

**Wildlife in Managed Forests: Forest Carnivores and their Habitats**  
**A focus on marten, fisher, and fox**  
**PROGRAM BIOS AND ABSTRACTS**  
**October 19, 2017**

**WELCOME AND INTRODUCTIONS**

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

Julie develops and implements programs to support statewide outreach with foresters, forest landowners and high school audiences. In addition, she manages an actively working demonstration forest for public enjoyment and education at The Oregon Garden in Silverton. She is the project manager for the Wildlife in Managed Forests Program for OFRI. Julie is also the Co-owner of Woodward Forestry, a forestry consulting business. Julie is an active member of Society of American Foresters and received her masters and bachelor degrees from Oregon State University.



Fran Cafferata Coe, Certified Wildlife Biologist<sup>®</sup>, Cafferata Consulting

Fran Cafferata Coe is a wildlife biologist for the timber industry. Fran has experience in writing wildlife management plans, completing forest harvest unit reviews and environmental surveys for sensitive, threatened and endangered plant and animal species and their habitats. Fran is a member of both The Wildlife Society and the Society of American Foresters. She is currently the Chair-elect for the Oregon Society of American Foresters. She is a past President of the Oregon Chapter of the Wildlife Society. Fran is passionate about bringing forestry and wildlife together to develop management strategies that are practical.



**DEFINING THE ISSUE – FOREST CARNIVORE POLICY AND IMPLICATIONS FOR FOREST LANDOWNERS**

Jim Thrailkill, Supervisor at the Roseburg Office, United States Fish and Wildlife Service

**Biography:** Jim has been involved with forest-wildlife related issues in Oregon for 27 years. His experience includes biologist and supervisory positions with the Oregon Cooperative Fish and Wildlife Unit at OSU, private contractor, Executive Director of the McKenzie Watershed Council, and the U.S. Fish and Wildlife Service.

**Abstract:** In recent years there's been a substantial increase in support and interest by federal, state, tribal and private stakeholders in implementing

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collaborative, voluntary and proactive measures benefiting Pacific fisher, coastal marten and Sierra Nevada red fox in Oregon. To be sure, much of this interest outside the U.S. Fish and Wildlife Service is motivated by a desire to reduce the potential need for listing these species under the federal ESA. Regardless of the motivation for this activity, it is clearly resulting in a much-improved long-term conservation outlook for this suite of carnivore species in Oregon. For example, exceptional collaborative partnerships among industry, agencies and academia have been formed that are quickly filling the data gaps in fisher, marten and fox distribution and life-history needs. However, to be fully successful in carnivore management, collaboration will also be needed by forestry and wildlife professionals in finding ways to conserve the ecosystems upon which these carnivores depend for their long-term persistence across the landscape. Addressing wide-ranging species influenced by broad-scale issues, such as fisher, marten and fox, inherently involves large landscapes, often with multiple landowners and land managers. And if these species become listed, accommodating different ownerships and management priorities will require developing a suite of conservation measures that can be voluntarily implemented based on local conditions, site potential and other considerations. This presentation will focus on forestry and wildlife professionals working together for a common forest-landscape approach for proactively managing carnivores.

**CARNIVORE WORKING GROUP UPDATE**



Derek Broman, *Carnivore Furbearer Coordinator for the Oregon Department of Fish and Wildlife*

**Biography:** Derek is the Carnivore-Furbearer Coordinator for the Oregon Department of Fish and Wildlife and has been with ODFW for two years. He has a Bachelor's Degree in Biology from Luther College and a Masters in Wildlife Ecology from the University of New Hampshire. He studied numerous carnivore species in the Midwest, New England, and Texas prior to arriving in Oregon. His current duties include managing the ODFW Bear, Cougar, Wolf, and Furbearer Programs. His office is at the ODFW HQ in

Salem.

**Abstract:** Considerations for listing under the Federal Endangered Species Act over recent decades have brought much attention to medium-size carnivores throughout Oregon. Numerous individuals and groups rallied to address the need for information, frequently producing collaborations across government agencies, academia and landowner groups. As the need for information and data gathering has grown, so has the need for communication and collaboration between researchers in order to ensure the use of proven, contemporary techniques and to not duplicate efforts. To meet this need, the Oregon Forest Carnivore Work Group was formed in 2016, consisting of over 120 individuals. The informal group meets periodically to present current projects and findings, prioritize research and information needs, and provide guidance on future efforts. Topics receiving the most attention have included fisher, Humboldt marten, Sierra Nevada red fox, data sharing and sampling techniques.

