

Re: Guadalupe-Coyote Resource Conservation District (GCRCD) Partnership Agreement Request  
To: Susan Hare, Board President, Stephanie Moreno, Executive Director  
From: Rick Lanman, President, Institute for Historical Ecology  
Date: April 30, 2023

**Request:** \$10,000 for analysis of the areas in Santa Clara County suitable for planting redwoods

**Purpose:** Coast redwoods (*Sequoia sempervirens*) are historically native to the Santa Cruz Mountains, but their current range has been drastically reduced by logging, conversion of lands to ranching, and development. California's redwood trees are better for long-term sequestration of atmospheric carbon than any other tree species in the world.<sup>1</sup> Therefore, restoring/planting redwoods could help to slow or stabilize global warming, as well as providing ecosystem services including air and water filtration, flood control, soil health, wildlife habitat, and climate resilience benefits.<sup>2</sup> However, before county and state agencies begin replanting redwoods in our county, it would be helpful to understand where the most suitable habitat is today, based on today's warming climate, soil conditions, etc. Although historic maps of the historic range of redwoods might be helpful as a guide to current restoration efforts, these are conflicting (see Addendum of three conflicting maps).<sup>3</sup> Faced with a similar dilemma, the Turtle Island Restoration Network has mapped the lands in Marin County ideal for redwood habitat, based on a scientific GIS analysis, although this work is unpublished.<sup>4</sup> I propose that GCRCD fund approximately \$10,000 for a similar analysis for Santa Clara County. We have a local expert, Christopher Potter PhD, of CASA Systems 2100, LLC, in Los Gatos, who has recently published on the methods required for this type of analysis in California Fish and Wildlife, a peer-reviewed scientific journal.<sup>5</sup> Dr. Potter has local knowledge based on his recent analysis and publication of the impact of the CZU fire on Santa Cruz County's redwood forests.<sup>6</sup>

**Proposal:** The Institute for Historical Ecology (a 510(c)(3) dba WeTree, Inc.) proposes that the GCRCD partner with it to contract for the analysis of suitable habitat for redwood planting in Santa Clara County. Dr. Potter proposes to use a combination of Machine Learning models (see his above referenced paper attached for an example) with the weighted spatial layer approach that Turtle Island applied to generate new rating maps of potential redwood planting habitat in the Santa Cruz Mountains. He would use GIS layers that are upgraded from those cited in the Turtle Island report - including recent satellite images of tree water use, canopy density, and evergreen percent cover, plus USDA soil type properties including depth, moisture holding capacity, and parent material. It would be a much-refined methodology, trained by the current location of coast redwood stands in the State Parks.

**Budget:** Tallying the hours required, Dr. Potter would estimate a budget of \$10K for Santa Clara County alone, plus another \$10K if we wanted to add San Mateo and Santa Cruz Counties which we would not opt for at this time. The role of the Institute of Historical Ecology would be to coordinate the work and submit the results for publication in the California Fish and Wildlife

Journal. This would be an in-kind contribution from the Institute for Historical Ecology estimated at 40 hours @ \$500/hour or \$20,000 total. The project would take 3-4 months to complete analysis and submit a manuscript for publication, with acknowledgement of the GCRC for funding.

