Describing Humboldt marten movement and basic population demographics in areas that differ in management intensity FY 2022-2023

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Scope of Work and Vision

Humboldt martens (*Martes caurina humboldtensis*) are a federally threatened distinct population segment with populations separated between private and federal ownerships. We are executing a multi-faceted telemetry study paired with non-invasive techniques to evaluate critical information gaps for Humboldt martens. Available research does not provide adequate information to inform habitat-related management decisions. Connectivity and dispersal were identified as focal areas of concern – especially connectivity between the southern Oregon and central Oregon populations (USFWS 2019, Schrott and Shinn 2020). This work was requested by the US Fish and Wildlife Service and can directly inform Critical Habitat. It is unknown how Humboldt martens move across or in proximity to privately managed lands. Humboldt martens in actively managed and Tribal ownerships appear to have high fecundity and survival (PSW 2019, Martin et al. in review). However, Oregon's forests differ in management practices and vegetation associations, so fecundity and survival rates should not be extrapolated to these regions. Identifying commonalities among study areas and among populations, like whether martens will travel through openings of certain sizes, or if such behavior is dependent on landscape composition or ground based cover (e.g., slash piles, shrub density), is paramount for providing science-based cohesive management direction across populations.

Objectives:

(1) Quantify fine-scale habitat characteristics used by martens by pairing a combination of movement, resting, and den locations with LiDAR and ground-based measurements of forest structure in areas of differing management history and landscape composition;

(2) Evaluate movement distances into openings that differ in vegetation density and composition using both non-invasive trials and GPS telemetry;

(3) Better understand relative influences of purported threats to populations by tracking individuals for >2 years and documenting their fitness (e.g., reproductive history, body condition, cause of morbidity);

(4) Contribute to fundamental information on population ecology, including minimum population size and extent, sex and age ratios, home range, density of potential predators, and diet (likely requires multiple study areas)

Summary of Accomplishments toward Objectives:
Since Fall 2022, we collected additional fine-scale movement data from nine martens in Oregon (Figure 1). We also used remote cameras to: perform a giving up densities experiment, set baited remote camera stations in search of further marten detections, and set unbaited remote camera stations to monitor GPS collar clusters for potential rest sites and better understand marten movement paths (Figure 2).

Last year (2022), funds from WCI allowed us to begin the first season of our giving up densities experiment to examine how martens perceive risk within different forest structure and composition, and we completed a second trial to conclude the experiment this year (2023). Within this experiment framework, we examined how martens tradeoff foraging and vigilance behavior in forest stands differing in age, canopy closure, shrub density, and percent down woody debris (Figure 3). So far, our preliminary analysis showed that martens visited older stands with less down woody debris cover slightly more than younger stands with more down woody debris cover. We also found that martens perceived slightly more risk in stands with less overstory cover. However, the strongest negative predictor of marten perceived risk was number of visits, meaning as martens visited sites more often, they would spend more time foraging and less time vigilant. These results are only preliminary, but we will be able to pair them with our collected GPS collar data to better understand how martens perceive and use habitat associations.

Additionally, in late summer 2023, we set 38 more baited camera stations in the Rogue Siskiyou National Forest between Agness and Port Orford, and another 44 cameras near Elkton, Oregon. These camera efforts will aid in searching for additional locations where martens may occur and represent collaboration with the Bureau of Land Management and US Forest Service.

Finally, we have been using a combination of telemetry and GPS collar clusters to identify potential rest structures (Figure 4). Identifying used rest structures will allow us to collect critical data on rest site habitat associations which will aid managers in improving Humboldt marten conservation strategies.