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**THE MARTEN STORY IN OREGON**

Katie M. Moriarty<sup>1</sup>, Mark A. Linnell<sup>2</sup>, Jake Verschuy<sup>3</sup>, Charlotte Eriksson<sup>4</sup>, David Green<sup>5</sup>, Matthew S. Delheimer<sup>1</sup>, Jonathan Pauli<sup>6</sup> and Taal Levi<sup>4</sup>

<sup>1</sup>USDA Forest Service, Pacific Northwest Research Station, <sup>2</sup>Oregon State University, College of Forestry, <sup>3</sup>National Council for Air and Stream Improvement, <sup>4</sup>Oregon State University, College of Agriculture, <sup>5</sup>Oregon State University, Institute for Natural Resources, <sup>6</sup>University of Wisconsin-Madison, Forestry and Wildlife Ecology



**Biography:** Katie is a postdoctoral research wildlife biologist. Her research aims to provide robust science-based information for forest managers and practitioners specifically aimed at balancing management with the long-term conservation of forest-dependent species. Katie focuses on applied hypothesis-based research questions using carnivores, often marten (*Martes caurina*) and fisher (*Pekania pennanti*), as study species. She and her team are collecting data relating to species distributions and fine scale habitat use. For instance, they have deployed remote cameras (>2700 locations, >7 million photographs) throughout the forested ranges of Oregon to describe the distribution and detectability of rare coastal marten and fisher, potential prey, and predators. They are also using GPS collars in novel ways to quantify marten and fisher movements, energetics, foraging, and fine-scale selection. Teams are concurrently measuring resting behavior and microsite selection. These multi-scale studies have

been possible using an approach, where the support of several small projects funded in part by many institutions – from government agencies to private industry – have combined to produce research where the whole is greater than the sum of its parts.

**Abstract:** Pacific martens (*Martes caurina*) historically resided throughout Oregon and northern California's coastal forests. Contemporary (1989-2012) records of martens ( $n = 26$ ) suggested state-wide range contraction in Oregon. The U.S. Fish and Wildlife Service concluded, however, that the coastal-distinct population segment of the Pacific marten (*M. c. humboldtensis*) was not warranted for federal Endangered Species Act protections in April 2015. This conclusion is under litigation. We surveyed throughout the Oregon coast range (2014-2017) to estimate the current coastal marten distribution using remote cameras ( $n = 963$ , 360 sample units) and scent detection teams ( $n = 179$  sample units). Our marten detections were only in areas known by prior surveys or road-killed mortalities, despite our unprecedented survey effort. For both populations we used vegetation plots where martens were detected to quantify fine- and broad-scale vegetation use, and addressed whether late-seral reserves established for spotted owls (*Strix occidentalis caurina*) could be sufficient for marten conservation. In addition, we described habitat use, home range size, density, population size, potential prey and diet in forested dunes of the central Oregon coast, west of Highway 101.

Martens were in younger forests with dense shrub cover, compared to spotted owls. Areas with high cover likely reduce predation risk from larger-bodied carnivores and owls. In the central coast, predicted marten and spotted owl habitat did not overlap. In contrast, in the south coast predicted habitat broadly overlapped within

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late-seral reserves. Martens in the coastal dunes had the smallest home ranges in North America. Martens exclusively used forest west of Highway 101, consisting of high shrub cover, including seasonally flooded areas. Forest west of Highway 101 had an increased abundance and diversity of small vertebrates compared to east of 101. Marten diet was primarily composed of birds, berries and small mammals (<100 grams). Unlike other coastal marten populations in the Pacific states, we found no indication that martens consumed foods originating from the ocean. The population in the dunes appears unique, persisting in an area without seasonal snow cover. Population size is small, estimated at 63 adult martens (95% Credible Interval: 58-73) and 73 potential territories (range: 46-91) across two subpopulations separated by the Umpqua River. Using population viability analysis, assuming two or more annual human-caused mortalities such as road kill, extinction risk for a subpopulation of 30 animals ranged from 34% to 100% in the next 40 years. Coastal martens would benefit from reducing road kills and other human-caused mortalities. Forest management that maintains or restores stands with berry-producing shrubs and dense, diverse understories would likely increase available habitat. Late-seral reserves developed for spotted owls in the south coast provide high-quality habitat for martens, but the population is presumed small and isolated. Limiting disturbance or vegetation management during reproductive periods (e.g., March-June, July-August for birth/kit-rearing and mating) could benefit population stability, but such predictions have not been tested.

