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Project Title:

Balancing fuel considerations and rare carnivore habitat: an evaluation of risk and reward

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Names and Affiliations of Collaborators: Keith Hamm and Desiree Early, Conservation Planning Department, Green Diamond Resource Company; Sal Chinnici, Wildlife Biologist, Mendocino & Humboldt Redwood Company; Jessica Buskirk, Wildlife Biologist, NCASI, Inc.

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1. Project Description:

Background and Justification:
        California has recently experienced significant increases in the extent and severity of wildfires that have devastated human communities as well as public and private forests, leading to substantial economic costs and effects to sensitive wildlife species. To inform an increased scale and pace at which land managers need to address this emerging wildfire crisis, we propose to focus on opportunities to inform strategic fuels reduction prescriptions that minimize disturbance to forest-dependent species and their habitat. Protecting small wildlife populations from fuel treatments while balancing the need to manage or treat forests has been difficult for both land managers and regulatory agencies. Unfortunately, broadly defining fire hazard and risk reduction strategies across California may inadvertently negatively affect small wildlife populations in naturally fire-resilient forests.
        We propose to evaluate vegetation and fuel conditions in areas used by two rare species. Our goal is to evaluate tradeoffs of retaining or promoting both dense vegetation and coarse woody material that may benefit wildlife species with the challenge of increasing fire risk in increasingly more common hot and dry weather conditions.

Objectives and Scope:
        We propose describing the fine-scale vegetative conditions used by two rare forest carnivores [Humboldt marten (*Martes caurina humboldtensis*) and Pacific fisher (*Pekania pennanti*)] to inform vegetation and fuel reduction strategies within fuel treatments or proposed habitat retention areas. Humboldt marten and Pacific fisher are forest specialists and structural obligate species. Researching their structural needs within the context of understanding fuel loads and fire risk will directly support the needs of land managers in balancing economic, ecological, and conservation goals.

Depending on funding availability and EMC needs, we have split our objectives into 3 possible options:
- Option 1: Humboldt marten vegetation surveys and analyses
- Option 2: Fisher location data, vegetation surveys and analyses
- Option 3: Forest carnivore vegetation use (combining both Humboldt marten and fisher related goals)

Future Vision: Within each objective, we will collect detailed vegetation and fuel measurements to inform forest planning. For measuring large woody material and slash, we aim to collect data using similar protocols as the current EMC-2023-003 project focused on fuel loads and implications for site productivity such that fuel hazard and fire modeling could be seamlessly conducted combining our two projects as desired. Dr. Bailey aims to submit a proposal in 2025 for a Phase II extension of that work, expanding fuel hazard estimates and forest plans to estimate landscape-scale wildfire risk. Data collected with this carnivore project would contribute to that effort.

        Our scope would be within the redwood belt of coastal northern California, an area with a maritime climate that will likely allow for increased habitat retention with minimal impacts to predicted fire risk compared to drier and warmer regions of California. This work would address complicated questions as to whether and how to best promote wildlife habitat in a unique geographic area.

2. Research Methods:
        If selected, we envision one of 3 options described in the deliverables and timeline section. All options focus on addressing aspects in Themes 6, 9, and 10.

If we were to focus on collecting vegetation and fuel data at known marten locations and random locations and analyzing selection (option 1), we would directly address Theme 6 by describing use of post-treatment slash as habitat structures (or the lack thereof) and by describing the vegetation and fuel aspects selected for by martens. Additionally, we would address Themes 9 (Wildlife Cumulative impacts) by providing direction to promote and not adversely affect wildlife species, 10 (Wildlife structures) by evaluating the prevalence and type of structures used.

If we were to increase geographic scope and focus on fishers (option 2), we would address the same themes. Fishers appear much more likely to use slash piles compared to martens (Ellison et al., unpublished). For example, fishers were detected at 25% of monitored slash piles in coastal northern California while martens were only detected at 2% (Ellison et al., unpublished; Figure 1). It would be a boon to identify fisher movement and use in similar and extended areas compared to coastal marten.

Figure 1. A pacific fisher (Pekania pennanti) was detected on remote camera at a slash pile on private timber land in coastal northern California. NCASI biologists monitored > 130 slash pile sites in this area where fisher and Humboldt marten (Martes caurina humboldtensis) populations overlap. Fisher were detected at 25% of monitored sites while martens were detected at only 2% of monitored sites.

Lastly, these data are difficult to collect and often not fully utilized. Here (option 3), we aim to increase collaborations on fuel hazard and wildfire risk – both locally with increases in slash pile occurrence and broadly across landscapes. We would need new expanded field data to inform future fire

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behavior models and evaluate increases in flame length and predicted spread given the retention of slash piles for wildlife habitat. This option would directly address Theme 6, including how best to manage fuel loads, vegetation patterns and fuel breaks, fire hazard reduction and overall wildfire risk mitigation in order to promote and maintain forest resistance and resilience while minimizing adverse impacts to wildlife habitat and resting/denning structures.

Given a selected option, we will first conduct a power analysis to inform the number of vegetation plots needed to robustly address critical questions and characterize potential uncertainty. Specifically, with this minimum goal in mind, we would implement the following methods under each option:

Option 1: Humboldt marten vegetation surveys and analyses

Given option 1, we will quantify vegetation selection characteristics relevant to martens. We have collected GPS data from coastal Humboldt martens since 2020, providing 100s of resting locations in coastal northern California primarily on Green Diamond Resource Company land (see methods in Hance et al. (2021), Movement Ecology). We have also identified both marten and fisher locations using scat detection dog teams and remote cameras, which can provide ecologically relevant locations for these elusive species. Specifically, we conducted paired searches in areas with large slash piles and in adjacent forest. A similar method could be employed on collaborator properties (Humboldt and Mendocino Redwood Company, Green Diamond Resource Company).

We will randomly select a subset of known used locations by martens for our reference sites, each paired with a random location within 7 km, which is an averaged daily distance moved for martens and fishers. We will prioritize known resting or denning locations, then areas of foraging based on detection dog team surveys, and last may consider recent camera detections to obtain a relevant sample size.

To reduce wildfire risk, potential treatments often remove understory vegetation and lower limbs of trees (ladder fuels). At each location (used/random), we will quantify canopy cover, basal area, snag density and size class, and woody material. Similar to Forest Inventory Analysis plots, we will establish three 18 meter (59.05 feet) transects at 30°, 150°, and 270° bearings. Along these transects, we will record canopy cover, horizontal cover, shrub and small tree cover, and assess woody volume, including large log volume and slash (Figure 2). To measure horizontal cover and obstruction relevant to martens, we will use a modified Robel pole method (Robel et al., 1970, Bello et al. 2001, Toledo and Herrick 2010).

To measure fuels, we will use an abbreviated version of the procedure described in Brown (1974) and used in the current EMC-2023-003 project. Within the first 1.8m, wood pieces under 0.6cm and 0.6cm-2.5cm diameter that intersect sub-transect will be tallied. Within the first 3m, we will additionally tally woody material between 2.5 and 7.6cm diameter. Throughout the total length of 18m, "logs" over 7.6cm diameter will be tallied, along with their length, diameter, and condition. This equates to 54m of log or large woody debris intersection, 18m of small wood, and 10.8m of small fire prone material tallied per plot. We will measure debris depth at three points per sub-transect by inserting a meter stick through the debris and measuring from the highest point of the debris and down past the litter layer to the duff below.

We will use decision trees to evaluate fine-scale vegetation use at marten resting and denning locations. Decision trees and other supervised machine learning approaches (e.g., random forest) attempt to model the relationship between a response and its predictors and offer powerful alternatives to traditional ecological modeling approaches (e.g., generalized linear models; De'ath

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and Fabricius (2000), Olden et al. (2008)). We will build decision trees by incorporating plot-level data into a boosted C5.0 algorithm using the same methods reported within Delheimer et al. (2023); Figure 3). Vegetation data describing marten selection will be analyzed by Dr. Munro.

Figure.8¡.*NCASI field biologists measure (A) visual obstruction relevant to Humboldt martens using a modified Robel pole method, and (B) the diameter at breast height of a live Douglas fir (Pseudotsuga menziesii). Similar to our proposed EMC project, we (NCASI biologists) collected vegetation measurements at used Humboldt marten locations and random available forest plots in southern coastal Oregon from 2023 – 2024. These data will help NCASI and land managers in Oregon understand how to identify, preserve, and/or recruit key habitat components that martens need when managing forests for fuels reductions.*
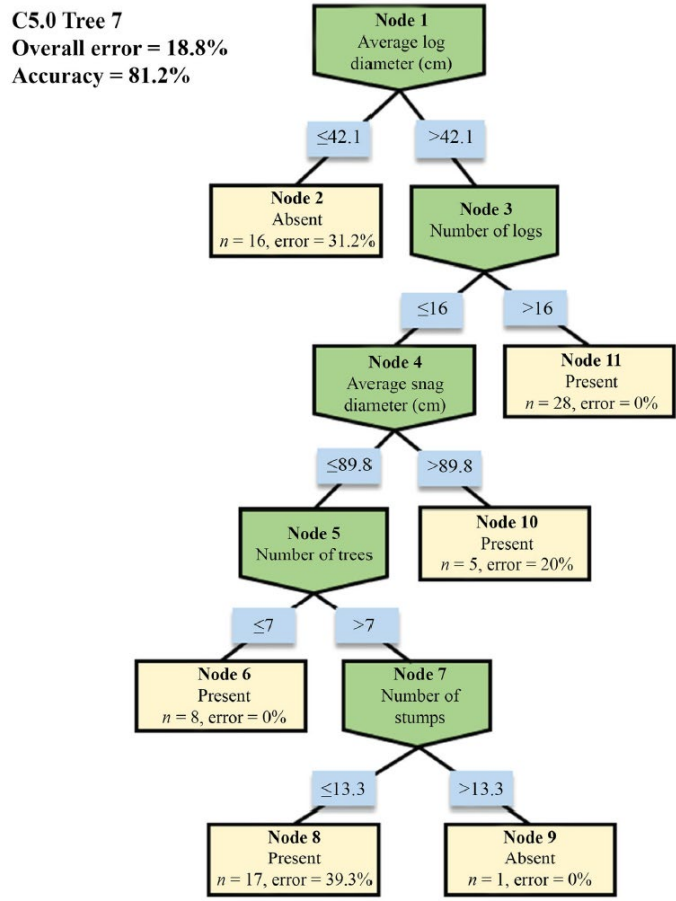
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C5.0 Tree 7
Overall error = 18.8%
Accuracy = 81.2%

Figure 3. *To provide the flexibility within treatments that balance manager's needs and maintaining conditions for sensitive wildlife, an understanding of the conditions used by such species in similar geographic environments would both satisfy wildlife biologists and foresters. This is an example of a decision tree used to describe plot-level features at resting and denning locations of Pacific martens (Martes caurina) in northern California (published with Delheimer et al. 2023, Journal of Wildlife Management, Figure 5). Dr. Munro used the boosted C5.0 model to extract one of many iterations of the machine learning outputs where green boxes represent intermediate steps that corresponded with martens' rest and den sites and tan boxes represent a conclusion from that path (i.e., terminal node). The blue boxes indicate the feature split point. For example, if average log diameter was less than 42.1 cm (16.5"), then the likelihood of martens resting or denning in plots was low, representing 16 plots with these conditions but a fairly high amount of potential error (31%). If the average log size was greater than 42.1cm and there were greater than 16 logs within a plot, likelihood of marten resting or denning was high. By having 6 relatively diverse characters of what a site could look like, managers could recognize that not all locations need to have the same prescription. All 3 options described would involve collecting vegetation data and assessing conditions used or not-detected for martens, fishers, or both species.*

Option 2: Fisher location data, vegetation surveys and analyses

Given option 2, we will expand efforts to multiple landowners, collect GPS movement data on fishers in areas with current slash piles, and quantify vegetation selection characteristics relevant to fishers.

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We will expand efforts to include both Green Diamond Resource Company and Humboldt and Mendocino Redwood Company land. Here, we will perform pre-trapping surveys using remote cameras to identify areas of fisher use (Cal Poly Humboldt IACUC # 2020W98, Supplemental attachment). At these areas, we will trap and collar fishers with GPS and VHF telemetry enabled devices following the guidelines under our approved Animal Care and Use Permit (Cal Poly Humboldt IACUC # 2022W62-A, Supplemental attachment). Field personnel will then use VHF telemetry to remotely download GPS movement data and locate fishers at rest and den structures. Additional rest sites will be identified through GPS movement data (see methods in Hance et al. 2021).

We will then collect vegetation and fuels data, as described under option 1, at fisher rest and den sites identified from GPS movement and/or telemetry data paired with random locations within 7 km. Similarly, we will prioritize known fisher resting or denning locations, then areas of foraging based on detection dog team surveys, and last may consider recent camera detections to obtain a relevant sample size. Vegetation data describing fisher selection will be analyzed by Dr. Munro as described under option 1.