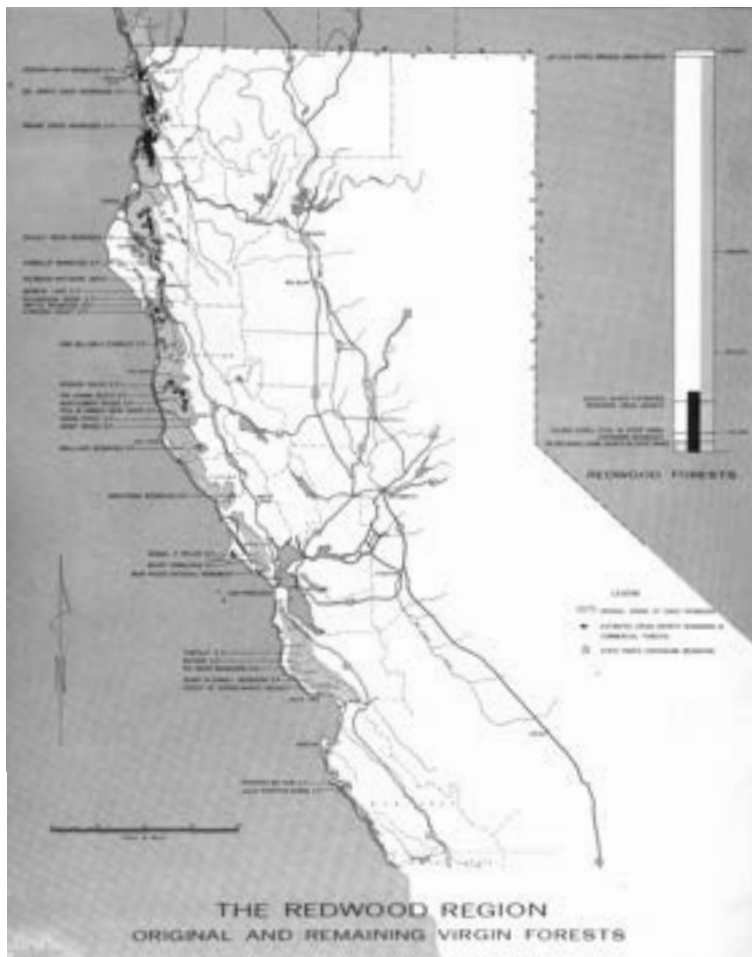
**Equity and Inclusion:**

Although this proposal doesn't immediately engage underserved and diverse communities, it sets the stage to apply for future grants for redwood planting and could engage organizations such as the Conservation Corps which provides opportunities for employment of underserved groups. Also, future redwood forests would provide aesthetic value to all our County's families and communities.

**Addendum I:**

**Three conflicting maps of the historic distribution of coast redwoods in Santa Clara County follow:**

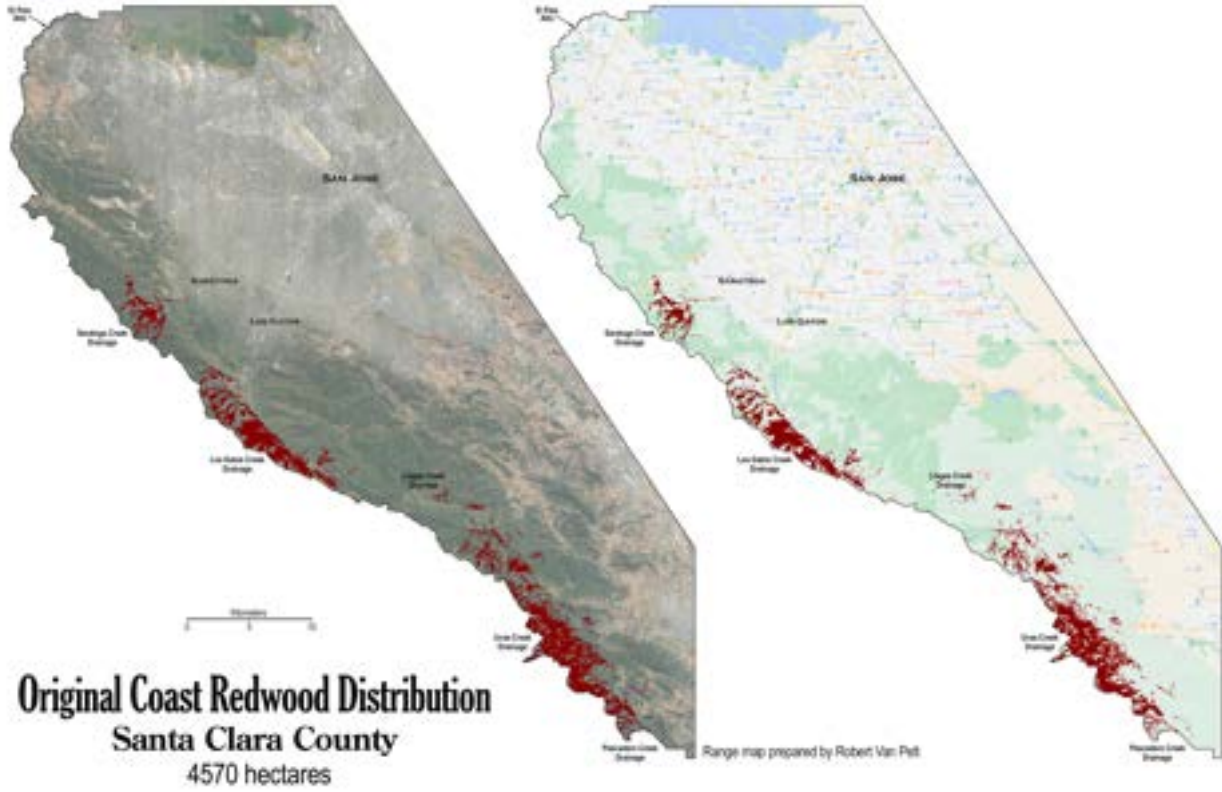
- 1. National Park Service 1964 Historic California Redwood Forest Map from The Redwoods- A National Opportunity for Conservation and Alternatives for Action**