**THE FISHER STORY IN OREGON**

Sean M. Matthews<sup>1</sup>, David S. Green<sup>1</sup> and Katie M. Moriarty<sup>2</sup>

<sup>1</sup> *Oregon State University, Institute for Natural Resources*

<sup>2</sup> *USDA Forest Service, Pacific Northwest Research Station*

**Biography:** Sean is wildlife ecologist and Associate Research Faculty with the Institute for Natural Resources at Oregon State University. Sean's research program is focused on human-wildlife coexistence, carnivore ecology, demography and habitat relationships of wildlife populations, and applications of novel technologies to wildlife research and management. Sean is collaborating with tribal, federal, state, private-industry, and academic partners throughout the Pacific Northwest.



B.S. Wildlife Management, Humboldt State University, 1997

M.S. Natural Resources, Humboldt State University, 2002

Ph.D. Environmental Conservation, University of Massachusetts Amherst, 2012

Post Doc Wildlife Conservation Society and North Carolina State University, 2015

Post Doc Ford Foundation and the National Academy of Sciences, 2015

**Abstract:** Fishers (*Pekania* [formerly] *pennanti*) are medium-size, forest-obligate carnivores that historically occupied most coniferous forests in Washington, Oregon and California. Human activities resulted in population

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decreases and range contractions throughout much of their historical distribution in the Pacific states. Conservation concerns have prompted regulatory actions by state and federal agencies. Numerous fisher research efforts and conservation measures have been undertaken in California and Washington. Systematic, non-invasive surveys were conducted in California to estimate the contemporary distribution, local and regional population densities, species interactions, and the population-level impacts of translocation and wildfire. Telemetry studies in California have elucidated habitat relationships at multiple spatial scales during daily resting bouts and denning, sources of mortality, and emerging threats related to rodenticides. The Washington Department of Fish and Wildlife has undertaken two reintroductions. The California Department of Fish and Wildlife, in collaboration with our industry partners, is completing an experimental translocation and pivoting to non-invasive monitoring of the translocated population.

In Oregon, the Oregon Department of Fish and Wildlife and partners reintroduced fishers to the southern Oregon Cascades between 1961 and 1981. These reintroductions were not evaluated for success, and fishers received little attention in Oregon until recently. Distribution-level survey efforts initiated in 2015 have revealed fishers persisting in the Klamath-Siskiyou region of southern Oregon and in a small portion of the southern Oregon Cascades. Fishers, however, remain undetected in the northern Oregon Cascades, and other portions of the state have not been surveyed. Recent surveys on the Cascade Siskiyou National Monument and neighboring ownerships have revealed limited and recent connectivity between fishers in the Klamath-Siskiyou and the monument. We are also finding fishers selecting late-seral forest conditions and high levels of reuse of resting structures. Despite these efforts, significant information gaps remain for management and conservation in Oregon. We have a timely opportunity to cooperatively capitalize on current Oregon research and build from other regional efforts to fill remaining information gaps and effectively manage for fishers in Oregon.

### **STATUS UPDATE ON THE SIERRA NEVADA RED FOX POPULATION IN OREGON**

Cate Quinn, PhD Student at U.C. Davis



**Biography:** Cate has been studying Sierra Nevada red fox for the last 5 years as a PhD student in the Mammalian Ecology Conservation Unit at UC Davis. The bulk of her research has been focused on the California population in the Sierra Nevada, using noninvasive monitoring to gain insight into population status and possible mechanisms of decline. Recently she has been collaborating with many terrific biologists throughout the state of Oregon to use a genetic approach to better understand the distribution, connectivity, and abundance of Sierra Nevada red fox and their montane red fox allies in Oregon.

**Abstract:** The Sierra Nevada red fox (SNRF; *Vulpes necator*) is a montane subspecies of red fox that historically occurred throughout the Sierra Nevada and Southern Cascade ranges in California and Oregon. Over the last century SNRF have declined precipitously; in California, where only 2 isolated populations each numbering <50 individuals occur, it is clear SNRF are

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imperiled. In contrast, almost no information on the status and distribution of SNRF in Oregon exists to guide conservation and early management strategies. Here we summarize initial results from camera and genetic surveys carried out 2010-2016, and explore the insights these data offer regarding the geographic distribution, abundance, connectivity and genetic distinctiveness of SNRF populations in the Cascade Range. We discuss implications to red fox management throughout Oregon, critical information needs, and ongoing research efforts currently targeting these knowledge gaps.