Option 3: Forest carnivore vegetation use

Given option 3, we will expand efforts to multiple landowners, collect GPS movement data on fishers in areas with current slash piles, and quantify vegetation and fuels measurements at marten and fisher used and random vegetation plots (as described under options 1 and 2). This option provides the most robust dataset for future fire risk modeling relevant to these areas given current forest practices, evaluates opportunities for both fishers and martens, and is most cost efficient overall. We gain significant benefits from the combined project due to flexibility in workloads and timing. For instance, while crews collect vegetation data for martens within this fiscal year, they can simultaneously set cameras in remote sites to scout for fisher trap locations. Fisher trapping can seamlessly occur. The crews are currently trained and efficient at collecting both vegetation data and handling these rare indicator species.

Vegetation data describing marten and fisher selection will be analyzed by Dr. Munro as described under option 1.

We believe this proposal has value to land managers and would address several EMC themes and critical monitoring questions. We provide information focused on several themes centered around maintenance of functional/suitable wildlife habitat and technical rule addendum #2 that provides guidance on assessment of snags and den trees, downed large woody debris, hardwoods, and habitat continuity. Because some of the difficult location data are already collected, this addition provides a unique opportunity to study marten and fisher on managed timberlands relative to these topics.

3. Scientific Uncertainty and Geographic Application:

We strongly believe there is high scientific uncertainty of the effectiveness of the FPRs relevant to protecting sensitive wildlife species while reducing fire hazards associated with timber operations. There is currently a dearth of knowledge necessary for land managers to identify and protect structures and other habitat conditions required by marten and fisher as mandated (14 CCR § 919 [939, 959], 16 U.S.C. § 1531(a)(3)). Our study would directly address this incomplete knowledge by characterizing sites and structures used and minimally required by marten (Options 1, 3) and/or fisher (Options 2, 3).

Additionally, several of the FPRs aimed at hazard reductions may result in the removal of structures beneficial to wildlife such as marten and fisher (14 CCR § 917.2 [937]). However, given the cooler temperatures and higher humidity of coastal northern California, we aim to build a dataset that will robustly address whether, and how much, hazard reduction practices may be safely altered in these areas in favor of marten and fisher conservation.

We propose an observational study, but one where we can first conduct a power analysis to inform the number of vegetation plots needed to characterize potential uncertainty. Because of the lack of information on marten and fisher habitat, even small datasets can provide significant value.

Data collection and implementation would be most appropriate within the coastal region of northern California, including Del Norte, Humboldt, and Mendocino counties. Information learned could be broadly extrapolated to much of the range of coastal martens in northwest California and southwest Oregon. We have just finished collecting complementary vegetation datasets in southern Oregon at used marten locations, including rest structures, and paired random locations (Figure 2, Figure 4). For example, preliminary data examination shows us that martens use sites with slightly higher median values of tree diameter, shrub cover, and horizontal cover, but may avoid sites with low average tree diameter, shrub cover, and horizontal cover despite availability on the landscape (Figure 5). These data could be synergistically combined with our proposed study and with those collected presently by Dr. John Bailey (EMC 2023-003) and his team. Together, these data would provide much needed guidance for both public and private land managers on how to retain sites and structures essential for marten and fisher when planning and conducting critical fuels reductions. Additionally, combining these products would provide a robust dataset for future fire risk modeling necessary to guide managers on the tradeoffs of fire risks when promoting wildlife habitat for sensitive species.
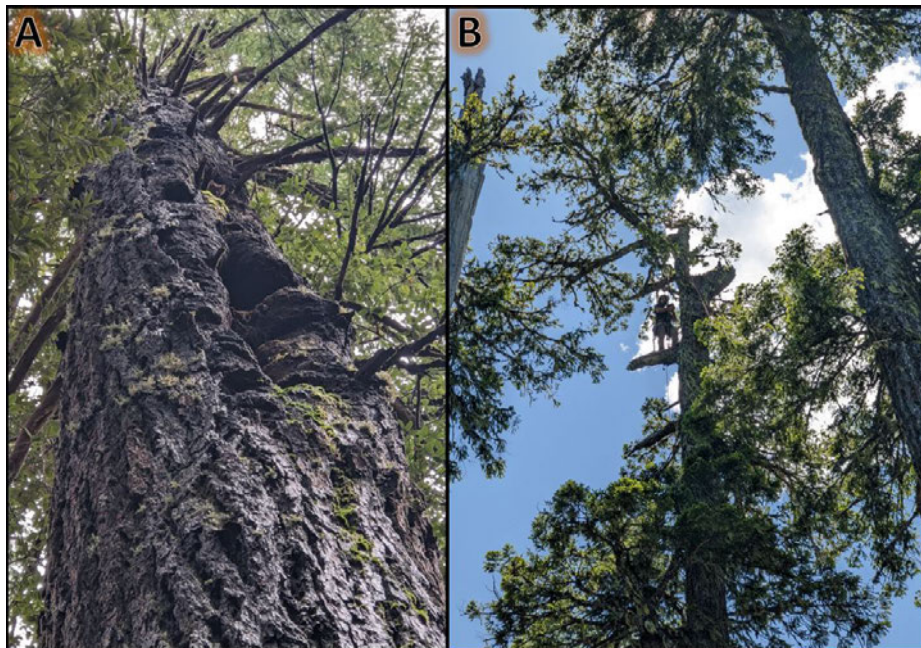
Figure 4. Coastal Humboldt marten (Martes caurina humboldtensis) rest structures in Rogue Siskiyou National Forest of southwestern Oregon. NCASI biologists used VHF telemetry to track (A) female marten #11 to a cavity within a live Douglas fir tree and (B) male marten #10 to a broken top within a live Douglas fir where certified tree climber M. Stevens identified the used microsite. NCASI biologists then collected vegetation plot data at these structures including, but not limited to, shrub cover, canopy cover, and basal area.
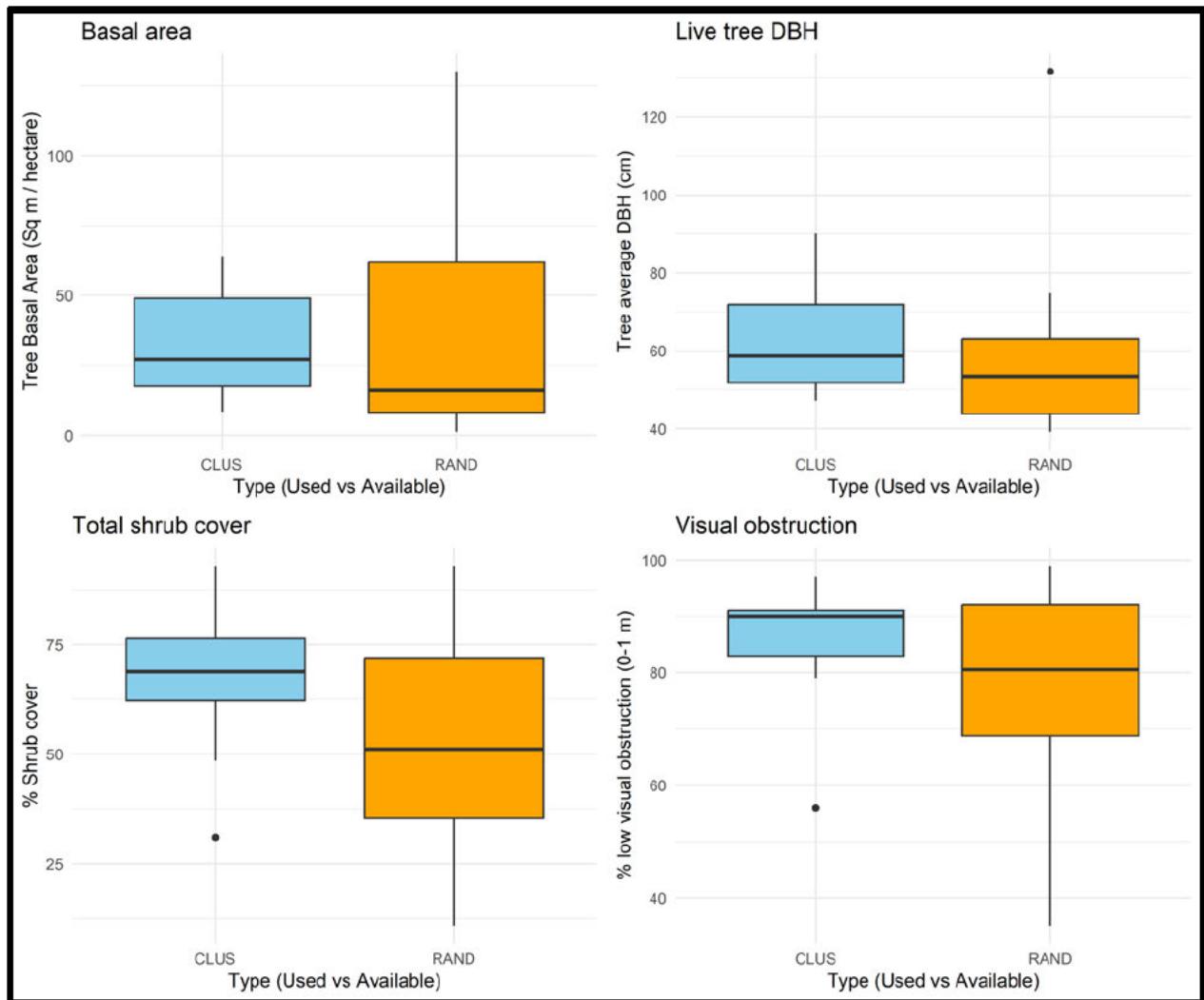
Figure 5*. A preliminary examination of a subset of vegetation variables collected at used marten sites revealed by GPS clustering and lack of movement (CLUS, blue, n = 12) compared to random available sites (RAND, orange, n = 23), including: basal area in m2 / hectare (top left), average live tree diameter at breast height (DBH, top right), average total percent shrub cover (bottom left), and percent visual obstruction (or horizontal cover) from 0 − 1 m off the ground (bottom right). NCASI biologists collected these data in Rogue Siskiyou National Forest in southwestern Oregon in 2023, and these do not represent the entire dataset of variables collected through 2024.*

Literature Cited

De'ath, G., and K. E. Fabricius. 2000. Classification and regression trees: a powerful yet simple technique for ecological data analysis. Ecology 81:3178-3192.

Delheimer, M. S., K. M. Moriarty, H. L. Munro, D. A. Early, K. A. Hamm, and R. E. Green. 2023. Structural complexity characterizes fine-scale forest conditions used by Pacific martens. The Journal of Wildlife Management 87:e22388.

Hance, D. J., K. M. Moriarty, B. A. Hollen, and R. W. Perry. 2021. Identifying resting locations of a small elusive forest carnivore using a two-stage model accounting for GPS measurement error and hidden behavioral states. Movement Ecology 9:1-22.

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Olden, J. D., J. J. Lawler, and N. L. Poff. 2008. Machine learning methods without tears: a primer for ecologists. The Quarterly Review of Biology 83:171-193.

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4. Critical Questions and Forest Practice Regulations Addressed:

Theme 6: Wildfire Hazard

Critical Monitoring Question	Proposal focus
a) treating post-harvest slash and slash piles to mitigate fuel hazard, modify fire behavior and reduce wildfire risk?	We will use the same protocols for woody-material data collection as described and executed within EMC-2023-003 (John Bailey PI). As such, we can combine data sets in the future to model fire and fire behavior directly across a broader landscape and within the context of wildlife habitat suitability.
b) treating post-harvest slash while retaining wildlife habitat structures, including snags and large woody debris?	Our proposal will directly enumerate the number and types of structures used by martens (Options 1, 3) and/or fishers (Options 2, 3), allowing managers to identify characteristics beneficial to sensitive species post-harvest and into the future.
c) managing fuel loads, vegetation patterns and fuel breaks for landscape-level fire hazard reduction and risk mitigation? (Thematic question for Fiscal Year 2024/2025 funding).	By evaluating fuel quantity, distribution, size, and patterns, we will provide the foundation for fire hazard modeling and strategic risk planning in an area that has more moisture and, presumably, less risk than much of California's forests.
d) managing forest structure and stocking standards over time to promote and maintain wildfire resistance and resilience? (Thematic question for Fiscal Year 2024/2025 funding).	Our results would strategically inform land management opportunities to balance management activities reducing wildfire risk while maintaining sensitive species' habitat use by providing metrics in managed stands used by martens (Options 1, 3) and/or fishers (Options 2, 3). Terrestrial specialists, such as these two species, are highly sensitive to landscape change including treatments that reduce fuel loading.

Theme 9: Wildlife Habitat: Cumulative Impact

Are the FPRs and associated regulations effective in...

Critical Monitoring Question	Proposal focus
a) protecting wildlife habitat and associated ecological processes?	Within a use-available framework, our study will provide foundational knowledge of biological habitat conditions suitable for martens (Options 1, 3) and/or fishers (Options 2, 3). This knowledge is currently meager, and our results will directly aid land managers in planning and conducting fuels and timber operations while retaining and/or recruiting suitable habitat for sensitive forest carnivores.
b) avoiding significant adverse impacts to wildlife species?	Results from this study will directly inform whether current fuels reduction prescriptions are effective at maintaining habitat, and key habitat elements (e.g., LWD and snags), for sensitive wildlife species.

Theme 10: Wildlife Habitat: Structures

Are the FPRs and associated regulations effective in retaining...

