planned.

Working with the FWS, Green Diamond has prepared a fisher CCAA based on the Oregon template CCAA. Green Diamond's CCAA for Fisher on its Oregon Timberlands will be used to manage 459,000 acres for the benefit of fisher. The Green Diamond Fisher CCAA is now complete and ready for the final decision of the FWS, which is expected in early 2019. See 84 Fed. Reg. 4851 (February 19, 2019).

C. Washington

In 2016, the FWS approved a programmatic CCAA for Fisher in Washington State sponsored by the Washington Department of Fish and Wildlife. In just three years, the WDFW Fisher CCAA has enrolled over 50 landowners representing three million acres of non-federal lands with certificates of participation in the Fisher CCAA. Concurrently, WDFW has reintroduced and established breeding populations of fisher in the northern and southern Cascades where they are inhabiting federal lands managed under the Northwest Forest Plan and also dispersing onto non-federal lands. These reintroduced fisher populations now supplement the reintroduced fisher population on Washington's Olympic Peninsula, where the National Park Service introduced fishers that have now dispersed to non-federal lands. In just three years, the fisher has gone from extirpated in coastal Washington State to a promising trajectory for reintroduction and conservation on federal, state, and private lands.

In 2016, Green Diamond enrolled its Washington timberlands in the FWS-approved programmatic CCAA for Fisher in Washington State. Over 350,000 acres owned and managed by Green Diamond are enrolled with certificates of participation in the WDFW CCAA for Fisher.

III. New Information on the Status and Reduced Threats to West Coast Fisher.

As part of commitments under an approved California Safe Harbor Agreement for Humboldt Marten (similar to monitoring commitments in Green Diamond's proposed Forest HCP for California Timberlands), Green Diamond conducted camera surveys for marten and fisher on its California Timberlands in October 2018 and completed the survey effort in February 2019. The systematic survey effort for fisher included 93 remote cameras spaced at 2.5 mile (4 km) intervals covering approximately 365,000 acres. Fishers were photo-verified at 50 stations (54%) and were the most frequently detected animal in the survey effort (see attached map). Fishers were detected at an additional 4 stations east of Green Diamond ownership as part of the survey effort for Humboldt marten. Based on these recent preliminary findings, fishers continue to be well-distributed across the California timberlands. Green Diamond is planning to complete a second survey of these stations in 2019-20 and is committed to periodic surveys for fisher and development of occupancy models for fisher under the proposed Forest HCP. A recent study by Furnas et al. (2017)¹ using robust procedures to estimate population size for the largest remaining native population of fisher in Northern California/Southern Oregon reported that approximately 3,196 fisher (95% CI = 2,507 – 4,184) existed in this area.

The unlawful use of anticoagulant rodenticides in marijuana cultivation is a recognized threat to fisher. To discourage and prevent unauthorized marijuana cultivation and associated abuse of pesticides on its California Timberlands, Green Diamond maintains a system of controlled access using locked gates on roads, security patrols, and written permits for authorized use of the property. To detect and remove marijuana cultivation and threats posed by rodenticides, Green Diamond uses ground-based security patrols and annual aerial surveillance flights to locate marijuana cultivation activity and then reports these locations to local law enforcement for eradication and removal.

¹ Furnas, B.J., R.H. Landers, R.L. Callas and S.M. Matthews. 2017. Estimating population size of fishers (*Pekania pennanti*) using camera stations and auxiliary data on home range size. *Ecosphere* 8:1-20.

We are also hopeful that the legalization of recreational marijuana use in California, Oregon, and Washington will lead to more responsible, lawful, and regulated marijuana cultivation that will replace the outlaw grow operations that misuse anticoagulant rodenticides. This is especially important in California where unlawful marijuana grows were common throughout the range of the fisher. Effective January 1, 2018, the State of California legalized marijuana cultivation and use for recreational purposes. In anticipation of lawful marijuana culture, state agencies and local governments made extensive and continuing efforts to bring marijuana cultivation into regulation with permitting and enforcement for marijuana cultivation as a lawful use of land, water resources, and pesticides. The development of a regulated marijuana cultivation industry has the potential to reduce the threat of irresponsible use of rodenticides that harm fisher.

IV. **Conclusion.**

Based on existing, enforceable resource management and conservation plans covering millions of acres of private, state, and federal lands throughout the range of the West Coast Fisher, reduced threats, and positive trends in the range and population of the West Coast Fisher, the West Coast Fisher is not endangered by extinction through all or a significant portion of its range nor does it appear likely to be endangered within the foreseeable future.