**A LANDOWNER CASE STUDY: HUMBOLDT MARTEN ON A MANAGED FOREST LANDSCAPE**

Desiree A. Early<sup>1</sup>, Keith A. Hamm<sup>1</sup>, Lowell V. Diller<sup>1</sup>, Keith M. Slauson<sup>2</sup>, and William J. Zielinski<sup>2</sup>

<sup>1</sup>*Green Diamond Resource Company*

<sup>2</sup>*USDA Forest Service, Pacific Southwest Research Station*

**Biography:** Desiree is a Terrestrial Wildlife Biologist for Green Diamond Resource Company. She is originally from Texas. She earned her Bachelor's degree from Midwestern State University. She moved to California to pursue a M.S. degree in natural resource management from Humboldt State University where she studied black bear movements and spatial interactions. Desiree was hired by Green Diamond Resource Company in 2008, and she is currently their Terrestrial Wildlife Biologist. Her work includes monitoring and research for listed or sensitive raptors and mammals that occur on Green Diamond's managed timberlands.



**Abstract:** The Humboldt marten (*Martes caurina humboldtensis*) historically occurred in California's coastal redwood-dominated forests, from northern Sonoma County to the Oregon border. The subspecies was thought to be extirpated due to over-trapping and loss of habitat until a small, remnant population was rediscovered in 1996 on the Six Rivers National Forest (Slauson et al. 2007). Surveys conducted from 2004 to 2011 on managed forests owned by Green Diamond Resource Company to the west of the remnant population yielded marten detections at several stations in the Pecwan and Bear Creek watersheds. To better understand the composition, movements, fates and habitat use of marten on these managed lands, a collaborative effort between Green Diamond, the U.S. Forest Service Pacific Southwest Research Station, the California Department of Fish and Wildlife and the Yurok Tribe was initiated in 2012. Between October 2012 and August 2016, 33 individual marten were captured (18 male, 15 female), and 24 (13 male, 11 female) were radio-marked. More than 2,000 telemetry locations have been obtained to date, resulting in 125 rest sites. After documenting reproduction in 2014, all adult female marten were monitored throughout each denning season (2014-2016) to determine denning phenology, kit production, site fidelity and the characteristics and spacing of denning structures.

Sixteen female marten were monitored, resulting in 12 reproductive efforts and 33 confirmed den sites. Eleven female marten successfully weaned a minimum of 17 kits. Two reproductive efforts failed because the adults died prior to kit independence, and one reproductive effort was assumed to have failed due to lack of

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observation of the female with kits during August. Females less than two years of age did not attempt reproduction. The majority of confirmed dens were located in cavities of live trees or snags. The den trees/snags contained complex structural features (e.g., complex crowns, large limbs, broken tops, basal hollows, multiple cavities, etc.) and were larger-diameter trees than those within the surrounding stand. The location of den structures ranged from 20 to 2,000 feet from the nearest man-made edge (road or recent harvest unit) and were located in a variety of stand ages. Fifty percent of reproductive females monitored for at least two breeding seasons reused a den structure from a previous season, and 60% reused a den structure within the same season. This study is ongoing and has the promise of providing important insights on how managed forests in the redwood region can provide denning habitat for coastal marten.

**FOOD WEBS AND THE RECOVERY OF FISHER AND MARTEN IN OREGON**

Taal Levi<sup>1</sup>, Katie M. Moriarty<sup>2</sup>, Charlotte Eriksson<sup>1</sup>, Brent Barry<sup>1</sup>, Jennifer Allen<sup>1</sup>,  
and Jake Verschuy<sup>3</sup>

<sup>1</sup>*Oregon State University, College of Agriculture*

<sup>2</sup>*USDA Forest Service, Pacific Northwest Research Station*

<sup>3</sup>*National Council for Air and Stream Improvement*



**Biography:** Taal Levi is Assistant Professor in the Department of Fisheries and Wildlife at Oregon State University. He was trained in physics and biology at UC Berkeley, and went on to receive a PhD in Environmental Studies from UC Santa Cruz. He has diverse research interests in wildlife ecology, conservation biology, and disease ecology in tropical, temperate and boreal ecosystems. A consistent

theme of his research is the implementation of quantitative methods and molecular methods to applied ecology and conservation issues.