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Critical Monitoring Question	Proposal focus
a) a mix of stages of snag development that maintain properly functioning levels of wildlife habitat?	Within a use-available framework, our proposal will directly enumerate the number and stages of snags and other structural elements minimally sufficient to maintain functional wildlife habitat for martens (Options 1, 3) and/or fishers (Options 2, 3).

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Forest Practice Rules and Regulations:

Article	FPR	Proposal focus
Article 2. Timber Harvesting Plan	14 CCR § 1038	Pursuant to this rule, timber operations that include the cutting or removal of trees which eliminates the vertical continuity of vegetative fuels and the horizontal continuity of tree crowns for the purpose of reducing flammable materials and maintaining a fuelbreak to reduce fire spread, duration and intensity are exempt from standard THP preparation and submission requirements. However, 1038 also requires that no known sites of rare, threatened, or endangered plants or animals will be disturbed or damaged. This study will increase our understanding of the possible impacts of such operations on sensitive species habitat.
	14 CCR § 1051.4	We address operational standards under Modified Timber Harvesting Plans for Fuel Hazard Reduction by addressing the presumption that activities are unlikely to cause significant adverse impact, in this case by evaluating marten (Options 1/3) and/or fisher (Options 2/3) habitat use. Although this rule applies to owners with 160 acres or less (and this project would be on larger landowners), the results would broadly apply for this region.
Article 3. Silvicultural Methods	14 CCR § 913.4	By focusing on specific Retention Trees of value to wildlife, this rule focuses on larger trees that might be den, nest, or rest structures used by wildlife. The results of this study will help to inform what specific elements should have priority for retention.
	14 CCR § 933.4	This rule focuses on Aggregated Retention Area that may conform or move towards Late Succession Forest Stands or similar areas. These retention locations may be better informed for the purpose of sensitive wildlife by placement in areas used by martens or fishers.
	14 CCR § 953.4	Special prescription or treatment areas allow intermediate treatments within a Timber Harvest Plan, which might include varied harvests or retention of slash piles.
Article 7. Hazard Reduction	14 CCR § 917.2	Within the coastal district, slash and coarse woody debris >1" and <8" in diameter must be removed or piled and burned. Here, some of the larger material may benefit wildlife use and connectivity by retaining such structures. The data to inform the retention of these structures is currently unavailable.
	14 CCR § 937	This rule aims to reduce fire hazards associated with timber operations. Within the northern coast range, there may be less risk of fire hazards with the cool temperatures and high humidity. Data to inform strategic retention of piles could benefit wildlife.
Article 9. Wildlife Protection Practices	14 CCR § 919	This rule focuses on the protection of specific structures, including nest (and den) sites for sensitive species. Leaving designated trees unharmed would benefit from data collected using a combination of GPS collar and fine scale movement data transformed to such structures with a combination of hidden Markov and state-space models.

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	14 CCR § 939	This rule entails planning timber operations to be planned and conducted in a way that maintains suitable habitat for wildlife species. In coastal northern California, managers could benefit from detailed information of marten and fisher habitat use as proposed within.
	14 CCR § 959	This rule focuses on overall habitat maintenance, including retaining diverse forest structure, snags and downed wood, wildlife corridors, potential enhancement of an area by creating den trees or retaining such structures. This rule also includes a monitoring component. Here, we aim to monitor sites directly and provide prescriptive information to inform future treatments to enhance habitat over time.
Article 7. Conversion Exemptions	14 CCR § 1104.1	Unless otherwise required, slash and coarse woody debris >1" in diameter and >2' long must receive full treatment no later than April 1 of the following year unless exempted. Here, we predict piles of larger material will benefit wildlife use and connectivity by retaining such structures. The data to inform these structures is currently unavailable. This particular article appears fairly uncommon, but may apply to other landowners within this region especially if fishers rest in piles with particular characteristics.
	16 U.S.C. § 1531(a)(3)	Under the Endangered Species Act, conservation programs and focused efforts are vital for threatened species, such as coastal marten. This project helps provide information to balance active forest management with prescriptions and information to aid in species conservation by identifying the conditions used versus areas that were available to individuals but not visited.

5. Roles, Collaborations, and Project Feasibility

NCASI Foundation will execute contracts, invoices, and provide integration with NCASI, Inc. with the project lead PI, who is responsible for project oversight, hiring and training of staff, progress reports, and deliverables. Susan McCord, Director, NCASI Foundation has 25yrs experience in contracts and grants management.

Principal investigator Katie Moriarty, Senior Research Scientist, specializes in rare and elusive forest-dependent species. Her research focuses on sustainable forestry, balancing the needs of sensitive wildlife species, and biodiversity. She has been working with martens and fishers for over 20 years and is leading a team designated by the IUCN to assess Pacific marten Red List status. She and her teams have published over 40 peer-reviewed papers specifically on forest management and either martens and fishers, focusing on providing science-based information for managers to assess risk and opportunities.

Principal investigator Holly Munro, Senior Research Scientist, has conducted forest biometrical and ecological research for 10 years. Her research has been at the intersection of forest biometrics, disturbance ecology, remote sensing, and machine learning applications. Through research collaborations she has co-authored approximately 24 peer-reviewed and outreach papers, technical reports, and large-scale environmental datasets.

John Bailey, Professor of Silviculture and Fire Management in Oregon State University's College of Forestry, specializes in characterizing the effects of fuels treatments on wildfire risk and forest health.

His research focuses on using traditional and experimental silviculture practices to achieve a spectrum of management objectives including sustainable wood production and wildlife habitat. His current EMC project is initiating our understanding of variable retention and selection harvesting on fuel loads and fire hazard; this work would expand that data set while linking wildlife habitat conservation.

Green Diamond Resource Company owns and manages approximately 400,000 acres in three northern California counties. Green Diamond Resource Company will provide access to existing site data, including marten and fisher locations from their research, access to GIS data at locations of interest, access to land, and field assistance with plot measurements. Keith Hamm and Desiree Early have over 25 and 12 years of experience respectively with the development and execution of silviculture and wildlife focused projects. Hamm and Early will participate in planning discussions including proposal development such that information can directly integrate into Green Diamond's workflow, facilitate information transfer, delegate coordination with field crews for safety and data collection, and review all products.

Humboldt and Mendocino Redwood Companies own and manage approximately 440,000 acres primarily in Humboldt, Mendocino, and Sonoma Counties in coastal northern California. Humboldt and Mendocino Redwood Company will provide access to existing site data, including fisher locations from previous surveys, access to GIS data at locations of interest, access to land for these proposed surveys (fisher only), and field assistance with plot measurements. Sal Chinnici has over 25 years of experience with the development and execution of silviculture and wildlife focused projects for Humboldt and Mendocino Redwood Companies. Chinnici will participate in planning discussions including proposal development such that information can directly integrate into Green Diamond's workflow, facilitate information transfer, delegate coordination with field crews for safety and data collection, and review all products.

Jessica Buskirk, Wildlife Biologist, has over 12 years of experience with wildlife capture and immobilization, field data collection, and thinking critically and creatively about wildlife data in applied settings such as sustainable forestry practices. Buskirk will interface directly with PIs and landowners to design the study to meet expectations, lead field crew hiring and training, maintain communication regarding forestry operations and NCASI staff access, manage workflow of field teams, and provide data summaries as requested.

Project feasibility is extremely high if support is considered for this fiscal year. We currently have a highly trained crew, federal, state, and animal care and use permits or permissions, and experienced collaborators. Unfortunately, our team is on soft money and will be dispersed unless we are successful at grants. Hiring a new team later would be significantly more costly due to the need for training all aspects of the methods. Further, the timing to pair this endeavor and vegetation data with EMC-2023-003 (John Bailey PI) would maximize products useful to the EMC and California practitioners efficiently.

Budget justification

To provide increased flexibility, we provide 3 options for consideration, each with an estimated budget and justification under 200 words. We order these from most complex and costly to least, please also see detailed budgets within.

Option 3: Forest carnivores, vegetation, and fuel characteristics; $315,388: We request funds to expand efforts to multiple landowners to collect GPS data on fishers in areas with current slash piles as well as collect vegetation data to evaluate both coastal marten and fisher use. Funding largely would be

allocated to staff for multiple field and data endeavors [pre-trapping surveys (cameras in kind), trapping and collaring, telemetry (receivers/antennas in kind), data processing] and vegetation surveys at both the previously determined marten sites and newly collected fisher locations. Staff time and fringe benefits would cost approximately $278,888 over 3 fiscal years (see budget below and supplemental). Supplies, GPS collars, would cost $14,500 and travel (vehicle + fuel) would cost approximately $19,500. We would collect vegetation data with added work to collect understory fuel and fire related metrics (e.g., modified Brown transects) which would seamlessly allow for fire modeling for assessing risk given current practices. Indirect costs to the NCASI Foundation would be 10% on the first $25,000 for a total of $2,500. Our total estimated cost to the EMC would be $315,388 with an estimated project cost, including in-kind support, of $508,477.

Option 2: Fisher GPS data and vegetation surveys; $262,784: We request funds to expand efforts to multiple landowners to collect GPS data on fishers in areas with current slash piles as well as collect vegetation data. Funding largely would be allocated to staff for both fisher endeavors [pre-trapping surveys (cameras in kind), trapping and collaring, telemetry (receivers/antennas in kind), data processing] and vegetation surveys at both the previously determined sites and newly collected fisher locations. Staff time would cost approximately $229,284 over 3 fiscal years (see attached budget). Supplies, GPS collars, would cost $14,500 and travel (vehicle + fuel) would cost $16,500. Indirect costs to the NCASI Foundation would be 10% on the first $25,000 for a total of $2,500. Our total estimated cost would be $262,784 with an estimated project cost, including in-kind support, of $430,877.

Option 1: Fuel, slash, vegetation surveys and analysis with pre-existing data from coastal martens; $74,862: We request funds to collect vegetation data to evaluate vegetation conditions on private lands focused on coastal marten use. We would expend approximately $67,862 on field crew expenses to measure vegetation characteristics at previously collected known marten rest, den, and random locations and analyze data to better describe characteristics to inform fuel treatments and possible restoration activities. We would spend approximately $4,500 on travel (vehicle and fuel). Indirect costs to the NCASI Foundation would be 10% on the first $25,000 for a total of $2,500. Our total estimated cost would be $74,682 with an estimated project cost, including in-kind support, of $113,267.

6. Project Deliverables

For all options, we expect at least 2 scientific presentations at professional society conferences and additional presentations as requested for either landowners or the EMC board. Moriarty, Bailey, and Munro have a strong track record for peer-reviewed publications. We anticipate at least 1 publication from any of the described options. As displayed in the timeline table below, we also will provide annual progress reports.

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OPTION 3

Task	FY 2024/25			FY 2025/26			FY 2026/27		
	Oct '24	Jan '25	Apr '25	Jul '25	Oct '25	Jan '26	Apr '26	Jul '26	Oct '26	Jan '27
Identify marten rest areas from recent GPS collar data (in kind)										
Coordinate study design with partners		E M C								E M C
Pre-trapping camera surveys										
Trap, collar fisher, identify rest and den locations		S T A R T								E N D
Measure vegetation characteristics										
Summarize/analyze data			PR1		PR2		PR3		PR4	
Compile final report										

OPTION 2

Task	FY 2024/25			FY 2025/26			FY 2026/27		
	Oct '24	Jan '25	Apr '25	Jul '25	Oct '25	Jan '26	Apr '26	Jul '26	Oct '26	Jan '27
Coordinate study design with partners		E M C								
Pre-trapping camera surveys (initially in kind, continues with award)									E M C	
Trap, collar fisher, identify rest and den locations		S								
Measure vegetation characteristics		T A							E	
Summarize/analyze data		R T	PR1		PR2		PR3		N D	
Compile final report										

OPTION 1

Task	FY 2024/25			FY 2025/26			FY 2026/27		
	Oct '24	Jan '25	Apr '25	Jul '25	Oct '25	Jan '26	Apr '26	Jul '26	Oct '26	Jan '27
Identify marten rest areas from recent GPS collar data (in kind)										
Coordinate study design with partners		E M			E M					
Measure vegetation characteristics		C			C					
Summarize/analyze data			PR1							
Compile final report										

PR - Progress report deliverable

FULL 7(c)(iii)(1)