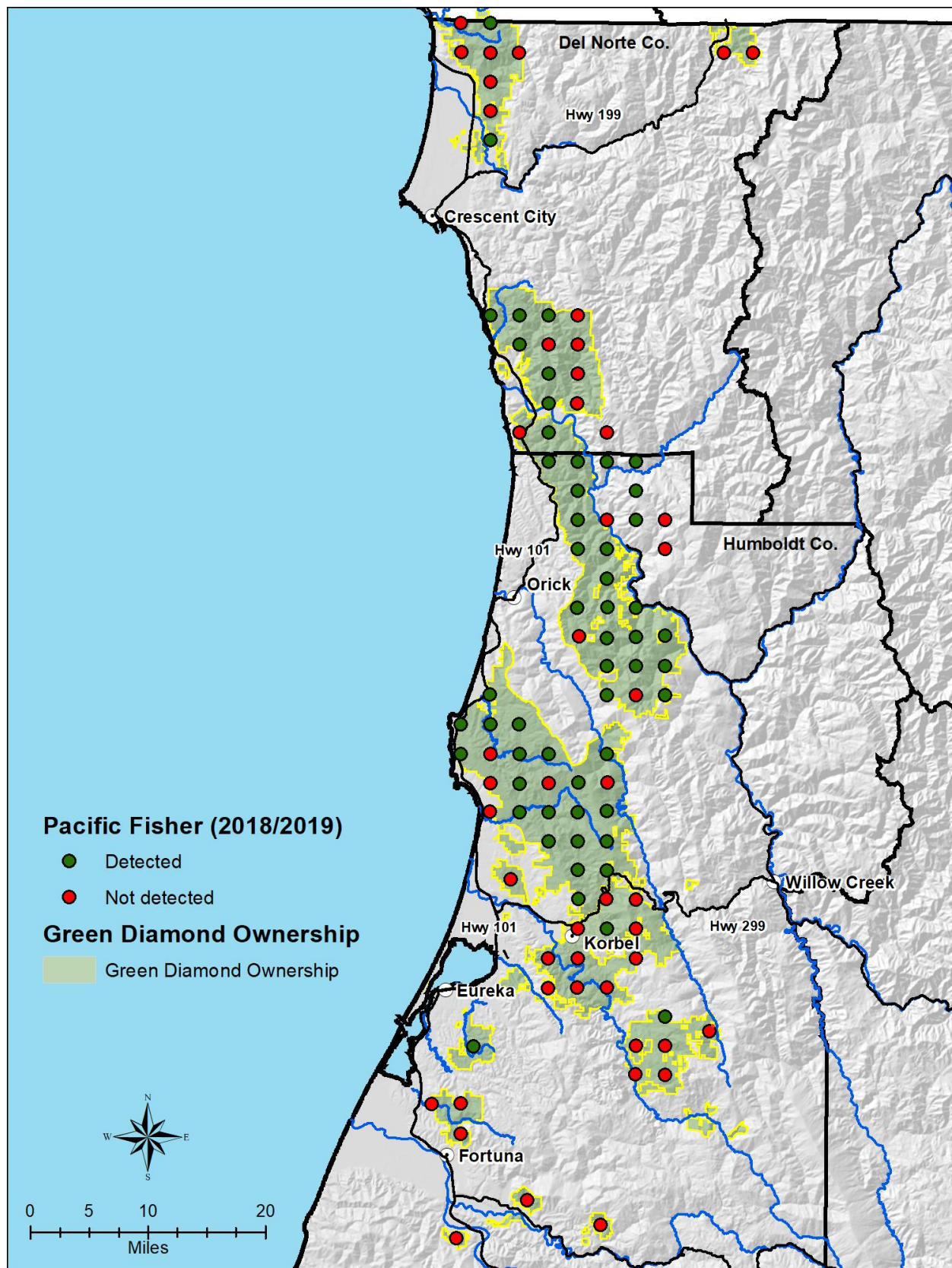
Sincerely,



Galen Schuler,
Vice President, General Counsel and Corporate Affairs

Enclosures

Cc: (Without Enclosures)
Jason Carlson, Vice President and General Manager, California Operations
Andy Elsbree, Vice President and General Manager, Oregon Operations
Blayde Fry, Vice President and General Manager, Northwest Timberlands
Keith Hamm, Manager, Conservation Planning, California Operations



WILDLIFE

IN MANAGED FORESTS

Fisher and Humboldt Marten



Wildlife in Managed Forests – Project Overview

This publication is part of a series from the Oregon Forest Resources Institute that aims to synthesize current research findings and make information available to foresters, wildlife managers and interested parties such as conservation organizations, regulators and policymakers. As part of the Wildlife in Managed Forests Outreach Project, information is disseminated through publications such as this one, as well as workshops, tours and conferences.

PROJECT PARTNERS:

Hancock Forest Management
National Council for Air and Stream
Improvement
Oregon Department of Fish and Wildlife
Oregon Department of Forestry
Oregon Forest & Industries Council
Oregon Forest Resources Institute
Oregon State University College of Forestry
Oregon State University Department of
Fisheries and Wildlife

Oregon State University Institute
for Natural Resources
Port Blakely
Starker Forests, Inc.
U.S. Department of Agriculture (USDA)
National Wildlife Research Center
U.S. Forest Service
U.S. Forest Service Pacific Northwest
Research Station
Weyerhaeuser Company

For copies of this report or further information, contact:



**Oregon Forest
Resources Institute**

Oregon Forest Resources Institute
317 SW Sixth Ave., Suite 400
Portland, OR 97204
971-673-2944

KnowYourForest.org

PREPARED FOR THE OREGON FOREST RESOURCES INSTITUTE BY:

Fran Cafferata Coe, Cafferata Consulting, Hillsboro, Ore.

Project Manager:

Julie Woodward, Senior Manager of Forestry Education, Oregon Forest Resources Institute

Photo credits for the cover:

Fisher: Lynn Rogers, North American Bear Center

Marten: Katie Moriarty

Photo credit for page sidebars and inside back cover:

Katie Moriarty

© Copyright 2018, Oregon Forest Resources Institute



Printed on recycled paper

Contents

1.0 Introduction 2

1.1 How can private landowners in Oregon influence fisher and Humboldt marten conservation? 3

2.0 Fisher and Humboldt marten identification 4

3.0 What does the current research say about fisher and Humboldt marten in Oregon? 4

3.1 The fisher story in Oregon..... 5

3.2 The Humboldt marten story in Oregon 8

3.2.2 Case Study: Humboldt marten on a managed forest landscape 10

4.0 Current management recommendations for fisher and Humboldt marten 12

5.0 Candidate Conservation Agreement with Assurances for the fisher in Oregon..... 13

6.0 Summary 14

7.0 Resources 15



Fisher kits captured and released as part of a research project in Northern California.
Photo: Sean Matthews

1.0 Introduction



The fisher is being considered for listing under the federal Endangered Species Act. Note rounded ears.
Photo: Mark Higley



All forest-dwelling carnivore species play key roles in the ecosystems they inhabit. Their roles as predators influence the food webs and ecosystem balance. In many cases, forest carnivores are both predator and prey, and therefore influence the health and population of a variety of interconnected species. Forest carnivores of interest to many Oregon forest landowners include the fisher (*Pekania pennanti*) and a subspecies of the Pacific marten, the Humboldt marten (*Martes caurina humboldtensis*). Both species inhabit forested areas of Oregon and are thought to have small population sizes. Historical population declines are assumed to result from over-trapping, generally low reproductive rates, and habitat alteration and fragmentation.

Due to their small geographic range and low numbers, fisher and Humboldt marten are being considered for listing under the federal Endangered Species Act (ESA). Much of the uncertainty surrounding these species stems from the fact that relatively little is known about their distribution, population size and trends, and emerging threats. New research being conducted throughout the state is looking to answer these questions. Table 1 summarizes the current listing status of both species at the time of printing.

Marten are fairly common in Oregon, but Humboldt marten are unique among the more widely dispersed Pacific marten. Pacific marten are found west of the Rocky Mountains of North America, including the Blue Mountains, Cascade Range, Coast Range and coastal forests of Oregon. Humboldt marten, a subspecies of Pacific marten, occur in two distinct populations in coastal forests of southern Oregon (see range map, page 9). The conservation status of Humboldt marten is in question, and is the focus of this publication along with fisher.