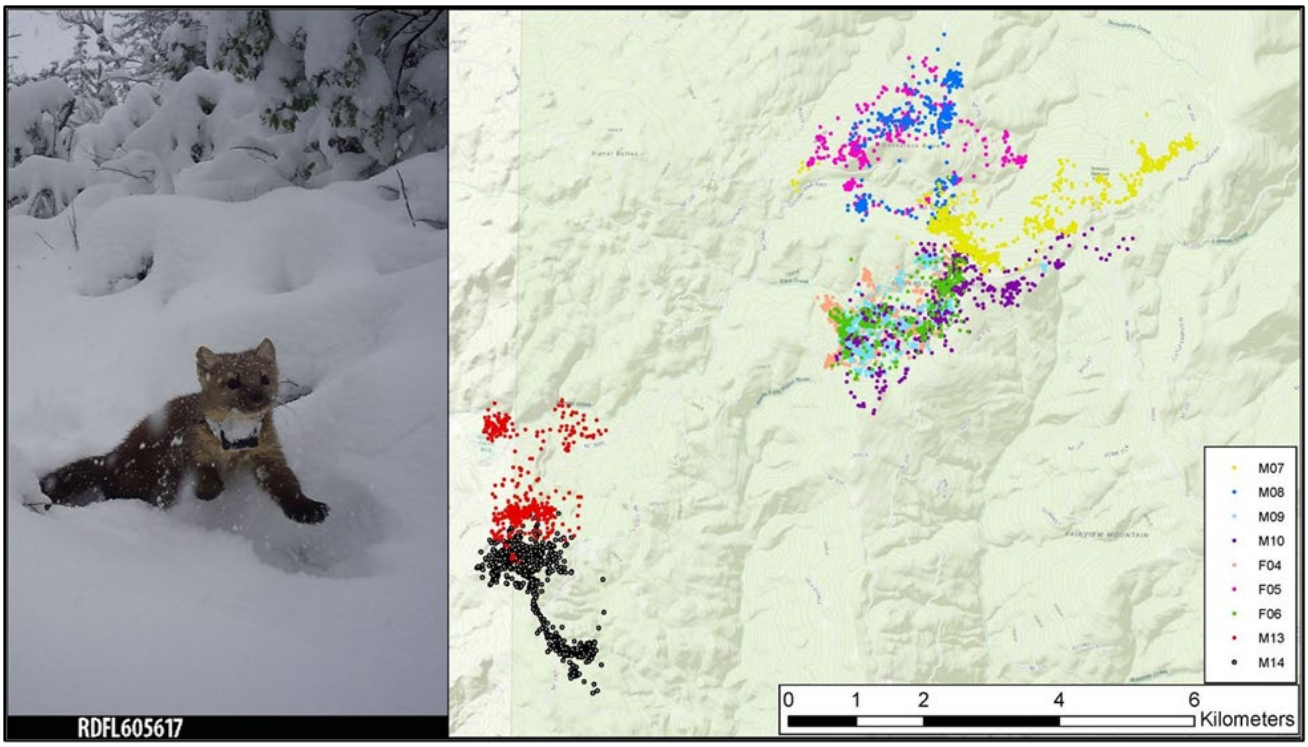

Figure 1. *Left:* A collared Humboldt marten (*Martes caurina humboldtensis*), male 13 (M13), moving through the landscape is captured on remote camera. *Right:* GPS collar data from nine Humboldt martens in southern Oregon. These data were collected from September, 2022 to February, 2023. Collars recorded a GPS location every five minutes for approximately 14 days each. All capture and processes were compliant under the USFWS Recovery Permit ESPER0011953, Cal Poly Humboldt Institute for Animal Use and Care permit 2020W98A, Oregon Scientific Take Permits 086-22 and 001-23, and with permission from the California Department of Fish and Wildlife with previous supervision by the State Wildlife Veterinarian.

Figure 2. Movement data from male marten 14 (M14) indicated potential use of a culvert for road crossing, so we set remote cameras in this area to ground truth the use of this area. Here, M14 is observed coming out of a culvert that passes under Forest Road 1703 in the Rogue Siskiyou National Forest.

Figure 3. A Humboldt marten visiting a baited density experiment station exhibits both foraging (*left panel*) and vigilance (*right panel*) behavior.

Figure 4. We use a combination of very high frequency telemetry (*left panel*) and GPS collar clusters (*right panel*) to identify and monitor structures, such as snags, that may serve as marten rest sites (*center panel*).