7. Requested Funding

	Cost per Unit		2024-2025		2025-2026		2026-2027		Total - All Years
			Number Units - Year 1	Total - Year 1	Number Units - Year 2	Total - Year 2	Number Units - Year 3	Total - Year 3	
Option 3 - EMC request: $315,388			*Estimated project cost:*	$508,477					
Personnel (4% raise per year included in sum)									
Jessica Buskirk, project manager and fi	$4,600 / month		4	18,400	10	47,840	6	29,808	96,048
Alyssa Roddy, trained capture lead	$4,200 / month		3.5	14,700	7	30,576	2.5	11,340	56,616
Mark Stevens, trained capture	$4,000 / month		3.5	14,000	7	29,120	2.5	10,800	53,920
Total Salary				**$47,100**		**$107,536**		**$51,948**	**$206,584**
Fringe benefits									
Jessica Buskirk, project manager and fi	0.35	35%		6,440		16,744		10,433	33,617
Alyssa Roddy, trained capture lead	0.35	35%		5,145		10,702		3,969	19,816
Mark Stevens, trained capture	0.35	35%		4,900		10,192		3,780	18,872
Total Fringe				**$16,485**		**$37,638**		**$18,182**	**$72,304**
SALARY & FRINGE COSTS				**$63,585**		**$145,174**		**$70,130**	**$278,888**
Operating expenses/supplies									
Lotek GPS collars	1450 / collar		0	0	10	14,500		0	14,500
Total Supplies & Services				**$0**		**$14,500**		**$0**	**$14,500**
Travel									
Vehicle 1 - rental from NCASI	$800 / month		4	3,200	7	5,600	2	1,600	10,400
Vehicle 1 - fuel	$700 / month		4	2,800	7	4,900	2	1,400	9,100
Total Travel Costs				**$6,000**		**$10,500**		**$3,000**	**$19,500**
TOTAL DIRECT COSTS				**$69,585**		**$170,174**		**$73,130**	**$312,888**
Indirect costs: NCASI Foundation 10% overhead on first $25,000				2,500					
EMC Funding Requested				**$72,085**		**$170,174**		**$73,130**	**$315,388**
Principal Investigators *(in-kind)*									
Katie Moriarty	$7,750 / month		0.75	5,813	0.5	4,030	0.75	6,278	16,120
John Bailey	$10,833 / month		0.25	2,708	0.25	2,817	0.5	5,850	11,375
Holly Munro	$7,750 / month		0.25	1,938	0.5	4,030	0.75	6,278	12,245
Total Salary *(in-kind)*				**$10,458**		**$10,877**		**$18,405**	**$39,740**
Fringe benefits									
Katie Moriarty	0.35	35%		2,034		1,411		2,197	5,642
John Bailey	0.35	35%		948		986		2,048	3,981
Holly Munro	0.35	35%		678		1,411		2,197	4,286
Total Fringe Estimate *(in-kind)*				**$3,660**		**$3,807**		**$6,442**	**$13,909**
SALARY & FRINGE COSTS *(in-kind)*				**$14,119**		**$14,684**		**$24,847**	**$53,649**
Operating expenses/supplies *(in-kind)*									
Lotek GPS collars	1450 / collar		0	0	2	2,900		0	2,900
Field computer, external hard drives	1500 /computer		1	1,500	1	1,500	1	1,500	4,500
Field packs, GPS, measurement tools, I	800 /person		3	2,400	3	2,400	3	2,400	7,200
Cameras *(in-kind)*	200 / camera		100	20,000	100	20,000		0	40,000
Lithium batteries *(in-kind)*	16 / 8 batteries/ came		800	12,800	800	12,800		0	25,600
Total Supplies & Services				**$36,700**		**$39,600**		**$3,900**	**$80,200**
Travel									
Vehicle 2 - rental from NCASI	$800 / month		4	3,200	7	5,600	2	1,600	10,400
Vehicle 2 - fuel	$700 / month		4	2,800	7	4,900	2	1,400	9,100
Total Travel Costs				**$6,000**		**$10,500**		**$3,000**	**$19,500**
TOTAL IN-KIND COSTS				**$67,277**		**$75,660**		**$50,152**	**$193,089**
Project Cost				**$139,362**		**$245,834**		**$123,282**	**$508,477**

Option 2 - EMC Request: $262,784   **Estimated project cost: $430,877**

	Cost per Unit	Number Units - Year 1 (2024-2025)	Total - Year 1	Number Units - Year 2 (2025-2026)	Total - Year 2	Number Units - Year 3 (2026-2027)	Total - Year 3	Total - All Years
Personnel (4% raise per year included in sum)								
Jessica Buskirk, project manager and fie	$4,600 / month	4	18,400	9	43,056	3	14,904	76,360
Alyssa Roddy, trained capture lead	$4,200 / month	3	12,600	6	26,208	2	9,072	47,880
Mark Stevens, trained capture	$4,000 / month	3	12,000	6	24,960	2	8,640	45,600
Total Salary			$43,000		$94,224		$32,616	$169,840
Fringe benefits								
Jessica Buskirk, project manager and fie	0.35 35%		6,440		15,070		5,216	26,726
Alyssa Roddy, trained capture lead	0.35 35%		4,410		9,173		3,175	16,758
Mark Stevens, trained capture	0.35 35%		4,200		8,736		3,024	15,960
Total Fringe			$15,050		$32,978		$11,416	$59,444
SALARY & FRINGE COSTS			$58,050		$127,202		$44,032	$229,284
Operating expenses/supplies								
Lotek GPS collars	1450 / collar	0	0	10	14,500		0	14,500
Total Supplies & Services			$0		$14,500		$0	$14,500
Travel								
Vehicle 1 - rental from NCASI	$800 / month	3	2,400	6	4,800	2	1,600	8,800
Vehicle 1 - fuel	$700 / month	3	2,100	6	4,200	2	1,400	7,700
Total Travel Costs			$4,500		$9,000		$3,000	$16,500
TOTAL DIRECT COSTS			$62,550		$150,702		$47,032	$260,284
Indirect costs: NCASI Foundation 10% overhead on first $25,000			2,500					
EMC Funding Requested			$65,050		$150,702		$47,032	$262,784
Principal Investigators (in-kind)								
Katie Moriarty	$7,750 / month	0.75	5,813	0.5	4,030	0.5	4,185	14,028
John Bailey	$10,833 / month	0.1	1,083	0.1	1,127	0.5	5,850	8,060
Holly Munro	$7,750 / month		0	0.25	2,015	0.75	6,278	8,293
Total Salary (in-kind)			$6,896		$7,172		$16,313	$30,380
Fringe benefits								
Katie Moriarty	0.35 35%		2,034		1,411		1,465	4,910
John Bailey	0.35 35%		379		394		2,048	2,821
Holly Munro	0.35 35%		0		705		2,197	2,902
Total Fringe Estimate (in-kind)			$2,414		$2,510		$5,709	$10,633
SALARY & FRINGE COSTS (in-kind)			$9,309		$9,682		$22,022	$41,013
Operating expenses/supplies (in-kind)								
Lotek GPS collars	1450 / collar	0	0	2	2,900		0	2,900
Field computer, external hard drives	1500 /computer	1	1,500	1	1,500	1	1,500	4,500
Field packs, GPS, measurement tools, I	800 /person	3	2,400	3	2,400	3	2,400	7,200
Cameras (in-kind)	200 / camera	100	20,000	100	20,000		0	40,000
Lithium batteries (in-kind)	16 / 8 batteries/ came	800	12,800	800	12,800		0	25,600
Total Supplies & Services			$36,700		$39,600		$3,900	$80,200
Travel								
Vehicle 2 - rental from NCASI	$800 / month	3	2,400	6	4,800	2	1,600	8,800
Vehicle 2 - fuel	$700 / month	3	2,100	6	4,200	2	1,400	7,700
Total Travel Costs			$4,500		$9,000		$3,000	$16,500
TOTAL IN-KIND COSTS			$57,405		$65,453		$45,234	$168,093
Project Cost			$122,455		$216,156		$92,266	$430,877

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Option 1 - EMC Request: $74,862		Estimated project cost:	$113,267					
			2024-2025		2025-2026		2026-2027	
	Cost per Unit	Number Units - Year 1	Total - Year 1	Number Units - Year 2	Total - Year 2	Number Units - Year 3	Total - Year 3	Total - All Years
Personnel (4% raise per year included in sum)								
Jessica Buskirk, project manager and fie	$4,600 / month	3.5	16,100	2	9,568		0	25,668
Alyssa Roddy, trained capture lead	$4,200 / month	3	12,600		0		0	12,600
Mark Stevens, trained capture	$4,000 / month	3	12,000		0		0	12,000
Total Salary			$40,700		$9,568		$0	$50,268
Fringe benefits								
Jessica Buskirk, project manager and fie	0.35	35%	5,635		3,349		0	8,984
Alyssa Roddy, trained capture lead	0.35	35%	4,410		0		0	4,410
Mark Stevens, trained capture	0.35	35%	4,200		0		0	4,200
Total Fringe			$14,245		$3,349		$0	$17,594
SALARY & FRINGE COSTS			$54,945		$12,917		$0	$67,862
Operating expenses/supplies								
Lotek GPS collars	1450 / collar		0		0		0	0
Total Supplies & Services			$0		$0		$0	$0
Travel								
Vehicle 1 - rental from NCASI	$800 / month	3	2,400		0		0	2,400
Vehicle 1 - fuel	$700 / month	3	2,100		0		0	2,100
Total Travel Costs			$4,500		$0		$0	$4,500
SUBAWARDS								
			0			0		0
Total Subawards			$0		$0		$0	$0
TOTAL DIRECT COSTS			$59,445		$12,917		$0	$72,362
Indirect costs: NCASI Foundation 10% overhead on first $25,000			2,500					
EMC Funding Requested			$61,945		$12,917		$0	$74,862
Principal Investigators (in-kind)								
Katie Moriarty	$7,750 / month	0.5	3,875	0.25	2,015		0	5,890
John Bailey	$10,833 / month	0.1	1,083	0.1	1,127		0	2,210
Holly Munro	$7,750 / month		0	0.5	4,030		0	4,030
Total Salary (in-kind)			$4,958		$7,172		$0	$12,130
Fringe benefits								
Katie Moriarty	0.35	35%	1,356		705		0	2,062
John Bailey	0.35	35%	379		394		0	774
Holly Munro	0.35	35%	0		1,411		0	1,411
Total Fringe Estimate (in-kind)			$1,735		$2,510		$0	$4,246
SALARY & FRINGE COSTS (in-kind)			$6,694		$9,682		$0	$16,376
Operating expenses/supplies (in-kind)								
Lotek GPS collars	1450 / collar	0	0		0		0	0
Field computer, external hard drives	1500 /computer	1	1,500	1	1,500		0	3,000
Field packs, GPS, measurement tools, l	800 /person	3	2,400		0		0	2,400
Cameras (in-kind)	200 / camera		0		0		0	0
Lithium batteries (in-kind)	16 / 8 batteries/ camera		0		0		0	0
Total Supplies & Services			$3,900		$1,500		$0	$5,400
Travel								
Vehicle 2 - rental from NCASI	$800 / month	3	2,400		0		0	2,400
Vehicle 2 - fuel	$700 / month	3	2,100		0		0	2,100
Total Travel Costs			$4,500		$0		$0	$4,500
TOTAL IN-KIND COSTS			$20,052		$18,353		$0	$38,406
Project Cost			$81,997		$31,270		$0	$113,267

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8. Required Forms and Relevant Information

- Full proposal
    - *2024-001_a_MoriartyEt_FullProposal_240719 (this document)*
- Letter of Support - Green Diamond Resource Company:
    - *2024-001_b_LetterOfSupport_GreenDiamond*
- Letter of Support - Humboldt and Mendicino Redwood Company:
    - *2024-001_c_LetterOfSupport_HumboldtMendicino*
- Letter of Support – USFWS
    - *2024-001_d_LetterOfSupport_USFWS*
- Detailed Budgets in Excel
    - *2024-001_e_NCASI-FoundationBudgets*
- Employer Identification Number (EIN) for NCASI Foundation: **31-1745612**
- Sample Resolution for the NCASI Foundation
    - *2024-001_f_NCASIFoundation_SampleResolution*
- Nondiscrimination Compliance Statement
    - *2024-001_g_NCASIFoundation_Nondiscrimination*
- Documentation regarding Federal Funding as applicable
    - *2024-001_h_NCASIFoundation_SAM verification*
- Drug-Free Workplace Certification
    - *2024-001_i_NCASIFoundation_DrugFreeWorkplace*
- Payee Data Record
    - *2024-001_j_NCASIFoundation_PayeeDataRecord*
- Fisher capture detailed methods as approved
    - *2024-001_k_NCASI_InstituteForAnimalUseAndCare_DetailedCaptureMethods*
- Previously approved EMC grant under Bailey as described within for reference
    - *2024-001_l_2023-003_BaileyFullProposal*

