NORTH COAST RESOURCE PARTNERSHIP

EXHIBIT A
PROPOSAL COVER PAGE

Proposal Type

☑ Concept Proposal for Demonstration Projects and Processes

Organization Name (Lead Applicant)

Humbots Data & Analysis

Organization Type

☐ Federally recognized Indian Tribe

☐ California State Indian Tribe

☐ Public agency

☐ Local or state agency/special district

☐ Resource Conservation District

☐ Non-profit organization

☐ Public utility

☑ Other: Private business (L.L.C)

Contact Name/Title

Name: Joe Snipes

Title: C.F.O.

Email: Joe.snipes@humbotsda.com

Phone Number (include area code): 707.382.8702

Organization Address (City, County, State, Zip Code):

PO Box 92 Hydesville CA. 95547

Authorized Representative (if different from the contact name)

Name: _____

Title: _____

Email: _____

Phone Number (include area code): _____

Certification of Authority

By signing below, the person executing the certificate on behalf of the proposer affirmatively represents that s/he has the requisite legal authority to do so on behalf of the proposer. Both the person executing this proposal on behalf of the proposer and proposer understand that the NCRP is relying on this representation in receiving and considering this proposal. The person signing below hereby acknowledges that s/he has read the entire Request for Proposals document and has complied with all requirements listed therein.

Official Authorized to Sign for Proposal

_____
Signature

3/13/2020
Date
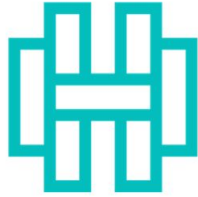
1. Key personnel and their qualifications
    a. **Joe Snipes**
    Joe Snipes is a devoted business owner to ForestScapes and Humbots Data & Analysis. He has a degree in Forestry and Natural Resources from College of the Redwoods. He has work experience on fuels reduction and fire suppression with the National Park Service and the U.S. Forest Service. His experience is in sales/customer relations and in safety training and implementation. He is a licensed FAA 107 certified pilot, and has training or experience in many fields of forestry management.
   b. **Danny Kelley**
    Danny Kelley is a passionate business coach and leader. Owns a public benefit corporation with a specific purpose of using its business to inspire individual, social, and environmental change that improves the human condition. His experience includes a 20-year career in software development using Agile methodologies. Danny holds a BA in Cross-Cultural Studies and an AA in Business. He holds several certifications in business and executive coaching and is affiliated with the International Coaching Federation (ICF).
    c. **James Lamping**
    James is a graduate student at Humboldt State University with a B.S. in Forestry and a minor in geospatial analysis. He is interested in the implementation of remote sensing applications in forestry. This past field season, James worked at Teakettle Experimental Forest, assisting in tree coring, regeneration surveys, canopy photos, stem mapping, and very high-resolution imagery collected using unmanned aerial systems (UAS) platforms.
    d. **Omar Padilla**
    Omar has been working with Humbots since March 2019, shortly after relocating from New York City. Largely self-taught, he is driven by a love of learning and exploring new technologies. Born in Puerto Rico and raised on Manhattan's Upper West Side, Omar began his career at Intellispace, an Internet service provider located near Times Square. From there, he moved to New York-Presbyterian Hospital in Upper Manhattan where he worked as Information Systems Manager. Three years later, he literally crossed the street to work for Columbia University Medical Center as Senior Systems Manager for Columbia Doctors. In his spare time, his constant inquiry and research on the tech front led him to develop an interest in UAV technology.
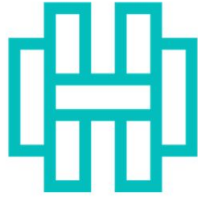
Omar has been working with drones for three years and is an FAA certified remote pilot. He is responsible for the electronic & hardware platform build and support for our new lidar development effort. Omar is currently an IT Security Analyst at County of Humboldt Information Technology.

e. Aaron Zuspan

Aaron Zuspan graduated *magna cum laude* from Humboldt State University with a degree in Forestry Restoration and Geospatial Analysis, and is currently pursuing a master's degree in Geographic Information Systems through the University of Central Arkansas. With a strong background in geospatial science, data analysis, and computer programming, he is passionate about using those skills to help manage and protect natural resources.