The Humboldt marten is a unique subspecies of the Pacific marten. Note triangular ears.
Photo: Katie Moriarty

TABLE 1. CURRENT FEDERAL AND OREGON STATE LISTING STATUS FOR THE FISHER AND HUMBOLDT MARTEN

SPECIES	FEDERAL STATUS*	STATE STATUS*
Fisher <i>Pekania pennanti</i>	Not listed	Sensitive Oregon Conservation Strategy Species
Humboldt marten <i>Martes caurina humboldtensis</i>	Not listed (proposed threatened as of Oct. 9, 2018)	Sensitive Oregon Conservation Strategy Species

*Listing status is current as of print date.

Why not wolverine, Sierra Nevada red fox, gray wolf, Canada lynx, bobcat or coyote?

The focus of this publication is on forest mesocarnivores whose biology and protection status may impact forest operations in Oregon.

What is a mesocarnivore?

A medium-size animal whose diet consists of 50 to 70 percent meat, with the balance consisting of non-vertebrate foods that may include invertebrates, fungi, fruits and other plant material.

1.1 HOW CAN PRIVATE LANDOWNERS IN OREGON INFLUENCE FISHER AND HUMBOLDT MARTEN CONSERVATION?

Species are listed under federal and state Endangered Species Acts (ESAs) when the science indicates their populations are at risk of becoming extinct throughout all or a significant portion of their range in the foreseeable future. Due to small population sizes and threats such as consumption of rodenticides, as well as habitat alteration, both fisher and Humboldt marten have been considered for listing under the federal ESA. When species become listed under the ESA, individuals and their habitat receive special protections under federal law. Listing these species may therefore limit forest landowners in their ability to actively manage their forests, depending on the rules that are implemented after listing. However, prior to and after listing, landowners and managers in Oregon play an important and unique role for mesocarnivore conservation. Involvement in research efforts and voluntary conservation efforts may even influence the listing outcomes for both species. Engaged landowners can promote conservation and understanding of both fisher and marten through the following methods:

1. Identify if the land you manage is currently in the known range of these forest carnivores, and coordinate with neighbors about carnivore conservation.
2. Allow access for research and monitoring, and partner with research teams.
3. Monitor for the presence of fisher and marten, and share monitoring results to help build the knowledge base of where and when forest carnivores occur.
4. Provide habitat features important for carnivores (see section 4 for more information).
5. Consider enrolling in a Candidate Conservation Agreement with Assurances (see section 5 for more information).

This publication will summarize fisher and Humboldt marten biology, discuss their habitat needs, discuss current research and provide science-based habitat management recommendations for these species.

Research wildlife biologist Sean Matthews climbs a tree in order to capture and collar fisher to learn more about their behavior.

Photo: Rebecca Green



2.0 Fisher and Humboldt marten identification

Fisher and Humboldt marten share many similarities. Both fisher and Humboldt marten are members of the weasel family, and distinguishing between the species can be challenging. In general, fisher are larger (they weigh up to four times as much), with darker fur and longer tails. They also have more rounded ears, whereas Humboldt marten have more triangular ears. Humboldt marten have patches of yellow, orange or cream on their chin and chest, whereas fisher are generally dark brown to black with small white patches on their chest and belly. The photos show differences between these species.

Figure 1. Fisher

Note rounded ears, size of front feet and chest patch.

Photo: Lynn Rogers, North American Bear Center



Figure 2. Marten

Note triangular ears and orange chest patch.

Photo: Katie Moriarty



3.0 What does the current research say about fisher and Humboldt marten in Oregon?

Researchers are studying fisher and marten to learn more about their biology and their role in the environment, and to determine best management practices. Current research focuses on the use of managed forests by these species, as well as providing some insights about their tolerances to forest management activities. Studies completed in the last 10 years have shown that a mosaic forest of successional stages may be used by fisher. Additionally, some timber management practices, including those that result in earlier successional stages, may benefit fisher by increasing their prey base of small mammals such as mice and voles. Fisher may respond favorably to forest management that retains legacy structural components (such as large-diameter leave trees, snags and down wood) and slash piles that allow for resting. Other recent research has focused on learning more about the species in general, including habitat selection; home range size; behaviors such as recruitment, reproduction and dispersal; population abundance and growth; the potential effects of climate and vegetation change; and the effects of fire (both prescribed and wildfire) and fuel-reduction techniques.

Recent research focusing on Humboldt marten has been directed at the information gaps in distribution, population sizes and habitat use, and characteristics to better inform management and conservation actions. Research indicates there are primarily two distinct populations of Humboldt marten in Oregon, located on the central and southern coast of the state. Recent survey efforts suggest these populations are small (Linnell *et al.* 2018). Other recent research efforts on Humboldt marten have explored recently documented use of coastal dune habitats by the species, as well as movement behavior in response to forest management, and the effects of thinning for fuels reduction.

Oregon Carnivore Working Group

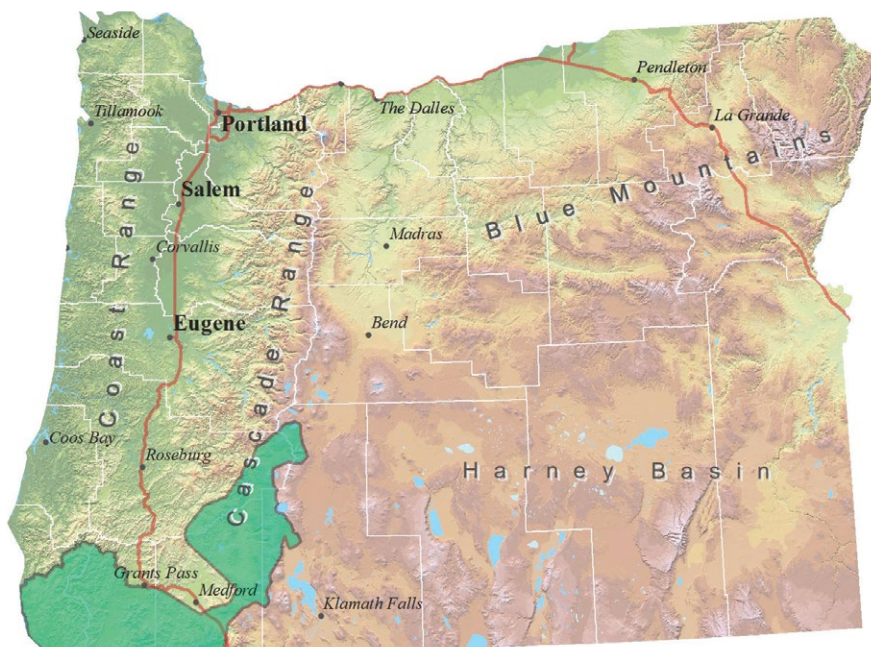
The Oregon Carnivore Working Group was organized by the Oregon Department of Fish and Wildlife to coordinate research efforts (16 ongoing projects on mesocarnivores in Oregon) and discuss emerging research needs. The group is made up of representatives from many interested groups,

including government entities, academic researchers, private industry and environmental advocates. Anyone is welcome to join the mailing list for the Carnivore Working Group. Contact Derek Broman with ODFW for more information: derek.j.broman@state.or.us.

