1. Title: Effects of Landscape-scale Forest Management on Pacific Marten Occupancy and Population Connectivity in Coastal Oregon (Approved 2014)

2. Investigators:
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3. Project Duration:
2014 –Complete non-invasive Pacific marten (*Martes caurina humboldtensis*) surveys in the landscapes within northern Coos, western Douglas, and western Lane Counties. Conduct initial analysis for Year-1 survey region and produce progress report.
2015 –Complete surveys in the southern Coos, northern Curry, Lincoln, Polk, Tillamook, and Yamhill Counties. Conduct final habitat and population connectivity analysis and complete final report.

4. Objectives: We have four objectives in order to achieve the overall goal of understanding how forest management affects marten occupancy and population connectivity:

    a. Conduct systematic surveys for martens on 2-km grids across a gradient in management intensities on private, federal, and state lands in the vicinity of two marten populations in coastal Oregon.
    b. Deploy hair snares at all marten detection locations to non-invasively collect genetic material for individual identification and abundance estimation.
    c. Conduct habitat compositional analysis at the home-range scale at each survey location.
    d. Determine the landscape patterns and compositions that facilitate connectivity within and passage between populations.

5. Summary of Accomplishments: In May and June of 2014 we developed the survey protocol for this project into a range-wide survey protocol for coastal Oregon. We developed and launched a [Google Drive](#) website to support the dissemination of digital survey and data collection materials and the uploading of field data for both this project and the range wide area. From July to August 2014 we completed surveys for martens on two study grids, the first in Lincoln County that included 18 survey units on forest lands managed by the Siuslaw National Forest, Plum Creek Timber Company, and the Bureau of Land Management (Figure 1). The second grid consisted of 20 survey units and was located in southern Coos County and included forest lands managed by the Rogue-Siskiyou National Forest and Plum Creek Timber Company (Figure 2).

We did not detect martens on either of our survey grids in 2014 despite using survey methods and a protocol that has achieved high probabilities of detection (> 0.90) for Humboldt martens in coastal California (Slauson et al. 2009) where there are known populations. We are carefully evaluating our protocol in order to ensure that we are maximizing our likelihood of marten detections, and we are exploring multiple hypotheses for lack of martens in these areas.

The occurrence of bobcats is one hypothesis that may explain our lack of observed marten detections. Predation of martens, primarily by bobcats (*Lynx rufus*), has recently emerged as a potential limiting factor for marten population distribution and persistence (Slauson et al. 2014), an on-going study of Humboldt martens in California. Bobcats are associated with naturally open and young forested stands (< 40 years old) in the coast range (Wengert 2013, Slauson in prep.) likely due to the abundance of key prey species (e.g., brush rabbits (*Sylvillagus bachmani*)) in these stand types. We observed bobcat scat or tracks in several of the survey stands with the structural characteristics, late-successional with lots of large-diameter snags and logs, consistent with marten occupancy. If this bobcat-predation hypothesis is true, it would align with concurrent research and suggest there is a need to identify potential predator co-occurrence when evaluating marten habitat relationships.

6. Problems, Barriers, Proposed Changes to Objectives: Our main "problem" was the failure to detect martens on either of our survey grids in 2014. We therefore will initiate new coarse-scale (6-km grid) early-survey-season surveys in 2015 that guide the placement of our finer-scale survey grids during May-September 2015. Multiple-scale grids are needed to ensure that we are not missing martens that are actually present and to increase our ability to detect marten occupancy patterns (across a gradient in stands that differ in age class and management history). Within subsets our 2014 and 2015 survey units, we may also deploy remote cameras along roads or trails within our survey units to estimate the distribution of bobcats and begin to evaluate the predator co-occurrence hypothesis described in Section 5 (above).

7. Planned Work: During 2015 we will conduct systematic surveys from May through August and complete a minimum of 3 additional survey grids. At the conclusion of field surveys in August we will begin preparing the dataset for analysis. By the end of October 2015 we will have completed the analysis and final report for the project. Additional products, such as results from genetic analysis and potential publications will be completed soon thereafter.

8. Comprehensive Summary: Not applicable – study concludes fall 2015.

9. Undergraduate Engagement in Project: During the first year of this project we provided research experience and internships for four OSU undergraduates and one former undergraduate. Research experience consisted of training by multiple agencies (Weyerhaeuser, Hancock Timber, BLM, and USFS) regarding field safety, participating in the field survey, and data management activities.

Undergraduate participants included: Thomas Stinson (E-campus student, Fisheries emphasis, male junior status), Jordan Ellison (female, senior status), Corwin Scott (male, junior status), and Allen Palmer (male, senior status).

10. List of Presentation and Publications: Although we do not plan to give any data-related presentations or publications until the completion of field work, this project has provided opportunities to update forest managers and biologists with the aim of facilitating additional collaboration and efforts regarding this species petitioned for Federal listing (April 2015).

Moriarty, K.M., K.M. Slauson, J.D. Bailey. Oct. 2014. Humboldt marten update – collaborative efforts and future strategies. U.S. Forest Service Region 6 Wildlife Program Managers Meeting. Green Springs, Oregon.

Moriarty, K.M., K.M. Slauson, J.D. Bailey. Sep. 2014. Humboldt marten update – collaborative efforts, future strategies, and resource needs. National Council for Air and Stream Improvement (NCASI) West Coast Regional Planning Meeting. Vancouver, Washington.