Option 3 - EMC request: $315,388		Estimated project cost:	$508,477					
		2024-2025		**2025-2026**		**2026-2027**		
	Cost per Unit	**Number Units - Year 1**	**Total - Year 1**	**Number Units - Year 2**	**Total - Year 2**	**Number Units - Year 3**	**Total - Year 3**	**Total - All Years**
Personnel (4% raise per year included in sum)								
Jessica Buskirk, project manager and f	$4,600 / month	4	18,400	10	47,840	6	29,808	96,048
Alyssa Roddy, trained capture lead	$4,200 / month	3.5	14,700	7	30,576	2.5	11,340	56,616
Mark Stevens, trained capture	$4,000 / month	3.5	14,000	7	29,120	2.5	10,800	53,920
Total Salary			**$47,100**		**$107,536**		**$51,948**	**$206,584**
Fringe benefits								
Jessica Buskirk, project manager and f	0.35 35%		6,440		16,744		10,433	33,617
Alyssa Roddy, trained capture lead	0.35 35%		5,145		10,702		3,969	19,816
Mark Stevens, trained capture	0.35 35%		4,900		10,192		3,780	18,872
Total Fringe			**$16,485**		**$37,638**		**$18,182**	**$72,304**
SALARY & FRINGE COSTS			**$63,585**		**$145,174**		**$70,130**	**$278,888**
Operating expenses/supplies								
Lotek GPS collars	1450 / collar	0	0	10	14,500		0	14,500
Total Supplies & Services			**$0**		**$14,500**		**$0**	**$14,500**
Travel								
Vehicle 1 - rental from NCASI	$800 / month	4	3,200	7	5,600	2	1,600	10,400
Vehicle 1 - fuel	$700 / month	4	2,800	7	4,900	2	1,400	9,100
Total Travel Costs			**$6,000**		**$10,500**		**$3,000**	**$19,500**
TOTAL DIRECT COSTS			**$69,585**		**$170,174**		**$73,130**	**$312,888**
Indirect costs: NCASI Foundation 10% overhead on first $25,000			2,500					
EMC Funding Requested			**$72,085**		**$170,174**		**$73,130**	**$315,388**
Principal Investigators (in-kind)								
Katie Moriarty	$7,750 / month	0.75	5,813	0.5	4,030	0.75	6,278	16,120
John Bailey	$10,833 / month	0.25	2,708	0.25	2,817	0.5	5,850	11,375
Holly Munro	$7,750 / month	0.25	1,938	0.5	4,030	0.75	6,278	12,245
Total Salary (in-kind)			**$10,458**		**$10,877**		**$18,405**	**$39,740**
Fringe benefits								
Katie Moriarty	0.35 35%		2,034		1,411		2,197	5,642
John Bailey	0.35 35%		948		986		2,048	3,981
Holly Munro	0.35 35%		678		1,411		2,197	4,286
Total Fringe Estimate (in-kind)			**$3,660**		**$3,807**		**$6,442**	**$13,909**
SALARY & FRINGE COSTS (in-kind)			**$14,119**		**$14,684**		**$24,847**	**$53,649**
Operating expenses/supplies (in-kind)								
Lotek GPS collars	1450 / collar	0	0	2	2,900		0	2,900
Field computer, external hard drives	1500 /computer	1	1,500	1	1,500	1	1,500	4,500
Field packs, GPS, measurement tools,	800 /person	3	2,400	3	2,400	3	2,400	7,200
Cameras (in-kind)	200 / camera	100	20,000	100	20,000		0	40,000
Lithium batteries (in-kind)	16 / 8 batteries/ came	800	12,800	800	12,800		0	25,600
Total Supplies & Services			**$36,700**		**$39,600**		**$3,900**	**$80,200**
Travel								
Vehicle 2 - rental from NCASI	$800 / month	4	3,200	7	5,600	2	1,600	10,400

	Cost per Unit		Number Units - Year 1	Total - Year 1	Number Units - Year 2	Total - Year 2	Number Units - Year 3	Total - Year 3	Total - All Years
Vehicle 2 - fuel	$700 / month		4	2,800	7	4,900	2	1,400	9,100
Total Travel Costs				**$6,000**		**$10,500**		**$3,000**	**$19,500**
TOTAL IN-KIND COSTS				**$67,277**		**$75,660**		**$50,152**	**$193,089**
Project Cost				**$139,362**		**$245,834**		**$123,282**	**$508,477**

Option 2 - EMC Request: $262,784				Estimated project cost:		$430,877			
			2024-2025		2025-2026		2026-2027		
	Cost per Unit		Number Units - Year 1	Total - Year 1	Number Units - Year 2	Total - Year 2	Number Units - Year 3	Total - Year 3	Total - All Years
Personnel (4% raise per year included in sum)									
Jessica Buskirk, project manager and f	$4,600 / month		4	18,400	9	43,056	3	14,904	76,360
Alyssa Roddy, trained capture lead	$4,200 / month		3	12,600	6	26,208	2	9,072	47,880
Mark Stevens, trained capture	$4,000 / month		3	12,000	6	24,960	2	8,640	45,600
Total Salary				**$43,000**		**$94,224**		**$32,616**	**$169,840**
Fringe benefits									
Jessica Buskirk, project manager and f	0.35	35%		6,440		15,070		5,216	26,726
Alyssa Roddy, trained capture lead	0.35	35%		4,410		9,173		3,175	16,758
Mark Stevens, trained capture	0.35	35%		4,200		8,736		3,024	15,960
Total Fringe				**$15,050**		**$32,978**		**$11,416**	**$59,444**
SALARY & FRINGE COSTS				**$58,050**		**$127,202**		**$44,032**	**$229,284**
Operating expenses/supplies									
Lotek GPS collars	1450 / collar		0	0	10	14,500		0	14,500
Total Supplies & Services				**$0**		**$14,500**		**$0**	**$14,500**
Travel									
Vehicle 1 - rental from NCASI	$800 / month		3	2,400	6	4,800	2	1,600	8,800
Vehicle 1 - fuel	$700 / month		3	2,100	6	4,200	2	1,400	7,700
Total Travel Costs				**$4,500**		**$9,000**		**$3,000**	**$16,500**
TOTAL DIRECT COSTS				**$62,550**		**$150,702**		**$47,032**	**$260,284**
Indirect costs: NCASI Foundation 10% overhead on first $25,000				2,500					
EMC Funding Requested				**$65,050**		**$150,702**		**$47,032**	**$262,784**
Principal Investigators (in-kind)									
Katie Moriarty	$7,750 / month		0.75	5,813	0.5	4,030	0.5	4,185	14,028
John Bailey	$10,833 / month		0.1	1,083	0.1	1,127	0.5	5,850	8,060
Holly Munro	$7,750 / month			0	0.25	2,015	0.75	6,278	8,293
Total Salary (in-kind)				**$6,896**		**$7,172**		**$16,313**	**$30,380**
Fringe benefits									
Katie Moriarty	0.35	35%		2,034		1,411		1,465	4,910
John Bailey	0.35	35%		379		394		2,048	2,821
Holly Munro	0.35	35%		0		705		2,197	2,902
Total Fringe Estimate (in-kind)				**$2,414**		**$2,510**		**$5,709**	**$10,633**
SALARY & FRINGE COSTS (in-kind)				**$9,309**		**$9,682**		**$22,022**	**$41,013**
Operating expenses/supplies (in-kind)									
Lotek GPS collars	1450 / collar		0	0	2	2,900		0	2,900
Field computer, external hard drives	1500 /computer		1	1,500	1	1,500	1	1,500	4,500
Field packs, GPS, measurement tools,	800 /person		3	2,400	3	2,400	3	2,400	7,200
Cameras (in-kind)	200 / camera		100	20,000	100	20,000		0	40,000

	Cost per Unit	Units Y1	Total Y1	Units Y2	Total Y2	Units Y3	Total Y3	Total All Years
Lithium batteries *(in-kind)*	16 / 8 batteries/ came	800	12,800	800	12,800		0	25,600
Total Supplies & Services			**$36,700**		**$39,600**		**$3,900**	**$80,200**
Travel								
Vehicle 2 - rental from NCASI	$800 / month	3	2,400	6	4,800	2	1,600	8,800
Vehicle 2 - fuel	$700 / month	3	2,100	6	4,200	2	1,400	7,700
Total Travel Costs			**$4,500**		**$9,000**		**$3,000**	**$16,500**
TOTAL IN-KIND COSTS			**$57,405**		**$65,453**		**$45,234**	**$168,093**
Project Cost			**$122,455**		**$216,156**		**$92,266**	**$430,877**

Option 1 - EMC Request: $74,862		*Estimated project cost:*	*$113,267*					
		2024-2025		2025-2026		2026-2027		
	Cost per Unit	**Number Units - Year 1**	**Total - Year 1**	**Number Units - Year 2**	**Total - Year 2**	**Number Units - Year 3**	**Total - Year 3**	**Total - All Years**
Personnel (4% raise per year included in sum)								
Jessica Buskirk, project manager and f	$4,600 / month	3.5	16,100	2	9,568		0	25,668
Alyssa Roddy, trained capture lead	$4,200 / month	3	12,600		0		0	12,600
Mark Stevens, trained capture	$4,000 / month	3	12,000		0		0	12,000
Total Salary			**$40,700**		**$9,568**		**$0**	**$50,268**
Fringe benefits								
Jessica Buskirk, project manager and f	0.35 / 35%		5,635		3,349		0	8,984
Alyssa Roddy, trained capture lead	0.35 / 35%		4,410		0		0	4,410
Mark Stevens, trained capture	0.35 / 35%		4,200		0		0	4,200
Total Fringe			**$14,245**		**$3,349**		**$0**	**$17,594**
SALARY & FRINGE COSTS			**$54,945**		**$12,917**		**$0**	**$67,862**
Operating expenses/supplies								
Lotek GPS collars	1450 / collar		0		0		0	0
Total Supplies & Services			**$0**		**$0**		**$0**	**$0**
Travel								
Vehicle 1 - rental from NCASI	$800 / month	3	2,400		0		0	2,400
Vehicle 1 - fuel	$700 / month	3	2,100		0		0	2,100
Total Travel Costs			**$4,500**		**$0**		**$0**	**$4,500**
SUBAWARDS								
			0		0	0		0
Total Subawards			**$0**		**$0**		**$0**	**$0**
TOTAL DIRECT COSTS			**$59,445**		**$12,917**		**$0**	**$72,362**
Indirect costs: NCASI Foundation 10% overhead on first $25,000			2,500					
EMC Funding Requested			**$61,945**		**$12,917**		**$0**	**$74,862**
Principal Investigators *(in-kind)*								
Katie Moriarty	$7,750 / month	0.5	3,875	0.25	2,015		0	5,890
John Bailey	$10,833 / month	0.1	1,083	0.1	1,127		0	2,210
Holly Munro	$7,750 / month		0	0.5	4,030		0	4,030
Total Salary *(in-kind)*			**$4,958**		**$7,172**		**$0**	**$12,130**
Fringe benefits								
Katie Moriarty	0.35 / 35%		1,356		705		0	2,062
John Bailey	0.35 / 35%		379		394		0	774
Holly Munro	0.35 / 35%		0		1,411		0	1,411

Total Fringe Estimate (*in-kind*)			**$1,735**		**$2,510**		**$0**	**$4,246**
SALARY & FRINGE COSTS (*in-kind*)			**$6,694**		**$9,682**		**$0**	**$16,376**
Operating expenses/supplies (*in-kind*)								
Lotek GPS collars	1450 / collar	0	0		0		0	0
Field computer, external hard drives	1500 /computer	1	1,500	1	1,500		0	3,000
Field packs, GPS, measurement tools,	800 /person	3	2,400		0		0	2,400
Cameras (*in-kind*)	200 / camera		0		0		0	0
Lithium batteries (*in-kind*)	16 / 8 batteries/ camera		0		0		0	0
Total Supplies & Services			**$3,900**		**$1,500**		**$0**	**$5,400**
Travel								
Vehicle 2 - rental from NCASI	$800 / month	3	2,400		0		0	2,400
Vehicle 2 - fuel	$700 / month	3	2,100		0		0	2,100
Total Travel Costs			**$4,500**		**$0**		**$0**	**$4,500**
TOTAL IN-KIND COSTS			**$20,052**		**$18,353**		**$0**	**$38,406**
Project Cost			**$81,997**		**$31,270**		**$0**	**$113,267**

P.O. Box 68
Korbel, CA 95550
(707) 668-4400
greendiamond.com

July 19, 2024

Dr. Kristina Wolf
Environmental Scientist
California Board of Forestry and Fire Protection
P.O. Box 944246
Sacramento, CA 94244-2460
kristina.wolf@bof.ca.gov

RE: Effectiveness Monitoring Committee Full Project Proposal - Balancing fuel considerations and rare carnivore habitat: an evaluation of risk and reward

Dear Dr. Wolf:
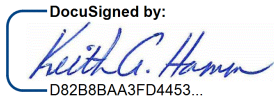
I am writing to the California Board of Forestry and Fire Protection Effectiveness Monitoring Committee (EMC) to express support of the project proposal "Balancing fuel considerations and rare carnivore habitat: an evaluation of risk and reward" (Dr. Katie Moriarty, NCASI, Dr. Holly Munro, NCASI, and Dr. John Bailey, Oregon State University). The proposed project would provide critically important information to resource managers on wildfire fuels reduction prescriptions and conservation of habitat and habitat components for rare forest carnivores such as Humboldt marten and Pacific fisher. Providing and retaining critically important habitat components for rare species on managed forest landscapes while simultaneously minimizing wildfire risk is a challenging resource management issue that warrants scientific inquiry to better inform resource management decisions and regulations affecting those decisions. The proposed project clearly meets the goals and objectives of the EMC with a team of scientists demonstrating a collaborative, transparent, and science-based approach addressing research themes and critical monitoring questions posed by the EMC and for evaluating effectiveness of specific California Forest Practice Rules.