3.1 THE FISHER STORY IN OREGON

Fisher are medium-size carnivores averaging 28-46 inches in length, with weight varying depending on sex and ranging from about 4 to 20 pounds. Though they are often referred to as a fisher “cat,” they are members of the weasel family. Fisher have powerful jaws, long well-furred tails, and dense dark brown to black fur, which is thicker and glossier in the winter. Recent research has led to a re-classification of the species, as it is now thought to be more closely related to the tayra (a South American member of the weasel family) than to marten (Proulx and Aubry 2014). Both fisher and marten are more closely related to the wolverine than they are to each other, but marten more so than fisher.

Figure 3. Approximate Range of Fisher in Oregon



There are two distinct fisher populations in Oregon: an indigenous population in the southwest and a reintroduced population in the southern Cascades (see range map left). Researchers conducted surveys using cameras and scat-detection dog teams to assess the distribution and detectability of fisher. The study included 1,855 camera survey stations, with the collection of more than 4 million photographs (not all of fisher). The researchers confirmed the presence of both the indigenous and introduced populations. According to

the data, it appeared the reintroduced population may have shifted or contracted. The sampling effort showed little evidence of population expansion into historically occupied forests in the Cascades, despite predicted habitat suitability (Barry 2018).

Small and isolated populations have been identified by researchers as the most challenging threat to the conservation of fisher in the Pacific Northwest. In a paper by Lofroth *et al.* (2010), researchers suggest the most effective conservation strategy to reduce the risk of fisher extinction involves protecting existing populations and encouraging them to expand beyond their current boundaries.

Habitat: Fisher habitat in Oregon includes forests with extensive canopy cover in areas with an abundance of available rest sites and dens, such as mistletoe clumps, hollow trees and tree cavities, logs and stumps, large down trees, and slash or brush piles. When using dens located in live trees or snags, fisher often show a preference for those found in the largest, most complex structure available on the landscape. Rest sites and dens may be a limiting factor for fisher habitat, as they are often rare features on the landscape. Once dens are found, fisher will reuse them. During a denning season, fisher may use as many as seven different dens, and have been shown to use artificial den structures as well.



Fisher require cavities for denning. Leaving large legacy trees provides habitat for fishers.

Photo: Kerry Rennie



Fisher have been known to use artificial dens like the one shown here.

Photo: Rebecca Green

Home range

An animal's home range is the area used by the individual in its normal activities of finding food, mating and raising young.

Researchers located resting sites and dens for radio-collared sub-adult and adult fisher in southern Oregon from October 2015 to June 2018. They were able to find 119 unique rest structures and 22 den and maternal structures. Fisher used live trees, snags, logs, slash piles, stumps, subnivean spaces (areas below snowpack) and rock piles. They were most frequently found in sites with mistletoe brooms and cavities. The size of the live tree, snag and log structures varied, ranging from about 8 to 83 inches in diameter. Researchers found den and maternal sites in the largest-diameter features. Dens were found in cavities until the kits were weaned and semi-mobile. At this time, researchers found and documented females using both slash piles and logs as maternal rest structures. Researchers concluded that there is a strong association with fisher and large structures that have cavities or mistletoe brooms (Moriarty *et al.* 2018).

Diet: Fisher are opportunistic foragers and prey upon a variety of species, including squirrels, mice and snowshoe hares, and have been known to specialize on porcupines. Fisher will also eat birds, insects and reptiles. For survival, adult fisher need the equivalent of about one small squirrel per day (Martin 1994).

Behavior: Fisher are territorial, with little overlap of home ranges between members of the same sex (Powell 1993). However, territorial overlap with the opposite sex is extensive (USFWS 2016). Fisher are polygynous, meaning one male will breed with various females during the mating season. Males may go to great lengths to expand their home ranges during mating seasons, with some male fisher expanding their home ranges as much as two and a half times (USFWS 2016).

Threats: Factors likely limiting fisher populations include predation, low reproductive rates, large home ranges and the need for highly specialized maternal dens. In addition, competition for food, mortality from consuming rodenticides, and altered forest composition and configuration are also likely factors.

Denning: Researchers in California have attempted to locate fisher using resting sites and dens during the early den season (March 1-April 15). Denning behavior is indicated by a sudden change in activity, from using numerous rest sites across the entire home range to more restricted movements in a small portion of the home range. Researchers tracked radio-collared fisher and documented their location and use of den and rest structures. Female fisher move kits to multiple den sites within the denning season. Den sites were an average of a half-mile from the previous denning location (Matthews *et al.* 2013).

From 2004 to 2011, researchers in California captured 179 individual fisher (94 females and 85 males). Those fisher exhibited denning behavior between March 22 and May 25. Approximately 23 percent of the denning females failed to produce kits. Failures were primarily due to predation, or death of the denning female from either disease or poisoning. Several den failures were from an undetermined cause. Approximately 65 percent of the denning females were successful at weaning at least one kit. The fate of the remaining denning females is unknown in this study, as researchers were not able to monitor them closely enough to determine their fate. Researchers summarize that in the Pacific Northwest, fisher begin denning from the last two weeks of March through the first week of April, with an average litter size of two kits. They also found that older females are more successful than younger females at raising kits to weaning age (Matthews *et al.* 2013).

Management hint:

Retaining existing large legacy structures as leave trees, as well as recruiting new legacy trees, is important for helping carnivore populations.



Resting structures are crucial for both fisher and marten. This is a female fisher resting.