Literature Cited

Slauson, K.M., J.A. Baldwin, and W.J. Zielinski. 2009. Status and estimated size of the only remnant population of the Humboldt subspecies of the American marten (*Martes americana humboldtensis*) in northwestern California. U.S. Forest Service, Pacific Southwest Research Station, Arcata, CA. 28 pp.

Slauson, K.M. and W.J. Zielinski. 2014. Humboldt marten dispersal and movement ecology study. 11 June 2014 Progress Report. U.S. Forest Service, Pacific Southwest Research Station, Arcata, CA and Green Diamond Resource Company. Unpublished report. 6 pp.

Slauson, K. In prep. Habitat associations of bobcats in coastal forests of Northern California.

Wengert, G. M. 2013. Ecology of intra-guild predation on fishers (*Martes pennanti*) in California. Doctoral dissertation, University of California, Davis.

Google Drive address:

https://drive.google.com/folderview?id=0B1L-wx_kPxkrdkxOUnFBdnRSMHM&usp=sharing

Figure 1. Location of the Grass Mountain Humboldt marten survey grid, completed in July of 2014. Old growth structural index is displayed in the background in grayscale, highest values in black and lowest in white. Section lines indicated by gray lines.
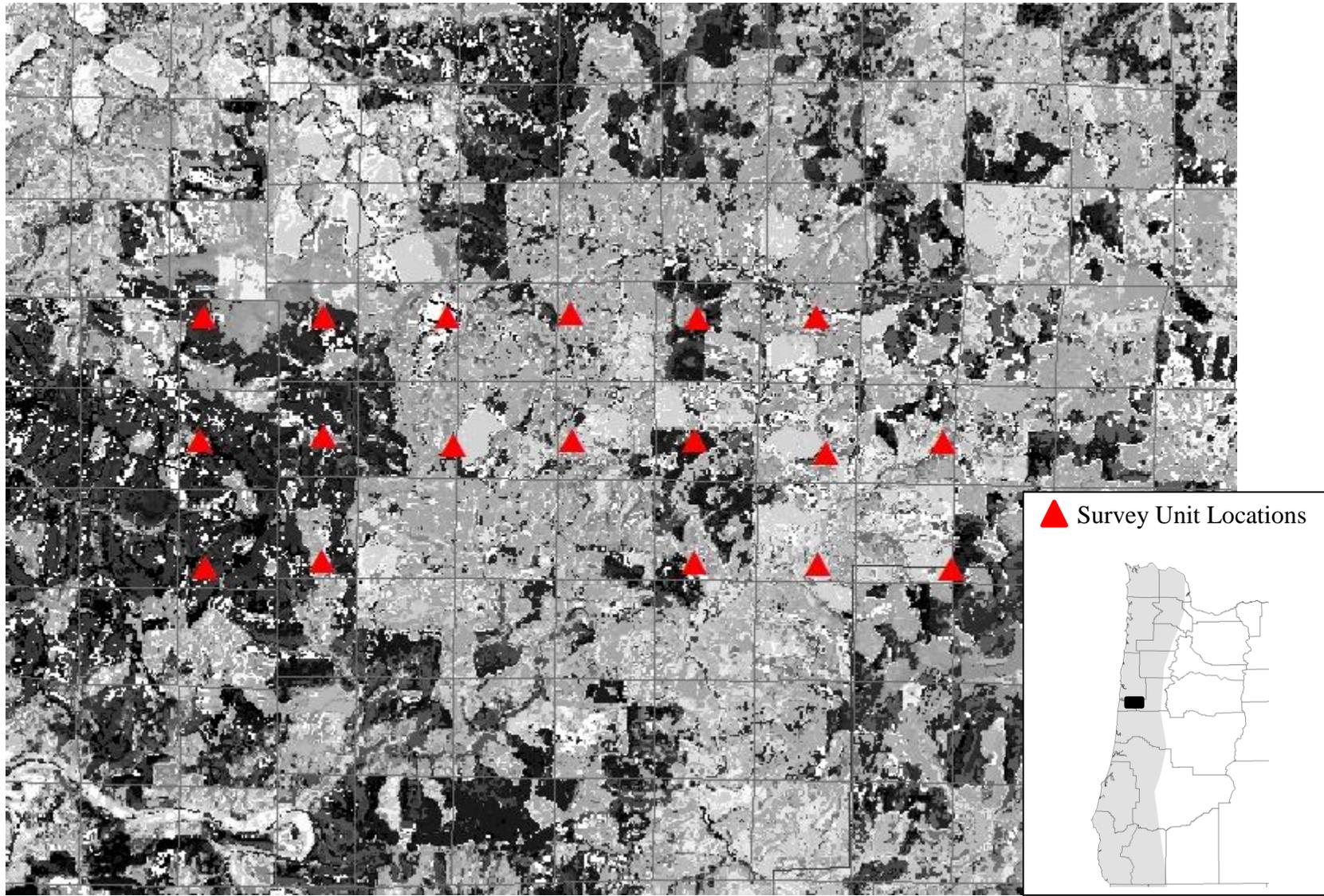

Survey Unit Locations

Figure 2. Location of the Powers Humboldt marten survey grid, completed in August of 2014. Old growth structural index is displayed in the background in grayscale, highest values in black and lowest in white. Section lines indicated by gray lines.