**Abstract:** Several carnivore species in Oregon forests are rare and geographically isolated, prompting petitions for listing under the Endangered Species Act. If listed, regulations have the potential to substantially influence land-use decisions and forestry on public and private lands, requiring information about population size, connectivity between populations and long-term viability. Carnivore diet has long been a neglected information gap, and prey availability strongly influences carnivore distributions and viability. Further, adequate food resources may be especially important for carnivores with high energetic requirements, such as martens and fishers. Our lab has harnessed an underutilized resource – scat – along with cameras to provide information on the abundance and ecology of fishers and martens. In central coastal Oregon, martens were predominantly detected in the coastal dunes compared with adjacent forests. The dunes had the highest amount of understory structure, but overstory trees were more abundant and larger in adjacent forests. The abundance index of potential prey species was higher in the dunes compared to older forest stands. Marten diet was primarily comprised of birds, berries and small mammals (<100 grams), including rare arboreal voles (*Arborimus longicaudus*, *A. albipes*). Our study suggests that martens are more flexible in their habitat use than previously believed, and that relative abundance of prey and understory structure may be more important than forest age.

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In southern Oregon, we deployed cameras at 743 locations (198 sample units), collecting data for a minimum of 35 days in winter and 60 days in summer. We obtained over 3 million photographs, amassing one of the largest systematically surveyed photo data sets. Fishers were detected at 47 unique sample units and 99 individual survey stations, confirming the presence of the indigenous and introduced populations. Neither population showed significant signs of expansion, and may have contracted. We hypothesize fisher distributions are positively correlated with prey and negatively influenced by carnivore competition. One interesting anecdote was the lack of porcupine detected in the landscape. Fishers were reintroduced in the southern Cascades to limit porcupine populations, and are thought to be reliant on porcupine and large-bodied prey, especially during winter. We have used detection dogs to collect scats of fisher, bobcat and lion that will be processed to address our hypothesis. These case studies provide small insights to a broader issue – how carnivores are distributed on the landscape and what resources they are utilizing. Ultimately, biotic interactions such as available prey and predation risk may contribute as much or more information about carnivore population persistence than vegetation alone.

**MAXIMIZING THE BIOLOGICAL VALUE OF STRUCTURAL RETENTION**

Sean Sultaire<sup>1</sup>, Andrew J. Kroll<sup>2</sup>, Jake Verschuyf<sup>3</sup>, Jessica Homyack<sup>2</sup> and Gary Roloff<sup>1</sup>

<sup>1</sup>Michigan State University, <sup>2</sup>Weyerhaeuser, <sup>3</sup>National Council for Air and Stream Improvement



**Biography:** Sean is a PhD student at Michigan State University studying how small mammals respond to structural retention in Oregon and Washington. As a researcher, he is interested in how local and landscape scale habitat attributes shape the animal populations and communities we observe in nature. Most importantly, he is interested how this information on the mechanisms that shape biodiversity can be applied to improve wildlife conservation decisions, specifically in forested ecosystems.

**Biography:** Jake is a Principal Research Scientist for the National Council for Air and Stream Improvement. He holds a PhD in Ecology and Environmental Science from Montana State University. Jake has spent the past 20 years studying managed forest/wildlife relationships, collaborating with universities, timber companies and consultants in the Pacific

Northwest, USA. His current research program focuses on wildlife and biodiversity responses to forest management practices in the Pacific Northwest.



**Abstract:** Structural retention after timber harvest is assumed to increase stand-level diversity of plants and animals, and is a requirement of state forest practices rules in Oregon and Washington. However, the effect of

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the spatial pattern of structural retention (dispersed vs. aggregated, upland vs. riparian) is not known for many wildlife species. Small mammals are useful indicators to examine the effects of forest management because they are relatively diverse, respond quickly to forest disturbance and have varied habitat requirements. Additionally, the small-mammal community is an important prey resource for many predators, including forest carnivores. Small-mammal populations occurring on timberlands in the Pacific Northwest are understudied, despite the fact that they could be a factor limiting the distribution of forest carnivores. To learn more about how small-mammal populations respond to structural retention, we manipulated location and aggregation of retained trees in clearcuts across 10 blocks in western Oregon and SW Washington under a randomized complete-block design. In these treatments, we deployed live-trap grids inside and outside retention patches to measure how small-mammal densities and species richness vary with retention treatment. Small-mammal diversity was greatest in the more aggregated treatments, particularly when associated with a riparian management zone. We had sufficient samples from three rodent species to estimate populations in relation to patch fragmentation (treatment) and habitat type (i.e., retention patch or clearcut). Deer mice, which are habitat generalists, showed no change in populations in response to retention treatments. Townsend's chipmunk, a forest-dependent species, occurred in higher densities in retention patches compared to clearcuts, and higher densities in more dispersed treatments. Bushy-tailed woodrats, a large-bodied species that is sensitive to high temperatures, had higher densities in retention patches than clearcuts, but showed no treatment effect. These results indicate that by increasing small-mammal diversity and abundance in relation to harvested areas, structural retention has the potential to increase the small-mammal prey base available to forest carnivores in managed forests. Dispersed retention appears to support the highest density of prey, while aggregated retention supports a more diverse prey base. Paired with information on the diet of forest carnivores in the Pacific Northwest, our research can help inform carnivore conservation strategies for managed forest landscapes. Although forest management and forest practices rules are focused on a stand-scale disturbance, it is important to consider larger spatial scales to determine effects of retention patterns on small-mammal populations or related predator communities.