Photo: Rebecca Green

RESEARCH SPOTLIGHT:**The Effects of Mixed-Severity Wildfire on Fisher Population Dynamics (Green, *et al.* 2018)**

This study is investigating the effects of naturally occurring, mixed-severity wildfire on a population of fisher in northern California and southern Oregon. Researchers collected genetic data and estimated fisher density the year before the fires, the year of the fires, and the two years post-fires. According to the data collected by the researchers, the population of fisher showed no decline in numbers the same year of the fires but declined

by 35 percent within two years after the fire. It appeared the fisher decline was most pronounced in areas that experienced more than a 50 percent change in canopy cover. The research in this study is ongoing, but the findings will help us understand how fisher are affected by landscape-level ecological disturbances, and may also help inform management decisions for this species.

What about reintroduction as a tool for increasing and expanding fisher and marten populations in Oregon?

There are two large-scale fisher reintroduction projects in California and Washington state, where fisher were extirpated (Lewis *et al.* 2016; Facka 2016). The multi-agency team has been working hard to re-establish self-sustaining fisher populations in three large areas of the historic range in western Washington: the Olympic Peninsula, the Southern Cascades, and the Northern Cascades. Fisher were reintroduced from 2008 to 2016, and

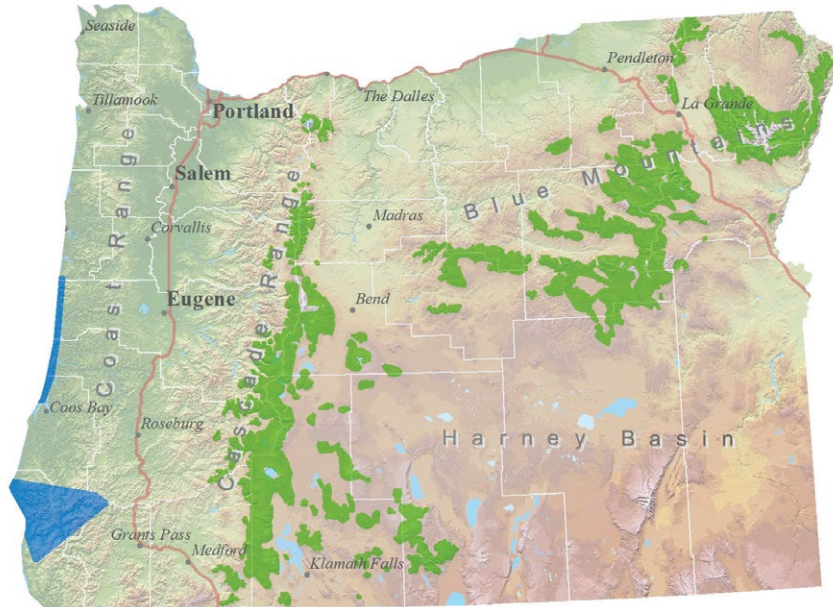
have generally survived but not expanded their range. Several researchers in Oregon expressed concern with reintroductions due to issues such as spread of disease, predation, available habitat and other factors. Relocation may be a valuable tool for survivability of fisher and marten in Oregon, but reintroduction projects would need careful consideration.

3.2 THE HUMBOLDT MARTEN STORY IN OREGON

Humboldt marten are small members of the weasel family, averaging 20-29 inches in length and weighing 1-3 pounds. Very little is known about the Humboldt marten, and therefore information presented here is a compilation of data from current and historical research. They historically occurred throughout coastal forests of Oregon and northern California. Researchers surveyed for marten during the 2014-2015 survey seasons, to confirm the persistence of historical populations and determine the limits of current distribution in the region (see range map, page 9). Researchers surveyed 348 sample units using a total of 72 track plates and 908 remote camera stations within an approximate 9,780 square-mile area. This study represented the largest carnivore survey conducted in Oregon at that time (Moriarty *et al.* 2015), but since then these surveys have expanded throughout the range of the marten.

The results of the study point to two distinct populations of Humboldt marten in Oregon (Moriarty *et al.* 2016): The central coast population, occurring only west of Highway 101, and the south coast population, possibly connected to populations in California (see range map, page 9).

Figure 4. Approximate Range of Marten in Oregon

**Management hint:**

The best way to help manage for healthy marten populations is to protect existing populations, re-establish populations in areas with suitable habitat, and improve habitat conditions for marten in areas near occupied territories.

- Pacific Marten
Martes caurina
- Humboldt marten
Martes caurina humboldtensis

Sources: Humboldt marten range from USFWS. Pacific marten range depicted from generalized elevation (>1500m) and forest cover (>40% canopy) masks and DataBasin watershed distribution information.

Habitat: Humboldt marten inhabit diverse forests, and appear dependent upon complex understories with heavy brush and high densities of down wood and other forest structure, for hunting and for cover from predators, and for dens and rest sites (Slauson *et al.* 2007). Suitable cover and den sites may include dense shrubs, down logs, mistletoe clumps, snags and trees with cavities (Kirkland 2016; USFWS 2015). Humboldt marten will generally avoid forest openings and thinned areas (Moriarty *et al.* 2016).

Diet: Humboldt marten will eat a variety of food and prey items, including fish, berries, birds, insects and amphibians, but their diet consists primarily of small mammals such as voles, squirrels and hares. Diets do vary by geographic region. Foraging is critical to the livelihood of marten; every day they need to forage between 17 and 29 percent of their body weight to survive (Gilbert *et al.* 2009).

Behavior: To meet caloric needs, marten forage daily, often switching between foraging and resting throughout the day. Recent research suggests that marten can travel long distances relative to their body size, in some cases traveling up to 16 miles a day (Moriarty *et al.* 2016).



Marten spend most of their time looking for food. Rest structures are crucial so they can recover between hunts.

Photo: Mark Linnell

Based on the number of marten detections and their movements, marten home ranges in coastal forests are small, and their range is limited when compared to known ranges of marten elsewhere. In addition, Humboldt marten are territorial and traverse their home range perimeter weekly (Moriarty *et al.* 2017).

Threats: Limiting factors to the Humboldt marten may include competition for food, rodenticides, and forest composition and configuration. Humboldt marten are also frequently subject to becoming roadkill as human development expands (Linnell *et al.* 2018).

Denning: Dens and rest sites are key to the survival of marten, as they act as a refuge from predators and weather. Marten live between 7 and 12 years in the wild (Derek Broman personal communication, June 2018). Breeding is from June to September, and kits are typically born from early April to mid-May.



