INITIAL CONCEPT PROPOSAL

EFFECTIVENESS MONITORING COMMITTEE PROGRAM

Prepared for:
Effectiveness Monitoring Committee
P.O. Box 944248
Sacramento, CA 94244-2480

Offeror:
Waterborne Environmental, Inc.
[redacted]

May 19, 2025

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I ADMINISTRATIVE INFORMATION

a. Date Submitted
May 19, 2025

b. Company Information
Assessing Vulnerability of Vegetation and Wildlife Communities

c. Project Number
Not Applicable

d. Principal Investigator (PI)
Andy Jabobson

e. Affiliation of PI and Address
Waterborne Environmental, Inc.
[redacted]

f. Applying Organization
Waterborne Environmental, Inc

g. Primary Contact Phone Number
Jeff Bigelow
[redacted]

h. Primary Email Contact of PI
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i. Name and Affiliation of Collaborators
Nicolas Guth - Waterborne Environmental, Inc
Zechariah Stone – Waterborne Environmental, Inc.

J. PROJECT DESCRIPTION

i) PROJECT DURATION
Three years.

ii) BACKGROUND AND JUSTIFICATION
Wildfires have and always will be an essential part of forested systems given most species have evolved with fire for millennia. In California, forests are vital for economic growth, recreation, clean water, and many other ecosystem services. In the last three decades these forests have been impacted by mega-fires that have fundamentally changed ecological functions and the structure and composition of communities. Therefore, it is vital to understand how both our actions and inactions contribute to the vulnerability and sustainability of forest ecosystems. To better manage

our forests, the main goal of the project is to understand how recent fires have affected vegetation and animal communities by assessing mega-fires in a historical and ecological context. Doing so will require models based on remote sensing and field data at different spatial scales, including information on vegetation and wildlife.

In California, assuring species survival requires contiguous areas of vegetation and connectivity to populations in Mexico, which is currently fragmented and impacted by border wall and other anthropogenic land uses. Each species has limiting factors which impact the total energy they can expend to traverse the landscape. Tortoise energy expenditure is particularly limited by temperatures (impacting time of travel but also dependent on available shade) and local micro-topographical changes. Ocelots and bobcats share similar locomotive functions but differ in behavior, habitat, time of travel, and thermoregulation, all of which impact total energy expenditure. These factors and therefore, energy expenditure can be multiplied by human-built obstructions such as roads, water diversion, and fences.

iii) OBJECTIVES AND SCOPE

The objectives of this project are to:

1) Define ecosystem vulnerability to mega-fires and post-transformation at local and regional scale
2) Link multi-scale bird and vegetation responses to fire regimes across the vulnerability framework to assess factors and mechanisms that drive vulnerability and resilience.

We will use spatial data modeling and analysis to support habitat conservation and landscape connectivity, in an effort to provide modeled data and guidance on habitat connectivity issues in California.

The scope of this project is to:

- Define ecosystem vulnerability to mega-fires and post-fire transformation at local and regional scales. The foundation of this approach is a vulnerability framework defined by fire regime characteristics across climatic environments and associated vegetation communities.
- Link multi-scale bird and vegetation responses to fire regimes across the vulnerability framework to assess factors and mechanisms that drive vulnerability and resilience. We will integrate remote sensing and spatial modeling with field-based data on vegetation and avian communities. The framework will identify potential tipping points based on vulnerability factors and mechanisms to identify management actions.
- Develop spatial models to estimate cumulative energy expenditure within existing corridors and habitat restoration scenarios in California. The models will provide

managers maps and data for comparative analysis, allowing them to choose those options best suited to minimize expenditure and improve likelihood of survival and reproduction. Remote sensing and other ancillary spatial data (topography, climate, etc.) are critical for identifying and mapping important hydrologic conditions and vegetation types that support habitat and to identify connectivity and potential refugia.

iv) RESEARCH METHODS

Task 1 of this project is to assemble datasets for use in analyses of fire history and bird species. This includes:

- Generating datasets that combine existing and new field data location coordinates with predictor variables derived from fire history data summarized at multiple scales.
- Developing archive of data and code used for analysis.

Task 2 of this project is to develop papers for the following topics:

- Landscape change: Using remote sensing indices in time series to describe ecological change.
- Climate refugia across a spectrum in vulnerability to change in climate and fire regimes.

Task 3 of this project is to develop data visualization and map products from the above research and assemble for presentation/delivery to interested stakeholders. This includes:

- Organizing map, tabular and graphical products for presentation
- Distributing products on agreed-upon platform (i.e., report, online story map, GIS database)

The final task will be to assemble information and datasets for use in modeling and support the research team with spatial modelling and statistical analyses. This includes:

- Developing spatial datasets as required for team efforts, including or in addition to, disturbance history, protected area status, and existing refugia maps for the cross-border region.
- Developing a framework for identifying and modeling species habitat and refugia that is designed to address specific concerns of the region, including a strategy for implementation.

v) SCIENTIFIC UNCERTAINTY AND GEOGRAPHIC APPLICATION

This project will have benefits across the state of California.

vi) COLLABORATIONS AND PROJECT FEASIBILITY

This proposed work will build upon recent studies of U.S. Geological Survey (USGS) of human-altered fire regimes in the Madrean Sky Islands (MSI) of the U.S. and Mexico and wider geographic area and range of climatic environments on the Mogollon Plateau (MP) and northern

Sierra Madre Occidental (SMO). We also plan on collaborating with the USGS on their current project of analyzing issues of natural and anthropogenic disturbance impacts on in the transboundary Madrean Archipelago ecoregion, covering parts of Arizona and New Mexico in the US and Sonora and Chihuahua in Mexico, and the adjacent Northern Sierra Madre Occidental in Mexico and north to the Mogollon Plateau in Arizona.

K. CRITICAL QUESTION THEME AND FOREST PRACTICE RULES OR REGULATIONS ADDRESSED

This project will address the following Critical Questions:

- Theme 9: Wildlife Habitat - Cumulative Impacts
    - This project will provide specific guidance for the assessment of cumulative impacts to biological habitat conditions, including vegetative communities, snags and den trees, downed trees, large woody debris, multistory canopy, road density, hardwood cover, late seral forest characteristics, and late seral habitat continuity.

L. REQUESTED FUNDING

Fiscal Year 1 = $63,600
Fiscal Year 2 = $77,850
Fiscal Year 3 = $83,100

Total Cost = $224,550