f. Jeffrey Laikam, PE

Jeffrey Laikam is a California registered civil engineer with a Bachelor of Science in Environmental Resource Engineering. His experience includes a 20 year career performing topographic surveying, land development, utility design, stormwater modeling, and infrastructure design. He has supported projects ranging from development of improvement plans for public jurisdictions, site restorations ranging from cannabis notice of violations to final site restoration for a decommissioned power plant, large subdivision design including low impact development stormwater design, CEQA initial studies, sewer and water system model and roadway and mass grading design.

g. Cassie Snipes

Cassie is Joe's spouse. She has a degree in Art and has 5+ years of experience in bookkeeping, A/P, and other various clerical work. She serves as HumBots bookkeeper and maintains contact with the it's CPA.
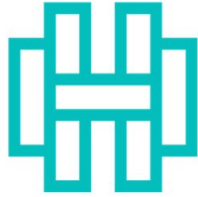
2. Proposed subcontractors
   a. N/A

3. Hourly rates - $80 per hour for all operations involving drone piloting and processing. For a visual observer and bookkeeper the rate is $40 per hour.

4. References

   a. Harold Zald - professor at HSU Forestry and GIS departments - 707.826.5484, hsz16@humboldt.edu

    b. Jim Graham - professor at HSU Environmental Science and GIS departments - 707.826.3823, james.graham@humboldt.edu

    c. Jim Baskin - retired Coastal Commission, owner of Lems Ridge LLC a private forestry business in Del Norte County - 707.601.8392, jim.baskin.54@gmail.com

    d. Mickey Jarvi - professor of Forestry and Geomatics at Michigan Tech - 906.369.4221

    e. Tim Baker - Professor of Forestry at College of the Redwoods - Tim-Baker@redwoods.edu

    f. Greg Foster - Executive Director for Redwood Economic Development Commision - 707.445.9651, gregg@rredc.com

5. lists /hyperlinks to examples of relevant work that support the proposal

    a. James Lamping work (see attachment)

NCRP DEMONSTRATION PROJECT AND PROCESSES CONCEPT PROPOSAL BUDGET AND SCHEDULE

Project Name: UAV - Stucture from Motion - Carbon Inventory (For a 100 acre test project)

Major Tasks	Task Description	NCRP Task Budget	Funding Match *	Total Task Budget	Scaled NCRP Budget **	Start Date	End Date
Project Administration	In cooperation with the County of Humboldt sigr	$0.00	$0.00	$0.00	$0.00		
Project Reporting	Data collection, performance measures, and pro	$0.00	$0.00	$0.00	$0.00		
Cost of goods sold (seperate from labor)	[ADD ROWS AS NEEDED]	$0.00	$0.00	$0.00	$0.00		
Labor		$0.00	$0.00	$0.00	$0.00		
Fixed Expenses		$0.00	$0.00	$0.00	$0.00		
		$0.00	$0.00	$0.00	$0.00		
		$0.00	$0.00	$0.00	$0.00		
		$0.00	$0.00	$0.00	$0.00		
		$0.00	$0.00	$0.00	$0.00		
		$0.00	$0.00	$0.00	$0.00		
		$0.00	$0.00	$0.00	$0.00		
Project Closeout		$0.00	$0.00	$0.00	$0.00		
Total NCRP 2020 Demonstration Project Request		**$0.00**	**$0.00**	**$0.00**	**$20,000.00**		

* List the sources and status of matching funds: [PLEASE LIST]

** Is Requested Budget scalable? If yes, indicate scaled totals; if no leave as $0.

Project scalability information for the reviewers (optional):

UAV - Structure from Motion (Sfm) - Carbon Inventory

Purpose

The purpose of this proposal for grant funding is to obtain monies to assist with inventorying measures to support the California Climate Investment carbon inventory.

1. Project Description

California is known for its diverse forested ecosystems and it is obvious that there needs to be more all around forest management if these ecosystems are going to survive and thrive in the future. Accurate carbon inventory in California can be expensive, time consuming, dangerous and filled with bias. Forest management and conservation requires detailed data, such as tree counts, individual tree heights and canopy cover, when supporting management and policy decision-making. Conventional monitoring, such as measurements done within field plots, have proven to be a robust and highly detailed method for collecting ecological measurements, but they lack spatial coverage and can lead to errors when calculating tree metrics on a stand level. The use of ground based and aerial technologies can increase the accuracy, reduce time, reduce costs and be much less dangerous than traditional methods.

Our company, Humbots Data & Analysis will provide before and after photogrammetry with unmanned aerial vehicles (UAV) on a California Climate Investment (CCI) fuels reduction project to establish a baseline of carbon/fuels load using SfM processing and provide continuous monitoring and inventorying on an annual basis.