Den and rest sites are key for the survival of marten.
Photo: Matthew Delheimer

RESEARCH SPOTLIGHT:

Population Status and Viability Analysis of Humboldt Marten in Coastal Oregon (Linnell *et al.* 2018)

Research continues to deepen our understanding of current populations of Humboldt marten in Oregon. Researchers used GPS telemetry, remote cameras and other methods to estimate home range sizes, density and population size of marten

within the current extent of the central coast Oregon population in the Oregon Dunes National Recreation Area. Researchers believe the biggest threat to Humboldt marten in coastal Oregon is the small population size.

Figure 5. Humboldt marten study area



3.2.2 Case Study: Humboldt marten on a managed forest landscape

Green Diamond Resource Company (Green Diamond) has been studying Humboldt marten on their lands in California. Humboldt marten were historically found throughout northern coastal California. They were thought to be extirpated from their range, but a remnant population was rediscovered in 1996 on the Six Rivers National Forest (Figure 5). Green Diamond owns and manages approximately 360,000 acres of industrial timberlands to the west of the remnant population in coastal northern California. Green Diamond ownership in this area is managed in even-aged stands, with a rotation age ranging from 45 to 60 years. This managed landscape comprises second- and third-growth forests.

Marten were not present in the early 1990s on the managed forests owned by Green Diamond (according to their track plate surveys), but started showing up in the early 2000s. Beginning in 2004, Green Diamond's camera traps discovered marten in two of their watersheds. Green Diamond continues to study this marten population to refine their understanding of Humboldt marten habitat use in managed forests. Most recent study efforts included camera traps and live



trapping. Marten were trapped from fall 2012 through fall 2015. In total they captured 33 individuals (18 males and 15 females). Of those, 24 were radio-marked (13 males and 11 females). Captured marten were measured, weighed, tagged and released. Additional unmarked individuals were detected in the study area. Over the study period, researchers recorded more than 2,000 telemetry locations, with a total of 125 resting sites and 33 dens. Rest structures on the managed forest included live trees, snags, slash piles, hollow logs and rock piles.

This study confirmed that marten tend to den in late winter/early spring, with the earliest kit documented on April 9. Green Diamond found that the den structures used were mostly live trees. However, snags, log and rock piles, artificial rest boxes and in-ground dens were also used. Additionally, the dens were almost always located in a cavity.

The live-tree characteristics that were consistent among the resting sites and dens showed that marten typically use large-diameter live trees. The average den tree was about 3 feet diameter at breast height (DBH). Additionally, these trees had broken or dead tops, large limbs, complex branching, basal hollows and multiple cavities. This shows the importance of maintaining large legacy trees where they exist, as leave trees, across the landscape throughout the cycle of forest management. Marten will use these structures in an otherwise relatively young stand.

Researchers plan to continue monitoring radio-marked individuals, mark new individuals, continue to collect rest and den site information, and continue to collect vegetation plot data at rest and den sites, to examine habitat characteristics. Future research may also include “use versus availability” studies on rest/den structures, including the use of slash piles as denning/rest sites. Researchers suggest everything they are learning about marten habitat in managed forests can be used to inform managers about how to help conserve marten on private lands.

Above: Large live wildlife trees like this one in the case study provide maternal dens sites for marten.

Left: Close-up of maternal den site.

Photos: Max Marquez

What does this mean for managing working forests?

Retaining large-diameter live trees where they exist, as leave trees, slash piles and legacy structures throughout timber harvests, is important for many wildlife species but may be critical for marten.



Photo: Mark Linnell

4.0 Current management recommendations for fisher and Humboldt marten

Despite an incomplete understanding of the effects of forest management on fisher and marten populations in Oregon, there are many opportunities for forest land managers to help develop and maintain suitable habitat for these species. We recommend the following options for a land manager interested in fisher and marten conservation:

- Maintain existing snags, logs and live legacy trees across the landscape. Large-diameter trees with complex structure (broken or dead tops, large limbs, complex branching, basal hollows and multiple cavities) are especially important to consider as leave trees.
- Strategically leave or create large slash piles near mature stands of timber, for rest sites and dens.
- Grow wildlife leave trees to maturity, to recruit the next generation of legacy trees and logs.
- Maintain mast and fruit-bearing trees and shrubs across the landscape, to help grow the prey base and provide food sources.
- Implement fuel-reduction projects with caution and strive to retain a mixture of conditions across the landscape, since fisher are often found resting and denning in mature stands that have dense understory vegetation and abundant ladder fuels.
- Consider installing game cameras, and report findings to current carnivore researchers if fisher or marten are detected. Also report if dead or injured fisher or marten are found on your property.
- Protect known populations by implementing voluntary timing restrictions during the denning season, and/or habitat buffers around known dens.
- Focus habitat improvements (retention of slash piles, legacy structures and large-diameter live trees) near or adjacent to known population sites, to encourage range expansion of the species.
- Limit rodenticide use.
- Restrict animal-control activities near occupied den sites.
- Consider enrolling in a Candidate Conservation Agreement with Assurances (CCAA) for fisher (See section 5 for more information).
- Consider cooperating with research organizations by allowing research and monitoring activities on your property, and stay informed on carnivore research.

Downed wood and slash around ground-based den sites are especially important as fisher and marten kits become mobile and too big for adults to move into tree den sites. Note the complex cover around the fisher kit in this photo.

Photo: Caylen Kelsey



5.0 Candidate Conservation Agreement with Assurances for the fisher in Oregon

The Candidate Conservation Agreement with Assurances, or CCAA, gives private landowners the opportunity to manage their lands proactively for fisher. In exchange for removing or reducing threats to fisher, enrolled landowners gain benefits in the form of an assurance from the U.S. Fish and Wildlife Service; this assurance states that if the fisher becomes listed as threatened or endangered in the future, the landowner will not be required to adhere to any further regulations as long as the CCAA remains in place and is being fully implemented. The goal of the CCAA is to both conserve and contribute to the recovery of fisher in Oregon, and to alleviate landowner uncertainty for future potential regulations. The objectives are intended to eliminate, reduce or minimize threats to the species in Oregon. To promote consistency and encourage enrollment in the CCAA, the USFWS drafted a template CCAA for Oregon that landowners can opt to join. The goals of the CCAA include the following:

- Gain knowledge about fisher demographics and responses to forest management activities.
- Promote conservation measures that reduce harm to fisher and their habitat.
- Provide a program of proactive recovery efforts.
- Assure enrolled landowners they will not have to hold the responsibility of implementing additional conservation methods.