Green Diamond is a family-owned business established in 1890 in Washington State, and for six generations, it has sustainably managed timberlands in the Pacific Northwest. Currently, Green Diamond owns and manages approximately 400,000 acres in California. All lands owned and managed by Green Diamond are independently audited and certified for sustainable forest management. Green Diamond has a long history of developing and implementing long-term habitat and species conservation plans to guide the management of its forests, and the company currently operates under California Safe Harbor Agreement for Humboldt marten (2018) , a USFWS approved Forest Habitat Conservation Plan including fisher (2019), and a Memorandum of Understanding with USFWS for Coastal (Humboldt) marten (2020). Green

Diamond has engaged with state, federal, tribal, and NCASI researchers for decades to improve our understanding of species' habitat needs in coastal northern California. Green Diamond is a committed collaborator in the project facilitating access by the research team and field crews, participating in discussions regarding project development and planning, provision and transfer of information, safety of crews, collection of data, and review of work products.

The recently completed and planned research projects investigating site occupancy and habitat use by Humboldt marten and site occupancy of fisher on the Green Diamond ownership provides a unique opportunity for evaluating wildfire risk and habitat retention prescriptions for these species under landscape scale agreements implemented through the California Forest Practice Rules. In addition, it would be particularly informative to better understand the interaction of habitat retention prescriptions and risk of wildfire in mesic coastal redwood and Douglas-fir forests. Much effort is being placed on providing current and future habitat for these species on managed forest landscapes and additional information on wildlife protection measures and risk/resilience of forests to wildfire is critically important to inform and adapt conservation efforts.

Sincerely,

DocuSigned by:

Keith G. Hamm

D82B8BAA3FD4453...

Keith A. Hamm, Conservation Planning Manager
Green Diamond Resource Company
900 Riverside Road | Korbel, California | 95550
khamm@greendiamond.com

Cc: Dr. Katie Moriarty

2

FULL 7(c)(iii)(1)

Kristina Wolf, Ph.D
California State Board of Forestry & Fire Protection
Effectiveness Monitoring Committee
P.O. Box 944246
Sacramento, CA 94244-2460

July 9, 2024

RE: Letter of Support for the proposed study: Balancing fuel considerations and rare carnivore habitat: an evaluation of risk and reward.

Dear Dr. Wolf,

The purpose of this letter is to indicate our support for the proposed fuel considerations and rare carnivore habitat study referenced above. There are few, if any, existing studies that have investigated how fuels reduction prescriptions can be implemented to reduce the risk of catastrophic wildfire while also minimizing habitat disturbance to rare species such as martens and fishers. This proposed study would provide important information to both land managers and regulatory agencies on how to balance the effectiveness of fuels reduction prescriptions to reduce wildfire risk while maintaining or improving the habitat of these rare carnivores.

On this study we will collaborate with Principal Investigators and NCASI Senior Research Scientists Katie Moriarity, Ph.D. and Holly Munro, Ph.D., along with Keith Hamm, Conservation Planning Manager at Green Diamond Resource Company. Mendocino and Humboldt Redwood Company will provide access to study sites on our working forestlands in Humboldt and Mendocino County, CA., along with data and logistical support as needed.

We think that this study has the potential to provide us with important research results on fine-scale vegetative conditions used by these rare species that will in turn inform vegetation management strategies within fuel treatments on our working forests.

Please feel free to contact me if you have any questions regarding our support for this proposal.

Sincerely,

Sal Chinnici
Director, Forest Sciences
Mendocino and Humboldt Redwood Companies

FULL 7(c)(iii)(1)

United States Department of the Interior
U.S. FISH AND WILDLIFE SERVICE
Ecological Services
Arcata Fish and Wildlife Office
1655 Heindon Road
Arcata, California 95521
Phone: 707-822-7201 Fax: 707-822-8411

In Reply Refer to:
Letter of Support for NCASI's full EMC proposal 2024-001

To: The California Board of Forestry Effectiveness Monitoring Committee

The U.S. Fish and Wildlife Service (Service) strongly supports projects that provide important information on the effectiveness of forestry management practices that sustain habitat features necessary for sensitive species while reducing wildfire risks. This is particularly true for the National Council for Air and Stream Improvement, Inc.'s (NCASI) proposed study titled "Balancing fuel considerations and rare carnivore habitat: an evaluation of risk and reward." Projects such as this will support conservation efforts regarding Humboldt marten (*Martes caurina humboldtensis*), a species recently listed as threatened under the Endangered Species Act as the coastal Distinct Population Segment of the Pacific marten.

The Service and NCASI signed a Memorandum of Understanding (MOU) with the National Alliance of Forest Owners formalizing the Wildlife Conservation Initiative, a collaborative partnership focused on advancing the conservation of at-risk species and listed species within private working forests nationwide. This proposed Effectiveness Monitoring Committee project is an excellent opportunity to meet the goals of the MOU and the collaborating landowners through robust research and monitoring of Humboldt marten populations.

The proposed project will increase NCASI's capacity to engage in collaborative research focused on Humboldt marten and enhance the Service's efforts to understand important species-landscape interactions. Specifically, this project will help us understand Humboldt marten habitat needs and structure use and assess the risk of large, catastrophic wildfires to Humboldt marten habitat. This work will fill important information gaps identified in the Service's Humboldt Marten Recovery Outline. The project will also be useful in informing future Endangered Species Act consultations with the Service and will enhance continued collaboration with partners engaged in conservation, including the Service, private timber groups, and other stakeholders.

Thank you for your consideration of this proposal. Should you have any questions regarding our support, please call Jenny Hutchinson at 707-825-5107.

Sincerely,

Vicky Ryan
Acting Field Supervisor

FULL 7(c)(iii)(1)

Effectiveness Monitoring Committee
Full Project Proposal

Deadline for Submission: July 5, 2023

Project #:	EMC-2023-003	**Date:**	July 5, 2023

Project Title: Pre- and Post-Harvest Fuel Loads and Implications for Site Productivity

Principle Investigator:

John D. Bailey
Oregon State University, College of Forestry
John.bailey@oregonstate.edu; 541-737-1497
140 Peavy Forest Science Center,
3100 SW Jefferson Way,
Corvallis, OR 97331

Collaborators:

Sal Chinnici
schinnici@hrcllc.com
707-845-3012

Joshua Petitmermet
jpetitmermet@mendoco.com
707-513-5006

Mendocino and Humboldt Redwood Co.
125 Main Street
Scotia, CA 95565

Contact Information:

Grant administration:

Hayley Ross
Mendocino and Humboldt Redwood Co.
hross@mendoco.com; 707-962-2814
PO Box 489
Fort Bragg, CA 95437

Project Duration: 2 years/3 months

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1. Background and Justification

Unusually large and intense wildfires have dramatically altered California's forests in recent years, affecting many ecosystem services including wildlife habitat, carbon storage, and wood supplies. Current management practices variably include surface fuels reduction treatments intended to reduce per-unit wildfire hazard and associated damage/loss. In sum, per-unit treatments contribute to landscape wildfire risk reduction by creating breaks in landscape-scale fuel continuity to limit fire severity and elevate suppression success where needed.

For commercial timber harvesting projects, California Forest Practice Rules (FPRs) include limited requirements for reducing activity fuels (slash) on the forest floor including, for example,

adjacent to structures and along roads open to the public (FPRs 2023). However, few studies have systematically quantified fuel loads both with and without prescribed surface/ladder fuels treatments and connected those effects on future stocking and stand biomass growth.

This study aims to fill this gap by conducting both pre- and post-harvest measurements of fuel loads resulting from commonly used silvicultural practices and using established sampling methods for long-term monitoring beyond this project's duration. Results of this study will feed into the adaptive management framework of the EMC and help inform Board of Forestry policy and regulations.

2. Objectives and Scope

In partnership with Humboldt and Mendocino Redwood Companies, Oregon State University will conduct a systematic pre-and post-harvest fuel loading study to understand how commonly applied forest management regimes combined with prescribed fuels reduction treatments affect fuels loading and associated wildfire hazard, tree regeneration, and site productivity/health. We will measure and compare stand conditions and fuels hazard in pre- and post-harvest forest stands, with and without prescribed fuels treatments, and quantify/contrast these effects on unit wildfire hazard, tree regeneration, and stand growth.

Our proposed research investigates:

- How many tons per acre of fuels exist pre- and post-harvest given several commonly applied regional silvicultural regimes (i.e., "archetypes")?
- Are FPR fuels treatment requirements effective in reducing fire hazard in the near term and subsequent wildfire risk following these archetypical silvicultural methods, while also providing for adequate stocking, growth, and stand health?

Our study will improve understanding of the effectiveness of current management practices to reduce unwanted wildfire impacts while maintaining sustainable forest management practices. This project would link broad, untested ideas about the implementation and effectiveness of emerging fuels treatments with actual, on-the-ground operations (implementation monitoring) and data (effectiveness monitoring) focused on wildfire hazard reduction and stand growth/health/sustainability on a per management unit basis. This near-term data is fundamental to any long-term landscape-scale wildfire risk reduction in aggregate and extends well beyond traditional thinning-from-below, mastication and pile burning treatments.

3. Critical Questions and Forest Practice Regulations Addressed

Theme 6: Wildfire Hazard

Are the FPRs and associated regulations effective in…

a)	*treating post-harvest slash and slash piles to mitigate fuel hazard, modify fire behavior and reduce wildfire risk?*	Our proposed research investigates how many tons per acre of fuels exist pre- and post-harvest given several commonly applied regional silvicultural regimes.
b)	*treating post-harvest slash while retaining wildlife habitat structures, including snags and large woody debris?*	Fixed-area plots will be augmented with basal area points and fuels transects as needed to develop custom fuel models for projecting fire behavior. We will include measures of deadwood structures for habitat, including herbicide-treated hardwoods in "frilled"' stands.
c)	*managing fuel loads, vegetation patterns and fuel breaks for landscape-level fire hazard reduction and risk mitigation?*	Our study will use a before-after control-impact (BACI) design to contrast fuels hazard associated with common silvicultural methods (e.g., Selection, Variable Retention, and Commercial Thinning) each in combination with and without understory fuels reduction treatments. A preliminary landscape-level wildfire risk assessment integrates this per-unit fuel hazard information over space with topographic position, weather patterns, and probable ignition sources. It includes an initial (available) values layer (i.e., timber, water, habitat, and human structures) for assessing the probable impacts of wildfires. It is only an initial step to design potential operational delineations for fire suppression and priority fuel mitigation treatment areas.
d)	*managing forest structure and stocking standards over time to promote and maintain wildfire resistance and resilience?* **(EMC Thematic question for Fiscal Year 2023/2024 funding)**.	This project will follow multiple replicate harvest units from pre-harvest to post-harvest to determine if site development (regeneration) and productivity has been affected by slash/fuels treatment and vegetation management conducted for wildfire hazard mitigation.

Theme 12: Resilience to Disturbance in a Changing Climate

Are the FPRs and associated regulations effective in …

a)	*improving overall forest wildfire resilience and the ability of forests to respond to climate change (e.g., in response to drought or bark beetle; reducing plant water stress)?*	Our study will improve understanding of the effectiveness of common management practices to reduce unwanted wildfire impacts, particularly when combined with prescribed fuels treatments. This project would link untested ideas about the effectiveness of fuels treatments with on-the-ground operations and resultant data about hazard reduction and growth/health on a per-unit basis, a foundation for landscape-scale wildfire risk reduction in aggregate.

Forest Practice Rules and Regulations:

14 CCR § 912.7, 932.7, 952.7 *Resource Conservation Standards for Minimum Stocking*	This FPR establishes standards for minimum acceptable stocking of commercial tree species in the Coast Forest District after timber operations have been completed. The amount of slash remaining post-harvest can impact stocking. Our study seeks to investigate if FPR fuels treatment requirements are effective in reducing fire hazard in the near term and wildfire risk overall following common silvicultural regimes, while providing for adequate stocking, growth, and stand health.
14 CCR § 913 *Silvicultural Objectives*	The objectives of this FPR are to describe standard silvicultural systems and to provide alternatives that shall meet the objectives of the Forest Practice Act (FPA) (PRC 4512 and 4513), including adequate stocking levels post-harvest. Before- and after-treatment fuel measurements and hazard modeling will inform the effectiveness of fire hazard reduction in target uneven-aged, intermediate, and special prescription silvicultural methods (913.2 (a) Selection, 913.3 (a) Commercial Thinning, and 913.4 (d) Variable Retention), and should also inform 913.4 (c) Fuelbreak/Defensible Space.
14 CCR § 917, 937, 957 *Hazard Reduction*	This FPR provides standards for the treatment of snags and logging slash to reduce fire and pest safety hazards in the logging area, to protect the area from potential insect and disease attack, and to prepare the area for reforestation. Our study will test the efficacy of slash/fuels treatment (required under 917.2 within the plan area, and adjacent to public roads and structures) in harvest units utilizing the target silvicultural methods.
14 CCR § 1038.3 *Forest Fire Prevention Exemption*	This article of the FPRs provides that those engaged in the cutting or removal of trees for the purpose of reducing flammable materials are exempt from the plan preparation and submission requirements, as well as the completion and stocking report requirements of the FPA. The article contains requirements for treatment of slash and woody debris. Before- and after-treatment fuels measurements and hazard modeling will inform the effectiveness of harvests operating under a Forest Fire Prevention Exemption 1038.3, where extensive slash/fuels treatments are conducted following stand thinning, like a Commercial Thinning.