We hope to make use of a current CCI project that has an existing LiDAR dataset. SfM works best if there are some gaps in the canopy. This would mean that we prefer canopies that are either naturally low to medium density, or ones that have had some sort of management or recent disturbance.

We plan to fly automated flight paths, in which we can usually fly 10-20 acres per mission but the area we can cover can be scaled up depending on available batteries and lighting conditions. The processing time usually is for every one hour of image collection would need about two working days of processing.

To begin any project we will need a KMZ or KML file to determine our flight plan, ground control points, line of sight restrictions, and take off and landing zones. We then set up a date and time to go fly the site. Once we arrive on site, a team of three will begin setting up ground control points (GCPs). Once all the GCPs have been set up we go over our pre flight checklist. Once everything has been checked off, we can then safely begin the UAV mission. We have one person who is designated "pilot in command" (PIC) and is responsible for giving final authority as to the operation of the UAV. This person will hold a FAA 107 license to legally fly and abide by all FAA rules and regulations. A second person will be designated visual observer, whose main responsibilities are to always have eyes on the drone (FAA law).
The third person will be a secondary visual observer and/or be training for future projects. After the flight is complete, we will then add a multispectral sensor to the drone and do the same flight path but this time

with the objective being species identification. After the flight we will return back to our office and begin processing the data.

    i. High density SfM Point Clouds of all plots
    ii. RGB Orthophoto of all plots
    iii. Ground control using RTK GPS
    iv. Accuracy report associated to all rendered models
    v. Raw imagery collected at the site
    vi. Raw GPS data collected at each site
    vii. multispectral imagery
    viii. CSV with individual tree metrics

The expected benefits from this operation will be:

1. Baseline of current fuel loads/carbon in a given unit.
2. Post thinning treatment flight will provide data on regrowth patterns and annual carbon added.
3. Reduced costs compared to traditional methods.
4. Shorter time span to collect and deliver data.
5. To identify stand dynamics - spacing, canopy density, tree heights and volumes, brush component (post treatment only).

How this process supports and achieves the objectives of the NCRP RFFC objectives

> This project will support the objectives of the NCRP RFFC by providing a dedicated business that has goals of achieving environmental and social justice through data collection and processing. We are passionate about providing data to increase forest resiliency, facilitate greenhouse grass accounting and general natural resource monitoring and data collection. It will help in achieving their objectives by providing high quality, accurate data that will lay the framework for multiple projects.

2. Specific project goals/objectives

1. To establish baseline of fuel/carbon loads
2. To follow up on an annual basis to detect changes in additional carbon, land movement, NDVI indices.
3. Provide quick reactionary assessment to disturbances such as wildfires, landslides, flooding, etc.

3. Describe how the project or process addresses the NCRP Goals and the intent of the NCRP regional forest and fire capacity program block grant

1. Respect local autonomy and local knowledge in Plan and project development and implementation
   a. Humbots is working on forming relationships with the Natural Resource and GIS departments of Humboldt State University. We strive to acknowledge, test and implement
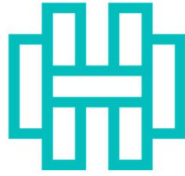
the newest and best practices available. We remain close to staff and students to keep updated on current program needs and future endeavours. We are also part of the airport advisory committees uav ad hoc committee that is committed to expanding and implementing a uav workforce in Humboldt County. We strive to always respect, incorporate and include indegnous/local knowledge of our lands and are always willing to listen to others' input.

2. Ensure that economically disadvantaged communities are supported and that project implementation enhances the economic vitality of disadvantaged communities by improving built and natural infrastructure systems and promoting adequate housing
   a. We are structured as a public benefit LLC which means that we donate a percent of our profit to environmental and social justice. We will create jobs from this work that will provide annual salaries. Creating a more efficient system will increase GDP for public land agencies and non profits while enhancing environmental monitoring.
3. Conserve and improve the economic benefits of North Coast Region working landscapes and natural areas
   a. Our data will lower budgets of data collection while providing land managers with better data to make more informed decisions.
4. Conserve, enhance, and restore watersheds and aquatic ecosystems, including functions, habitats, and elements that support biological diversity. --
   a. We are structured as a public benefit LLC which means that we will donate a percent of our profits to environmental and social causes.
5. Enhance salmonid populations by conserving, enhancing, and restoring required habitats and watershed processes
   a. Our data will allow managers to obtain accurate digital elevation models that will allow managers to implement certain strategies to enhance salmonoid populations. Also allow for a better inventory of riparian vegetation allowing for a better understanding of stream buffers.
6. Address climate change effects, impacts, vulnerabilities, including droughts, fires, floods, and sea level rise. Develop adaptation strategies for local and regional sectors to improve air and water quality and promote public health.
   a. We will be able to provide data that can account for carbon sequestration on an annual basis following a fuels reduction project that can be used by agencies to report based on CCI requirements.
7. Improve flood protection, forest and community resiliency to reduce the public safety impacts associated with floods and wildfires
   a. We can do this by providing services that help monitor stream health and stream buffers.
   b. We could provide erosion control analysis that could lead to less sediment in streams.

