

Initial Concept Proposal

Date Submitted: 5/14/2024

Project Title: Establishing a Survey Protocol for Marbled Murrelet Using Passive Acoustic Technology (Phase 1)

Project # (to be assigned by EMC):

Principal Investigator(s), Affiliation(s), and Contact Information (email, phone):

Brian Dotters- Sierra Pacific Industries, [REDACTED]

Dr. Zach Peery- Department of Forest and Wildlife Ecology

University of Wisconsin, Madison, [REDACTED]

Dr. Connor Wood- Cornell Lab of Ornithology, K. Lisa Yang Center for Conservation Bioacoustics, [REDACTED]

Collaborator(s) and Affiliation(s):

Kevin Roberts- SPI

Sal Chinnici- MRC/HRC

Keith Hamm- Green Diamond Resource Co.

Stacy Stanish- CAL FIRE

Rich Klug- CA DFW

Research Theme(s), Critical Monitoring Question(s), and Rules or Regulations Addressed.

Theme 7: Wildlife Habitat: Species and Nest Sites- This study specifically relates to Theme 7 (a and b) as the research questions revolve around BOF sensitive species and state/federally listed species and developing a survey protocol to locate and apply correct protection measures as outlined in the FPRs.

Theme 9: Wildlife Habitat: Cumulative Impacts- this study directly relates to Theme 9 (a-c) as it would enable all land owners to potentially utilize a new, more cost effective survey protocol to locate and then protect Marled Murrelets and their associated nesting habitat, and avoid significant adverse impacts where applicable.

Additional Rules/Regulations:

14 CCR §919.11

14 CCR §898.2 (d)

14 CCR §1036.1

14 CCR §1091.5 (b)

14 CCR §1090.5 (n)

14 CCR §1094.6 (m)1-3

Project Duration and Dates (MM/YY - MM/YY): 3 years

Estimated Funds Requested for Project: Please provide the total amount of funding requested from the EMC, broken down by year of expenditure, with a brief justification of costs not to exceed 200 words.

< \$10,000

\$10,000 - \$25,000

\$25,000 - \$75,000

\$75,000 - \$150,000

> \$150,000

Total:\$376,445.95 Year 1: \$150,422.65 (Salaries/fringe, ARU deployments, tuition, travel, housing, vehicle rental, misc. supplies, UW overhead) Year 2: \$150,422.65(Salaries/fringe, ARU deployments, tuition, travel, housing, vehicle rental, misc. supplies,UW overhead) Year 3: \$75,600.75 (salaries/fringe, tuition, misc. supplies, UW overhead)

Project Description: *In not more than 2,000 words, describe the project, including (1) Background and Justification, (2) Research Question(s), including Objective and Scope, (3) description of Research Methods, (4) Scientific Uncertainty and Geographic Applicability, including identified monitoring location(s), and (5) a description of the roles of Collaborators and Project Feasibility.*

Background and Justification: Advancements in passive acoustic survey methods have improved the efficiency and effectiveness of surveying and monitoring of rare and elusive species (Sugai et al., 2019, Kahl et al., 2021, Wood et al., 2021, Lesmeister et al., 2021)(Wade et al., 2006, Brandes et al., 2008, Thompson et al., 2010, Lesmeister et al., 2021)(Borker et al., 2015 and Cragg et al., 2015). Survey protocols utilizing this technology have been developed and are currently being implemented to survey for a range of Federally listed (USFWS 2021) and candidate species (Kramer et al. 2023). Recent research and comparing audio visual, radar surveys and passive acoustic surveys to detect murrelet species throughout their range (Borker et al., 2015 and Cragg et al., 2015) have opened the door for the opportunity to potentially utilize autonomous recording units (ARUs) for project level surveys to avoid take of Marbled Murrelet (MAMU) under the ESA (Duarte et al., 2024). By establishing a passive acoustic-based survey protocol for MAMU, all land managers (regardless of ownership/permit status) will be provided with a more cost effective and time efficient mechanism to help streamline management activities to comply with state and federal regulations pertaining to MAMU.

Project Duration: 3 years (Phase 1: 2025-2027)

Research Questions: The research questions for this project are: (1) Can a one or two year MAMU survey protocol, that achieves a high probability of detection, be established using passive acoustic technology, (2) can audio detections be used to quantify occupancy vs. presence vs. absence by comparing results of concurrently conducted audio-visual surveys, (3) what is the effective detectability range/ARU deployment arrangement needed (i.e., survey area coverage) to achieve desired detection probabilities/survey coverage, and (4) can a custom detector be developed for MAMU so BirdNET can be utilized by any entity to scan ARU recordings for MAMU detections?

Description of Research Methods: ARUs will be deployed during the MAMU breeding season on Humboldt Redwood Company (HRC) property and programmed to record acoustic data during the times that coincide with MAMU high activity periods. ARUs will be deployed concurrently with audio-visual (AV) surveys that are being conducted as part of a MAMU Habitat Conservation Plan monitoring program. Deploying the ARUs concurrently with AV surveys will allow for proper occupancy analyses to be completed. Currently, there are 33 monitoring stations/stands where AV surveys are conducted annually as part of the HCP monitoring program that ARUs will be deployed in association with.

Combining passive acoustic surveys with machine learning detectors to identify at-risk species in bulk audio datasets has become an increasingly effective approach to providing time-sensitive conservation data. Our team has successfully applied this approach to Spotted Owl conservation throughout California and will adapt our proven bioacoustics workflow to conduct MAMU surveys. In short, audio can be passively recorded via durable, low-cost devices deployed in stands known or suspected to be used by MAMU for nesting - as well as unknown stands. We will then analyze the audio with the BirdNET algorithm and conduct an extensive manual review of the results, enabling us to generate probabilistic predictions of MAMU vocalizations. Within the subset of sites at which MAMU vocalizations are detected, we can use vocalization rates (e.g., calls per day) from known nesting stands to infer nest presence/absence at stands of unknown status.

Scientific Uncertainty, Geographic Applicability and Location: This study will take place in Humboldt County within the HRC Marbled Murrelet Conservation Areas. These areas include lands owned and managed by HRC as well as neighboring Headwater Forest Reserve and Humboldt Redwood State Parks which are used as control sites. Completion of this project would benefit both industrial and non-industrial timber managers throughout the range of MAMU in California and could also be adopted/adapted where applicable in Oregon and Washington. The development of a streamlined cost effective, time efficient survey protocol would specifically be of benefit to all NTMPs and small land owners who have been restricted by current MAMU protocols that are in place.

Collaborators and Project Feasibility: The PI's and many of the collaborators have worked together for many years on numerous projects and produced multiple published manuscripts covering an array of species. Some of these projects have included work with ARUs and the resulting associated manuscripts and/or protocols. We represent a broad range of expertise in the biological and forestry fields in both the academia and private sector with extensive knowledge of the analytical framework needed to complete the proposed project. Feasibility of this project is extremely high given the track record of products our team has produced. Brian Dotters will be responsible for grant oversight, project development/implementation, coordination and manuscript development. Dr. Zach Peery will be responsible for graduate student oversight, analytical methods, project development/implementation and manuscript development. Dr. Connor Wood will be responsible for graduate student oversight, analytical methods, project development/implementation and manuscript development. Sal Chinnici will be responsible for funding/completion of AV surveys, providing access to monitoring sites and providing data. Kevin Roberts will be responsible for project oversight, implementation, coordination and manuscript development. Stacy Stanish will be responsible for project oversight, consultation, implementation and manuscript review. Rich Klug will be responsible for project oversight, consultation, implementation and manuscript review. Keith Hamm will provide additional monitoring locations if needed.