4. Research Methods

Site selection on HRC/MRC (Figure 1) will follow planned, operational harvests opportunistically, many of which are already scheduled for treatment and contracted for the coming year – a strength given the abbreviated time for this research. *If funded*, targeted additional sites will be added as needed during year 2 to provide sufficient replication within silvicultural treatments (e.g., Selection, Commercial Thinning, and Variable Retention, detailed later) across

representative northern California landscape conditions and stand types to provide meaningful inferential space to the results. Overstory treatment effectiveness addresses forest health, wildlife habitat and long-term sustainability directly, with indirect connections to stocking success and surface fuels hazard.

Surface fuels reduction treatments will be implemented operationally within nested, replicated subunits of each overstory harvest unit; smaller units will be divided in half randomly, but larger units could potentially have multiple fuels reduction areas at appropriate operational scales (e.g., fuels treatments along roads and nearer to the WUI). Stocking and surface fuels hazard are directly impacted by these understory treatments, and interact with overstory conditions to drive wildfire behavior, risk and long-term productivity, and sustainability.

Experimental Design:

Our study will use a before-after control-impact (BACI) design to contrast fuel hazard associated with the target silvicultural treatment groups, each in combination with/without subsequent understory fuels reduction treatments (Figure 2). Beginning with pre-treatment data collection, we will use standard mensuration methods for overstory and understory vegetation sampling; measuring surface and ladder fuels and calculating tons per acre will follow Brown (1974) and Snell and Brown (1980) to augment classification into standard fuel models.

We will use 4-10 plots per stand depending on the amount of stand-level variability (i.e., similar Coefficients of Variation), since Commercial Thinning treatments produce less variability than Selection treatments; stands are the experimental unit with nested sub-units. Fixed-area sample plots will be augmented with both basal area points and fuels transects as needed to develop custom fuel models linked to overstory and understory stand condition for projecting fire behavior. We will include standard measures of deadwood structures, including those in herbicide-treated hardwoods in "frilled"' stands. We will thoroughly photo document all plots, points and transects; we will field-assign and photo document fuel models to aid in the narrative development relative to these management regimes, surface fuels and effectiveness.

Only a Phase I (preliminary) assessment of landscape wildfire risk will be possible on this two-year timeline; that assessment will integrate this new fuel hazard data/information over space with topographic position of several planned harvest operation scenarios, combined with common weather patterns and probable ignition locations; the objective is to estimate wildfire risk across a range of potential future treatment intensities and fire weather scenarios. Subsequent risk assessment work would expand these scenarios and, more importantly, refine a values layer (i.e., timber, water, habitat, and human structures) for assessing the probable impacts of future wildfires. This future detailed wildfire risk assessment would facilitate the design of potential operational delineations (PODs) for priority fuel mitigation treatment areas, forest plans, and fire suppression planning.
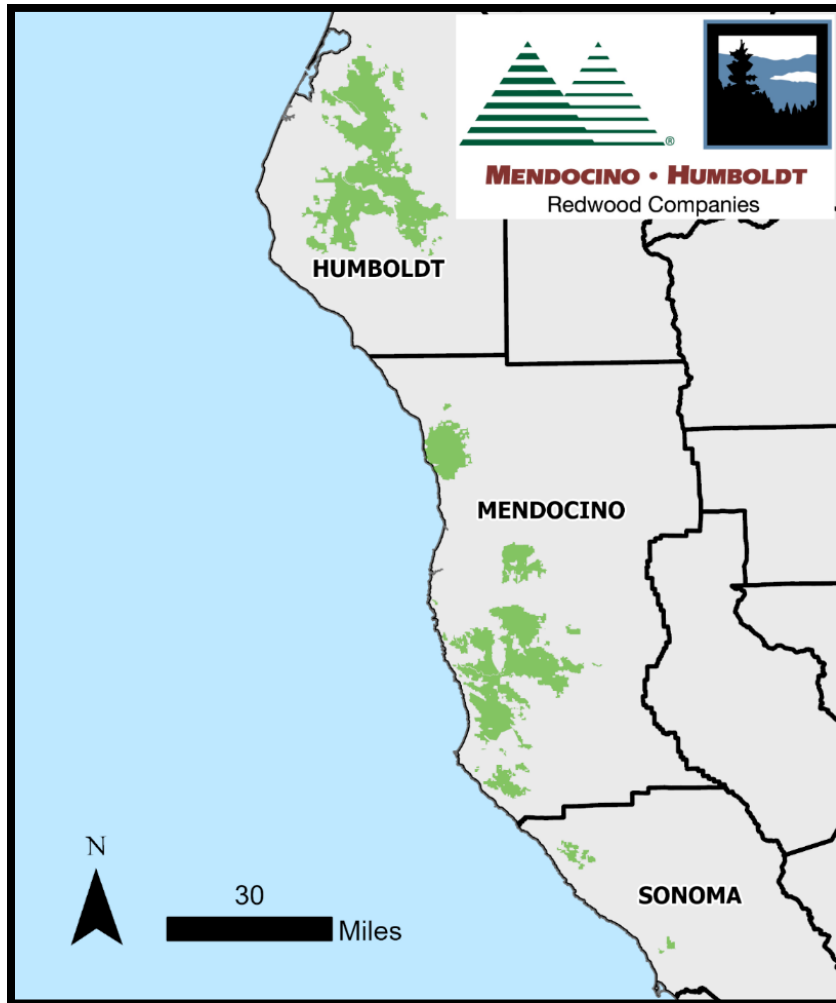
Figure 1. Map of Mendocino Companies timberlands, located in Humboldt, Mendocino, and Sonoma Counties. The timberlands together comprise over 440,000 acres of redwood and mixed conifer forest managed for long-term sustainable timber production.

	Variable structure, lowest canopy connectivity	*Moderate*	*Most uniform structure, highest canopy connectivity*
HIGH FUEL HAZARD	Variable Retention[1] without fuels reduction	Selection[2] without fuels reduction	Commercial Thinning[3] treatments without fuels reduction
LOW FUEL HAZARD	Variable Retention **with** fuels reduction	Selection **with** fuels reduction	Commercial Thinning treatments **with** fuels reduction

[1] Variable Retention: A Special Prescription based on the retention of variable sizes of tree clumps, low density areas, and openings for regeneration while retaining structural elements and biological legacies from the pre-harvest stand for integration into the post-harvest stand (FPRs 2023).

[2] Selection: Uneven-aged management (primarily in redwood dominated stands) in which trees of different age and size classes are removed in small groups or individually in order to stimulate the growth of residual trees, provide smaller openings for regeneration, and create canopy fuel breaks (i.e., reduced canopy bulk density and increased height to the base of live crowns), A range of 50 to 125 square feet per acre of basal area is to be retained depending in site class (FPRs 2023).

[3] Commercial Thinning: an intermediate stand treatment in young, even-aged plantations in which trees are removed to maintain or increase average stand diameter of the residual crop trees, promote timber growth, and/or improve forest health and wildfire resistance as with other canopy treatments. A range of 50 to 125 square feet per acre of basal area is to be retained depending on site class (FPRs 2023).

Figure 2. The study will use a before-after-control-impact (BACI) study design using silvicultural treatments e.g., Selection, Commercial Thinning and Variable Retention, each in combination with fuels reduction treatments. Fuels reduction treatments are appropriate to site conditions and operational constraints, and may include pruning and slashing, piling activity fuels, pile burning, broadcast burning, and mastication.

5. Scientific Uncertainty and Geographic Application

This study seeks to answer important questions regarding how common sustainable forest management practices affect wildfire hazard, tree regeneration and site productivity during a period of a warming climate and increased environmental stress. The three archetype overstory treatments will be well understood by the end of this project; Commercial Thinning is expected to homogenize stand conditions. Most uncertainty will arise from variability in site conditions, particularly for the extensive range of conditions to which Commercial Thinning treatments might be applied, and from variations in surface fuels treatments due to site conditions and

operational limitations. However, it is crucial to collect some of this baseline data on the effectiveness of surface fuels treatments within these common management regimes given both operational and climatic uncertainty. Our sampling range will attempt to span conditions over common management situations; the preliminary risk assessment scenarios will span additional treatment intensities and climatic conditions.

Our results will be directly applicable to the Coast District but may also be applicable to the Northern and Southern districts depending on tree species and silvicultural similarities. Research and monitoring locations would include Humboldt Redwood Company (HRC) lands in Humboldt County, CA (~210,000 acres) and Mendocino Redwood Company (MRC) Lands in Mendocino and Sonoma Counties, CA (~240,000 acres).

6. Collaborations and Project Feasibility

Oregon State University will provide the PI, who is responsible for project oversight, Research Assistant (and summer students/technicians) hiring/training, and all progress reports and deliverables. Humboldt and Mendocino Redwood Companies will provide access to site data, operational planning/oversight of silvicultural treatments, and field assistance with plot measurements.

Principal investigator John Bailey, Professor of Silviculture and Fire Management in OSU's College of Forestry, specializes in characterizing the effects of fuels treatments on wildfire risk and forest health. His research focuses on using traditional and experimental silviculture practices to achieve a spectrum of management objectives, including sustainable wood production and wildlife habitat.

Humboldt Redwood Company and its sister company, Mendocino Redwood Company, own and manage approximately 440,000 acres across three North Coast counties, with timber harvest activity covering an average of 9,600 acres per year. The ownership provides ample and varied locations for sampling within planned treatment areas, with a high degree of certainty of operations timing and access to study sites.

Project feasibility is considered high given the ongoing management operations of applicable forests in northern California (a large and stable study area), existing knowledge/experience of the collaborators (both companies and the university), availability of and access to a land base for treatments and research plots, established sampling methodologies, some existing relevant stand data, and the pressing need to gather data and advance the science in this area.

7. Project Deliverables

Deliverable	Description	Approximate delivery date
Pre-harvest Fuels Summary Report 1	A synthesis of the study design demonstrating the range of applicable forest types and treatments across the northern CA landscape	March 2025
Pre- to Post-Harvest Summary Report 2	A synthesis of the impact of fuels reduction treatments on fuel models, wildfire hazard, stocking, productivity, and forest health/habitat conditions	December 2025
Phase I Wildfire Risk Assessment	Spatial analysis of potential wildfire flow at landscape scales and associated risk to natural and human resources	March 2026
Journal manuscript	Manuscript version of treatment effectiveness for both hazard and risk reduction	March 2026 +

8. Detailed Project Timeline

Task	2023/24				2024/25				2025/26		
	_Q1*_	_Q2_	_Q3_	_Q4_	_Q1_	_Q2_	_Q3_	_Q4_	_Q1_	_Q2_	_Q3_
Site selection (_initially performed as in-kind, begins with award notification_)	▓	▓		▓							
Pre-harvest field data collection (_initially as in-kind, begins with award notification_)	▓	▓		▓	▓	▓					
Pre-harvest data analysis; year 1 add sites		▓	▓			▓	SR1				
Post-harvest field data collection				▓	▓	▓		▓	▓	▓	
Post-harvest data analyses/comparisons							▓	▓		SR2	
Hazard syntheses/comparisons										▓	▓
Preliminary wildfire risk assessment											▓
Final Report completion; manuscript											▓

*Q1: First Quarter of Fiscal Year 2023/2024 - July, August, and September; Q3 has limited site access for many areas.

SR = Summary Report deliverable

9. **Requested Funding**

Category	Description	Fiscal Year 1	Fiscal Year 2	Fiscal Year 3	Total
Personnel	PI - Research direction/oversight	$8,962	$9,231	$4,754	$22,947
	OSU Research assistant	$37,080	$38,192	$19,669	$94,941
	HRC/MRC personnel - Project support	$2,222	$4,444	$3,333	$10,000
Fringe Benefits	PI - Research direction/oversight	$4,391	$4,708	$2,520	$11,619
	OSU Research assistant	$23,360	$24,825	$13,178	$61,363
Other	Publication costs			$1,500	$1,500
Operating Expenses	Supplies	$2,040	$2,000		$4,040
Travel	Travel expenses	$9,699	$10,625	$2,824	$23,148
Indirect Cost	12%	$9,367	$10,008	$5,395	$26,347
Total Cost		$97,121	$104,033	$53,173	$255,905
Matching or In-Kind Contributions	Project support - HRC/MRC personnel	$2,222	$4,444	$3,333	$10,000
EMC Funding Requested		$94,899	$99,589	$49,840	$245,905

10. References

Brown, James K. 1974. Handbook for inventorying downed woody material. Gen. Tech. Rep. INT-16. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Forest and Range Experiment Station. 24 pp.

California Department of Forestry and Fire Protection. 2023. California Forest Practice Rules 2023. Title 14, California Code of Regulations Chapters 4, 4.5, and 10. California Department of Forestry and Fire Protection, Resource Management, Forest Practice Program. Sacramento, CA. 432 pp.

Snell, J.A. Kendall; Brown, James K. 1980. Handbook for predicting residue weights of Pacific Northwest conifers. Gen. Tech. Rep. PNW-GTR-103. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Forest and Range Experiment Station. 51 pp.

11. Appendices

The following items are attached to this proposal.

- **Employer Identification Number** – Proof of active business registration with the California Secretary of state

- **Letters of support** – if collaborations or partnerships are noted in the proposal, letter of support or other forms of evidence that partners are aware of and in support of the proposed project should be provided. Applicants should clearly indicate what work will be completed with partners with funds from this solicitation if partnerships are noted.