4. Describe how this project is scalable, replicable, measurable, innovative and results in outcomes that will increase the scope and scale of multibenefit forest management in the North Coast.
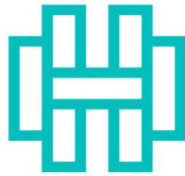
a. Scalability - With over 30 million acres of forest land in California, the amount of proposed fuels reduction projects and California's carbon accounting requirements, this process can be scalable as long as people continue to manage their forests. We are located near Humboldt State University that has a top notch Forestry and geospatial program that can aid our growing workforce when we are ready to scale up. We have financial ties through family and friends as well as the local lending agency, Redwood Region Economic Development Commission that can help with loans and our cash flow needs.

b. Replicable - Sites can be flown with the same mission many times over. This means that we can assess a site at many different temporal resolutions. The one major thing holding us back would be canopy density. If the canopy is too dense we will not be able to interpolate a solid DSM and therefore will not be able to determine tree heights or any other interesting thing happening beneath the canopy

c. Measurable - the software and hardware that we use comes with many ways to measure the accuracy of a given project by giving statistical reports and other data that will help define baseline and recurring flights.

d. Innovative - UAV drone technology is projected to keep increasing in the future. The need for cheaper, faster and better data is in high demand and will likely replace old methods of forest measurements.

5. Describe the need for the project and how the project addresses forest health and climate change/extreme event resiliency.

a. The need for fast, accurate and recurring data collection is one of the main foundations to any project.

6. Describe the location and size of the project and the communities served by this project.

a. To be determined. We have emails into the North Coast Regional Land Trust and Cal Fire.

7. List and describe the partnerships involved in the project and local and/or political support.

a. College of the Redwoods - Professor Tim Baker, HSU, RREDC, SBDC (Small Business Development Center), Edge Caliber - *See Statement of Qualifications for contact information.*

8. List the estimated quantifiable, measurable, benefits expected to result from the proposed project

a. Annual net greenhouse gas sequestration

    b.   Forest metrics such as land movement, NDVI indices, spacing, canopy density, tree heights and volumes, brush component (post treatment only).

9. List and scientific studies, plans, designs or reports completed for the project of process.

    a.   Attached to this proposal is a current thesis that one of our team members is working on for Humboldt States Forestry and GIS graduate program.

10. Describe the approach to data collection, performance measures, and project reporting of outcomes/lessons learned.

    a.   Data will be collected by a UAV that will fly in automated flight paths around the proposed unit(s). We typically fly it in a gridded pattern to allow for a controllable amount of overlap for each image. We will use Agisoft software and will have the following outputs:
         i.   High density SfM Point Clouds of all plots
        ii.   RGB Orthophoto of all plots
      iii.   Ground control using RTK GPS
      iv.   Accuracy report associated to all rendered models
        v.   Raw imagery collected at the site
      vi.   Raw GPS data collected at each site
     vii.   multispectral imagery
    viii.   CSV with individual tree metrics

    b.   Performance measures - We always track each of the following performance measures
         i.   Prepare flight plan
        ii.   Prepare equipment
      iii.   Schedule inspection
      iv.   Conduct inspection had to fly it twice as the first time it did not do the correct flight path.
        v.   Conduct post inspection
      vi.   Data processing & delivery of service

    c. Project reporting of outcomes/lessons learned -
        i. We can cater to the needs of the NCRP. We can either meet in person, do a virtual meeting or have a standard report of our outcomes/lessons learned. We can be flexible in this aspect.

The NCRP budget template is left mostly blank as we have had trouble contacting an agency that would allow us to demo this service. If we were to get assistance from NCRP to put us in touch for a demo, we could quickly fill out the NCRP budget.