CCAA's are expected to benefit fisher in the following ways:

- Expand our knowledge of fisher distribution and interaction with existing populations.
- Aid in acquiring more accurate information on fisher densities.
- Better understand how fisher respond to vegetation control.
- Protect known fisher and their offspring.
- Facilitate cooperation and collaboration among enrolled landowners.

For more information or to enroll in a CCAA, visit the USFWS website:

<https://www.fws.gov/oregonfwo/Documents/CCAA/FinalFisherCCAA.pdf>.

Leaving existing snags on the landscape helps fisher and marten, as well as many other species.
Photo: Sean Matthews

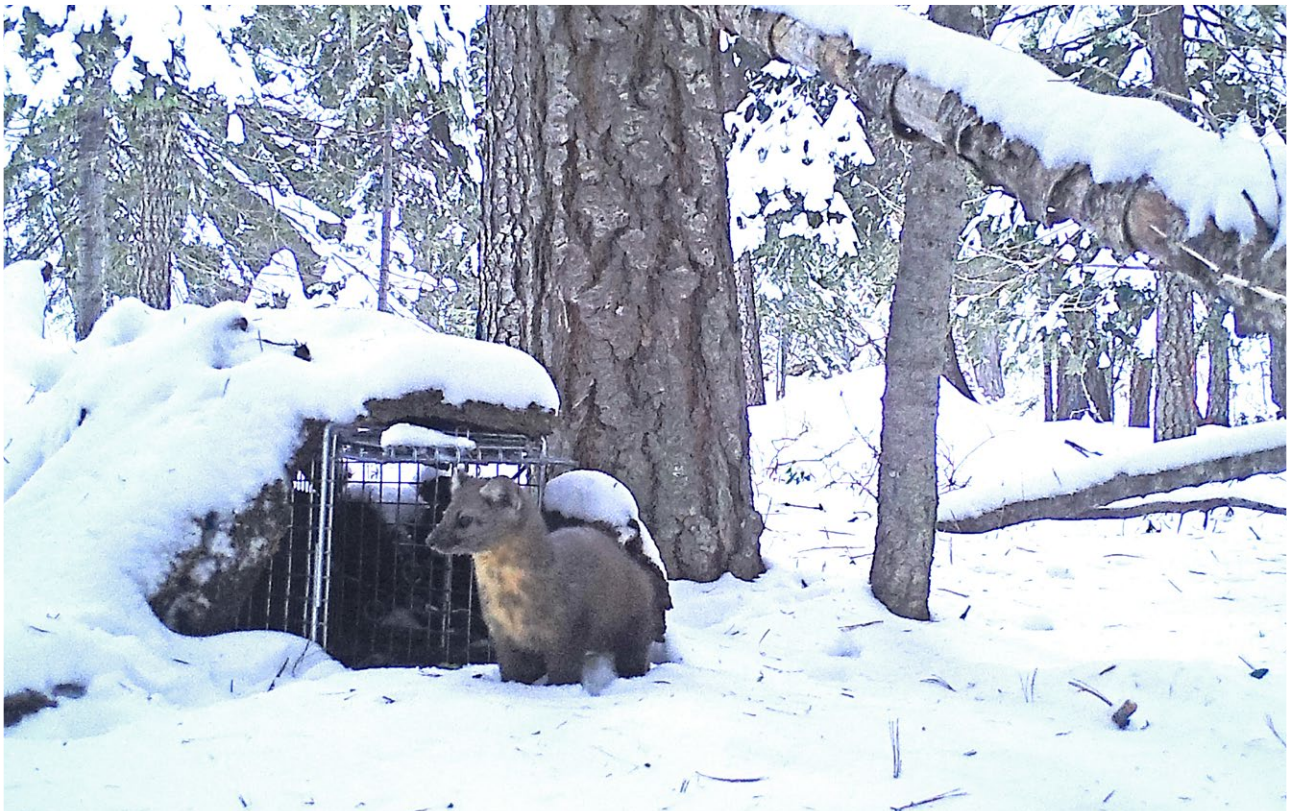


6.0 Summary

Forest carnivores play an important role in the ecosystems they inhabit, and are at risk of being listed as threatened or endangered, making them species of extreme interest.

Fisher and Humboldt marten in Oregon have been considered for listing under the federal ESA. When species become listed under the ESA, their habitat (in this case, forests) may become regulated, and forest landowners may be limited in their ability to actively manage their forest, depending on rules that are implemented. Landowners and managers of forests and wildlife agree that healthy forests and healthy wildlife populations are a common goal. Landowners and managers in Oregon play an important and unique role for carnivore conservation. Landowners can do the following:

- Monitor their own land for the presence of forest carnivores. They can share these results with researchers or agencies to help build the knowledge base of where and when forest carnivores occur.
- Cooperate with existing research efforts by allowing access or partnering with research teams.
- Know if the land they manage is currently in the known range of the fisher or Humboldt marten, and coordinate with neighbors about carnivore conservation.
- Retain legacy structure and provide other habitat features important for carnivores.
- Consider enrolling in a conservation agreement.



Research is ongoing for the marten. Researchers use live traps like this one to learn more about marten behavior.
Photo: Sean Matthews.