**CCAA AGREEMENTS AND WHAT THIS MEANS FOR LANDOWNERS**

Jody Caicco, Fish and Wildlife Biologist for the U.S. Fish and Wildlife Service



**Biography:** Jody is currently serving as the Forest Resources Division Manager and works on mostly listed species issues with agencies and landowners. She has been with the Fish and Wildlife Service for 29 years, and has a BS in Natural Resource Conservation from UC Berkeley.

**Abstract:** Candidate Conservation Agreements with Assurances (CCAAs) are a tool under the Endangered Species Act designed to create incentives for landowners to engage in voluntary activities that provide a net conservation benefit for at-risk species. In Oregon, a template CCAA was developed for the fisher that private landowners can enroll in. By doing so, landowners can receive a permit containing assurances that if they engage in certain conservation actions that benefit fishers, they will not be required to implement additional conservation measures beyond the CCAA. A description of the fisher template CCAA will be discussed, along with what is required for enrollment.

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**CONSERVATION PRIORITIES AND NEXT STEPS**

Sue Livingston, Wildlife Biologist for the U.S. Fish and Wildlife Service



**Biography:** Sue currently works collaboratively with Federal, State, and private managers on managing and conserving forest species. Prior to coming to the Fish and Wildlife Service 23 years ago, she was a district wildlife biologist with the Siskiyou National Forest. She has a Master's Degree in Wildlife Management from the University of Maine and is a Certified Wildlife Biologist®.

**Abstract:** Let's take a break from non-stop presentations, great as they are, and engage in a discussion about what we have heard today about forest carnivores. What are their conservation needs? How might they be met? What are some ways that interested managers could contribute to those needs? We will discuss these points, and any other related topics that we unravel, during the allotted time.

**IMPLICATIONS FOR LANDOWNERS: INTEGRATING SCIENCE AND MANAGEMENT FOR FOREST CARNIVORES**

Jessica A. Homyack, Wildlife Scientist for Weyerhaeuser Company, Centralia, Washington



**Biography:** Jessica manages Weyerhaeuser's Western Environmental Research Program in Oregon, Washington, and Montana. She received degrees in wildlife science and management from West Virginia University, University of Maine, and Virginia Tech prior to working for Weyerhaeuser. Jessica has investigated prey populations for Canada lynx and American marten, bobcat - lynx hybridization, and habitat selection of river otters.

**Abstract:** Conservation of small forest carnivores in the Pacific Northwest is challenged by perceived interactions between carnivore life history characteristics and management of forests for wood products. The current state of knowledge suggests that fisher and marten are tied to structurally diverse forests. However, research also indicates that these small carnivores can exhibit strong behavioral plasticity and occupy a broader range of habitat types and exploit a wider variety of prey than previously recognized. Here, I draw from other conservation success stories and ongoing challenges for marten and fisher from other geographic regions to expand our understanding of the factors that limit populations in managed forests and other human-altered landscapes. For example, despite high human populations and road densities in mid-Atlantic and New England states, fisher populations have increased significantly in recent decades. Further, threatened Newfoundland marten use a variety of forest conditions, including regenerating forest, and incorporate a novel prey source into their diets. In contrast, fisher and marten in the Pacific Northwest appear to occur in isolated populations at low densities. Collectively, the body of science suggests that managed forests can provide suitable habitat structure and abundant prey populations, but factors related to energetics, food availability and

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the predator community may play roles in limiting recovery of small carnivores in Oregon and Washington. While ongoing and future research elucidates the proportional effects of these factors on population recovery, forest managers must continue their involvement in collaborative research and conservation efforts for these species. By participating in multi-stakeholder working groups and developing practical conservation agreements (e.g., Candidate Conservation Agreements with Assurances), private forest landowners can act as agents of change and shift the conservation paradigm from conflict to collaboration.