2. Save the Redwoods Historic Coast Redwood Range Santa Clara and Santa Cruz Counties



3. **Robert Van Pelt PhD Map of Original Coast Redwood Distribution, Santa Clara County**, Professor, School of Environmental and Forest Sciences, College of the Environment, University of Washington



**Addendum II: Article on Coast Redwoods as the Best Tree Species for Carbon Sequestration:**

**YaleEnvironment**360

*Published at the  
Yale School of the Environment*

[https://e360.yale.edu/digest/california\\_redwoods\\_co2\\_storage](https://e360.yale.edu/digest/california_redwoods_co2_storage)

E360 Digest

July 7, 2016

## **California's Redwood Trees Are Best in the World at Storing CO<sub>2</sub>**

California's ancient redwood trees store more carbon dioxide per acre than any other forest in the world, including tropical rain forests like the Amazon, according to [new research published in the journal \*Forest Ecology and Management\*](#).



California redwood trees.

The findings are the result of a seven-year study by scientists at Humboldt University and the University of Washington. Redwoods store 2,600 metric tons of carbon per hectare (2.4 acres), more than double the absorption rate of the Pacific Northwest's conifer trees or Australia's eucalyptus forests, the study found. The main reason redwoods surpass all others in CO<sub>2</sub> storage is their longevity, the scientists said. "The story of carbon is huge," Robert Van Pelt, a scientist

at Humboldt State University and co-author of the research, [told \*The Mercury News\*](#). “The carbon part of a redwood may be more important than the lumber part in the coming decades.”

### **References for this proposal:**

1. Van Pelt R, Sillett SC, Kruse WA, et al: Emergent crowns and light-use complementarity lead to global maximum biomass and leaf area in Sequoia sempervirens forests. *Forest Ecology and Management* 375:279–308, 2016
2. Domke GM, Oswalt SN, Walters BF, et al: Tree planting has the potential to increase carbon sequestration capacity of forests in the United States. *Proc Natl Acad Sci USA* 117:24649–24651, 2020
3. The National Park Service: The Redwoods- A National Opportunity for Conservation and Alternatives for Action 1964 National Park Service [Internet]. Washington, DC, USA, United States Department of the Interior, 1964 Available from: [https://books.google.com/books/about/The\\_Redwoods\\_a\\_National\\_Opportunity\\_for.html?id=h-QowAEACAAJ](https://books.google.com/books/about/The_Redwoods_a_National_Opportunity_for.html?id=h-QowAEACAAJ)
4. GIS Analysis of Historic Redwood Range in Marin County [Internet]. Olema, Ca, USA, Turtle Island Restoration Network, 2017 Available from: <https://seaturtles.org/historicredwoodrange/>
5. Potter C, Alexander O: Machine learning to understand patterns of burn severity from the SCU Lightning Complex Fires of August 2020. *California Fish and Wildlife Journal* 108:108–120, 2022
6. CASA Systems 2100, Potter C: Impacts of the CZU Lightning Complex Fire of August 2020 on the forests of Big Basin Redwoods State Park [Internet]. *California Fish and Wildlife Journal* 109, 2023 [cited 2023 May 1] Available from: <http://www.doi.org/10.51492/cfwj.109.1>