7.0 Resources

- Barry, Brent R. 2018. Distribution, Habitat Associations, and Conservation Status of Pacific Fisher (*Pekania pennanti*) in Oregon. Oregon State University.
- Facka, A. N. 2016. Conservation translocations as opportunities for scientific advancement: a case study with fishers (*Pekania pennanti*). Dissertation, North Carolina State University, Raleigh, North Carolina.
- Gilbert, J. H., P. A. Zollner, A. K. Green, J. L. Wright, and W. H. Karasov. 2009. Seasonal field metabolic rates of American martens in Wisconsin. *American Midland Naturalist* 162:327-334.
- Green, David S. 2018. Mixed-Severity Wildfires Have a Negative Effect On Fishers and a Positive Effect On Gray Foxes. Poster Presentation. Oregon State University; Institute for Natural Resources.
- Hiller, Tim L. 2015. Feasibility Assessment for the Reintroduction of Fishers in Western Oregon, USA. U.S. Fish and Wildlife Service, Portland, Oregon. Accessed at: http://www.dfw.state.or.us/resources/hunting/small_game/docs/Fisher_reintroduction_feasibility_assessment_2015.pdf on July 23, 2017.
- Kirkland, John. 2016. Science Findings: Striving for Balance: Maintaining Marten Habitat while Reducing Fuels. USDA Forest Service, Pacific Northwest Research Station, Portland, Oregon. Accessed at: <https://www.fs.fed.us/pnw/science/scifi192.pdf> on July 24, 2017.
- Lewis, F. C., et al. 2014. Evaluation of Fisher Restoration in Olympic National Park and the Olympic Recovery Area Annual Report 2013. Accessed at: <https://www.nps.gov/olym/learn/nature/fisher-reintroduction.htm> on February 6, 2018.
- Lewis, J. C., R. A. Powell, and W. J. Zielinski. 2012. Carnivore translocations and conservation: insights from population models and field data for fishers. *PLoS ONE* 7:e32726.
- 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.
- Linnell *et al.* 2018. Density and population viability of coastal marten: a rare and geographically isolated small carnivore. *PeerJ* 6:e4530; DOI 10.7717/peerj.4530.
- Lofroth, E. C., C. M. Raley, J. M. Higley, R. L. Truex, J. S. Yaeger, J. C. Lewis, P. J. Happe, L. L. Finley, R. H. Naney, L. J. Hale, A. L. Krause, S. A. Livingston, A. M. Myers, and R. N. Brown. 2010. Conservation of Fishers (*Martes pennanti*) in South-Central British Columbia, Western Washington, Western Oregon, and California—Volume I: Conservation Assessment. USDI Bureau of Land Management, Denver, Colorado, USA.
- Martin, S. K. 1994. Feeding ecology of American martens and fishers. Pages 297-315 in S. W. Buskirk, A. S. Harestad, M. G. Raphael, and R. A. Powell, editors. *Martens, sables, and fishers: biology and conservation*. Cornell University Press, Ithaca, New York.
- Matthews, Sean M., J. Mark Higley, Kerry M. Rennie, Rebecca E. Green, Charles A. Goddard, Greta M. Wengert, Mourad W. Gabriel, and Todd K. Fuller. 2013. Reproduction, Recruitment and Dispersal of Fishers (*Martes pennanti*) in a Managed Douglas-fir Forest in California. *Journal of Mammalogy*, 94(1):100-108.

- Moriarty, K. M., M. A. Linnell, J. Thornton, and J. D. Bailey. 2015. Humboldt marten detectability protocol. Oregon State University, unpublished protocol.
- Moriarty, Katie M., John D. Bailey, Sharon E. Smythe, and Jake Verschuyt. 2016. Distribution of Pacific Marten in Coastal Oregon. *Northwestern Naturalist* 97(2):71-81. Accessed at: <http://www.bioone.org/doi/abs/10.1898/NWN16-01.1?journalCode=nwnt> on July 24, 2017.
- Moriarty, Katie M., Mark A. Linnell, Brandon E. Chasco, Clinton W. Epps, and William J. Zielinski. 2017. Using high-resolution short-term location data to describe territoriality in Pacific martens. *Journal of Mammalogy*: Vol 98(3):678-689.
- Moriarty, Katie M., Caylen Kelsey, Sean M. Matthews. 2018. Unpublished report for Klamath Plateau Fisher Ecology Study, Southern Oregon.
- Powell, R. A. 1993. *The fisher: life history, ecology and behavior*. 2nd edition. University of Minnesota Press, Minneapolis, Minnesota.
- Proulx, Gilbert and Keith B. Aubry. 2014. The “Martes Complex” – An Opportunity to Bring Together Marten, Fisher, Sable, Wolverine and Tayra Biologists. *Canadian Wildlife Biology and Management: Volume 3, Number 1*. ISSN: 1929-3100. Accessed at: <http://cwbm.name/wp-content/uploads/2016/04/4-Vol-3-Issue-1-Proulx-and-Aubry.pdf> on July 23, 2017.
- Slauson, Keith M., William J. Zielinski, and John P. Hayes. 2007. Habitat Selection by American Martens in Coastal California. *Journal of Wildlife Management* 71(2):458-468.
- U.S. Fish and Wildlife Service (USFWS). 2015. Coastal Oregon and Northern Coastal California Populations of the Pacific Marten (*Martes caurina*). USFWS, Portland, Oregon. Accessed at: [https://www.fws.gov/oregonfwo/ExternalAffairs/News/2015/Coastal_Marten_Final_Species_Report_April_2015%20\(1\).pdf](https://www.fws.gov/oregonfwo/ExternalAffairs/News/2015/Coastal_Marten_Final_Species_Report_April_2015%20(1).pdf) on July 24, 2017.
- USFWS. 2016. Final Species Report: Fisher (*Pekania pennanti*), West Coast Population. USFWS, Klamath Falls, Oregon. Accessed at: <https://www.fws.gov/klamathfallsfwo/news/Fisher/Final/SpeciesRpt-FisherFinal-20160331.pdf> on July 24, 2017.



Radio-collared fisher sniffing – likely looking for food.
Photo: Mark Higley



Oregon Forest Resources Institute

Oregon Forest Resources Institute
317 SW Sixth Ave., Suite 400
Portland, OR 97204
971-673-2944

OregonForests.org

Julie Woodward, Senior Manager of Forestry Education

Mike Cloughesy, Director of Forestry

Thank you to all our contributors

OFRI is grateful to the many people who gave their time, expertise, insights and comments during the development of this publication: Jenniffer Bakke, Hancock Forest Management; Seth Barnes, Oregon Forest & Industries Council; Herman Biederbeck, Oregon Department of Fish and Wildlife; Derek Broman, Oregon Department of Fish and Wildlife; Desiree Early, Green Diamond Resource Company; David Green, Oregon State University; Jessica Homyack, Weyerhaeuser Company; Sean Matthews, Oregon State University; Christine Maynard, Cafferata Consulting; Katie Moriarty, U.S. Forest Service; Claudine Reynolds, Port Blakely; Mike Rochelle, Weyerhaeuser Company; Nicole Strong, Oregon State University; Jake Verschuyl, National Council for Air and Stream Improvement; Jennifer Weikel, Oregon Department of Forestry.

***Designed by:** Carlee Justis, State of Oregon Publishing & Distribution.*

Follow us on Facebook, Twitter and Instagram.



Oregon Forest
Resources Institute