- **Nondiscrimination Compliance Statement** (form STD19)

- **Drug Free Workplace Certification** (Form STD21)

- **Payee Data Record** (Form STD204)

- **System for Award Management** – must have active registration in SAM to apply. Active registration must be maintained throughout life of award. Must include screenshot of Sam registration page in application appendices to be eligible.

Business License
County of Humboldt
Eureka, California

JOSH MONSON
HUMBOLDT REDWOOD CO, LLC
PO BOX 390
CALPELLA, CA 95418-0436

This License is issued to:

Business Name: **HUMBOLDT REDWOOD CO, LLC**
Owner Name(s):   Contact - JOSH MONSON

This License Valid Only at the Following Location(s)

125 MAIN ST
SCOTIA, CA 95565

Type of business activity to be transacted:

REAL ESTATE / FORESTRY

TYPE	**ISSUED**	**EXPIRES**
Storefront	07/07/2022	10/01/2023

Starting January 1, 2021, Assembly Bill 1607 requires the prevention of gender-based discrimination of business establishments. A full notice is available in English or other languages by going to:
https://www.dca.ca.gov/publications/

This License Must Be Displayed in Public View

FULL 7(c)(iii)(1)

My Dashboard Entities ⌄ Matters & SOP ⌄ Orders & Results ⌄ Calendar ⌄ Reports ⌄ Forms & Tools ⌄

Admin ⌄

Entity Details

Entity Name:

Jurisdiction of Formation: Delaware

Return to Entity Grid

Humboldt Redwood Company, LLC

Formation Date:

CSC Entity ID:

05/06/2008

2716967

◢ 📂 **Entity Details**

Jurisdiction Details - California

Statutory Representation

Registered With:	Secretary Of State
Authorization Date:	06/27/2008
Jurisdiction ID:	200818010179
Registered Agent:	Corporation Service Company Which Will Do Business In California As CSC-Lawyers Incorporating Service 2710 Gateway Oaks Drive, Suite 150N, Sacramento, CA, 95833-3505
Jurisdiction Status:	Active
Corporate Database Status:	Active
Jurisdiction Description:	
Status Filed Date:	

Note: The Corporate Database Status is obtained from the Secretary of State or equivalent corporation department (US only)
display the status with the most recent date on the Jurisdiction and Corporate Tracker grids.

Additional Details

FULL 7(c)(iii)(1)

![Oregon State University College of Forestry logo]

Memorandum

College of Forestry – Silviculture and Fire Labs
Department of Engineering, Resources and Management

_____

July 5, 2023

TO: The California Board of Forestry Effectiveness Monitoring Committee

FROM: John Bailey, Professor of Silviculture and Fire Management

RE: Support for the proposed study: *EMC-2023-003*

This memorandum specifies my full support as Principal Investigator for the proposed study:
"Pre- and Post-Harvest Fuel Loads and Implications for Site Productivity". There are
few existing studies that have quantified fuels hazards associated with commonly used
management approaches on private lands in northern California, both with and without
surface/ladder fuels treatments. These treatment options impact sustainable forest
management going forward in terms of future stocking and stand growth, plus a range of
ecosystem services like wildlife habitat. However, the physical and conceptual landscape within
which we manage these stands is changing quickly with unprecedented climatic patterns,
impacts to forest health, and increasingly likely associated wildfire. The proposed study would
provide important baseline information on the effectiveness of current management practices
and Forest Practice Regulations to reduce unwanted wildfire impacts on private lands – the
thematic question for FY2023-24.

I have collaborated closely with Mendocino and Humboldt Redwood Company in the
development of the research concept and ultimate proposal; if funded, I will work closely with
them to complete the research and deliver results, required reports and an associated scientific
manuscript. Study sites will be on their working forestlands in Humboldt and Mendocino County,
CA. Oregon State University is a premier forestry research institution and well situated to
contribute to this project.

[signature: John Jeff Bailey]

June 16, 2023

RE: Proposed study of Pre- and Post-Harvest Fuel Loads and Implications for Site Productivity.

To: The California Board of Forestry Effectiveness Monitoring Committee

The purpose of this letter is to indicate our support for the proposed pre- and post-harvest fuel loads study referenced above. There are few existing studies that have quantified fuel loads both with and without surface/ladder fuels treatments resulting from common harvest techniques and connected those effects on future stocking and stand growth. The proposed study would provide important information on the effectiveness of current management practices to reduce unwanted wildfire impacts.

On this study we will collaborate with John Bailey, Ph.D., Professor of Silviculture and Fire Management in Oregon State University's College of Forestry. Dr. Bailey specializes in characterizing the effects of fuel treatment on fire risk and forest succession. Study sites will be on our working forestlands in Humboldt and Mendocino County, CA.

Accordingly, the Humboldt and Mendocino Redwood Companies will commit approximately $10,000 in kind (non-cash) support to Dr. Bailey's proposal. Specifically, HRC/MRC staff will provide access, help with the field sampling, and provide other needed logistical support during this study.

Please feel free to contact me if you have any questions regarding our support for this proposal.

Sincerely,

Sal Chinnici
Director, Forest Sciences
Mendocino and Humboldt Redwood Companies

FULL 7(c)(iii)(1)

NONDISCRIMINATION COMPLIANCE STATEMENT

STD. 19 (Rev. 10/2019)

COMPANY NAME

Humboldt Redwood Company, LLC

The company named above (herinafter referred to as "prospective contractor") hereby certifies, unless specifically exempted, compliance with Government Code Section 12990 (a-f) and California Code of Regulations, Title 2, Division 4, Chapter 5 in matters relating to reporting requirements and the development, implementation and maintenance of a Nondiscrimination Program. Prospective contractor agrees not to unlawfully discriminate, harass or allow harassment against any employee or applicant for employment because of sex, race, color, ancestry, religious creed, national origin, physical disability (including HIV and AIDS), medical condition (cancer), age (over 40), marital status, denial of family care leave and denial of pregnancy disability leave.

CERTIFICATION

I, the official named below, hereby swear that I am duly authorized to legally bind the prospective contractor to the above described certification. I am fully aware that this certification, executed on the date and in the county below, is made under penalty of perjury under the laws of the State of California.

OFFICIAL'S NAME

Jim Pelkey

DATE EXECUTED	EXECUTED IN THE COUNTY OF
06/30/2023	Sonoma

PROSPECTIVE CONTRACTOR'S SIGNATURE

PROSPECTIVE CONTRACTOR'S TITLE

Chief Financial Officer

PROSPECTIVE CONTRACTOR'S LEGAL BUSINESS NAME

Humboldt Redwood Company, LLC

DRUG-FREE WORKPLACE CERTIFICATION

CERTIFICATION

I, the official named below, hereby swear that I am duly authorized legally to bind the contractor or grant recipient to the certification described below. I am fully aware that this certification, executed on the date below, is made under penalty of perjury under the laws of the State of California.

CONTRACTOR/BIDDER FIRM NAME	FEDERAL ID NUMBER
Humboldt Redwood Company, LLC	26-2635546
BY (Authorized Signature)	DATE EXECUTED
	06/30/2023
PRINTED NAME AND TITLE OF PERSON SIGNING	TELEPHONE NUMBER (Include Area Code)
Jim Pelkey	(707) 620-2978
TITLE	
Chief Financial Officer	
CONTRACTOR/BIDDER FIRM'S MAILING ADDRESS	
PO Box 390, Calpella CA 95418	

The contractor or grant recipient named above hereby certifies compliance with Government Code Section 8355 in matters relating to providing a drug-free workplace. The above named contractor or grant recipient will:

1. Publish a statement notifying employees that unlawful manufacture, distribution, dispensation, possession, or use of a controlled substance is prohibited and specifying actions to be taken against employees for violations, as required by Government Code Section 8355(a).

2. Establish a Drug-Free Awareness Program as required by Government Code Section 8355(b), to inform employees about all of the following:

   (a) The dangers of drug abuse in the workplace,

   (b) The person's or organization's policy of maintaining a drug-free workplace,

   (c) Any available counseling, rehabilitation and employee assistance programs, and

   (d) Penalties that may be imposed upon employees for drug abuse violations.

3. Provide as required by Government Code Section 8355(c), that every employee who works on the proposed contract or grant:

   (a) Will receive a copy of the company's drug-free workplace policy statement, and

   (b) Will agree to abide by the terms of the company's statement as a condition of employment on the contract or grant.

4. At the election of the contractor or grantee, from and after the "Date Executed" and until _____ (DATE) (NOT TO EXCEED 36 MONTHS), the state will regard this certificate as valid for all contracts or grants entered into between the contractor or grantee and this state agency without requiring the contractor or grantee to provide a new and individual certificate for each contract or grant. If the contractor or grantee elects to fill in the blank date, then the terms and conditions of this certificate shall have the same force, meaning, effect and enforceability as if a certificate were separately, specifically, and individually provided for each contract or grant between the contractor or grantee and this state agency.

FULL 7(c)(iii)(1)

STATE OF CALIFORNIA – DEPARTMENT OF FINANCE
PAYEE DATA RECORD
(Required when receiving payment from the State of California in lieu of IRS W-9 or W-7)
STD 204 (Rev. 03/2021)

Section 1 – Payee Information

NAME (This is required. Do not leave this line blank. Must match the payee's federal tax return)

HUMBOLDT REDWOOD COMPANY LLC

BUSINESS NAME, DBA NAME or DISREGARDED SINGLE MEMBER LLC NAME (If different from above)

MAILING ADDRESS (number, street, apt. or suite no.) (See instructions on Page 2)

PO BOX 390

CITY, STATE, ZIP CODE	**E-MAIL ADDRESS**
CALPELLA, CA 95418	darms@mendoco.com

Section 2 – Entity Type

Check one (1) box only that matches the entity type of the Payee listed in Section 1 above. (See instructions on page 2)

☐ SOLE PROPRIETOR / INDIVIDUAL	**CORPORATION** (see instructions on page 2)
☐ SINGLE MEMBER LLC *Disregarded Entity owned by an individual*	☐ MEDICAL (*e.g., dentistry, chiropractic, etc.*)
☐ PARTNERSHIP	☐ LEGAL (*e.g., attorney services*)
☐ ESTATE OR TRUST	☐ EXEMPT (*e.g., nonprofit*)
	☒ ALL OTHERS

Section 3 – Tax Identification Number

Enter your Tax Identification Number (TIN) in the appropriate box. The TIN must **match** the name given in Section 1 of this form. Do not provide more than one (1) TIN. The TIN is a 9-digit number. **Note:** Payment will not be processed without a TIN.

- For **Individuals**, enter SSN.
- If you are a **Resident Alien**, and you do not have and are not eligible to get an SSN, enter your ITIN.
- Grantor Trusts (such as a Revocable Living Trust while the grantors are alive) may not have a separate FEIN. Those trusts must enter the individual grantor's SSN.
- For **Sole Proprietor or Single Member LLC (disregarded entity), in which the sole member is an individual**, enter SSN (ITIN if applicable) or FEIN (FTB prefers SSN).
- For **Single Member LLC (disregarded entity), in which the sole member is a business entity**, enter the owner entity's FEIN. Do not use the disregarded entity's FEIN.
- For all other entities including LLC that is taxed as a corporation or partnership, estates/trusts (with FEINs), enter the entity's FEIN.

Social Security Number (SSN) or Individual Tax Identification Number (ITIN)

__ __ __ - __ __ - __ __ __ __

OR

Federal Employer Identification Number (FEIN)

2 6 - 2 6 3 5 5 4 6

Section 4 – Payee Residency Status (See instructions)

☒ **CALIFORNIA RESIDENT** – Qualified to do business in California or maintains a permanent place of business in California.

☐ **CALIFORNIA NONRESIDENT** – Payments to nonresidents for services may be subject to state income tax withholding.

  ☐ No services performed in California
  ☐ Copy of Franchise Tax Board waiver of state withholding is attached.

Section 5 – Certification

I hereby certify under penalty of perjury that the information provided on this document is true and correct. Should my residency status change, I will promptly notify the state agency below.

NAME OF AUTHORIZED PAYEE REPRESENTATIVE	**TITLE**	**E-MAIL ADDRESS**
DEANNA ARMS	ACCOUNTING SUPERVISOR	darms@mendoco.com

SIGNATURE *Deanna Arms*	**DATE** 4-6-2023	**TELEPHONE** (include area code) 707-485-6750

Section 6 – Paying State Agency

Please return completed form to:

STATE AGENCY/DEPARTMENT OFFICE	**UNIT/SECTION**

MAILING ADDRESS	**FAX**	**TELEPHONE** (include area code)

CITY	**STATE**	**ZIP CODE**	**E-MAIL ADDRESS**

FULL 7(C)(III)(1)

HUMBOLDT REDWOOD CO LLC ● Active Registration

⋮

Unique Entity ID:	**Doing Business As:**	**Purpose of Registration:**	*Expiration Date*
LHNXV3574DU5	(blank)	All Awards	Jun 19, 2024
CAGE/NCAGE:	**Physical Address:**		
5BXQ3	125 MAIN ST		
	SCOTIA, CA 95565-9743 USA		

FULL 7(c)(iii)(1)