



NORTH COAST RESOURCE PARTNERSHIP

Strategic Biomass Utilization at Multiple Scales: A Comprehensive Planning and Piloting Initiative to Sustain North Coast Forests, Communities, and Economies

Developed by the
North Coast Resource Partnership and the
Watershed Research and Training Center

In partnership with the



With funding from the





INTRODUCTION

California’s Wildfire and Forest Resilience Action Plan, a Comprehensive Strategy of the Governor’s Forest Management Task Force, was released in January 2021. The strategy included several actions for the Governor’s Office of Planning and Research (OPR) (renamed the Governor’s Office of Land Use and Climate Innovation (LCI) effective July 1, 2024) to implement, including:

“Key Action 3.10: Address Feedstock Barriers through Pilot Projects: Office of Planning and Research will develop five pilot projects to test new mechanisms for developing long-term feedstock contracts. Information and templates from the pilot projects will be shared broadly to provide a menu of options for broader adoption.”

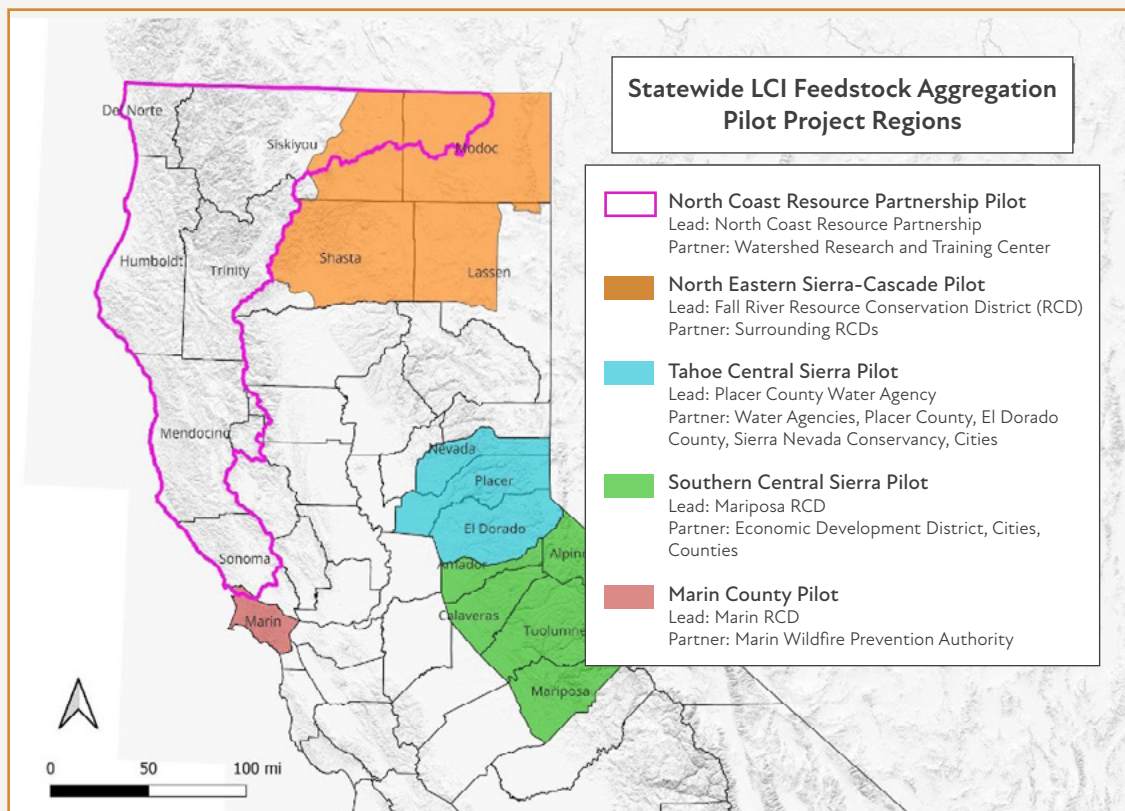
Senate Bill 85 made appropriations for the support of the state government for the 2020–21 fiscal year. Section 2 of SB 85 includes funding for the Pilot Projects in the Wildfire and Forest Resilience Action Plan:

“The funds appropriated in this item are available for support or local assistance and shall be used to (a) develop a framework for the state’s wood utilization policies and priorities, (b) support new long-term wood feedstock pilot projects, (c) spur innovation in the wood sector, (d) partner with the IBank to develop a focused market strategy, and (e) complete a statewide wood products workforce assessment. These funds are available for expenditure or encumbrance until June 30, 2022, and for liquidation until June 30, 2025.”

The Joint Institute for Wood Products Innovation at the Board of Forestry and Fire Protection, in collaboration with the LCI, developed draft criteria for the Pilot Projects and provided areas/regions of the state and entities within the regions to manage and implement the Pilot Projects. Those regions and pilot entities include the North Coast Resource Partnership Pilot, led by the North Coast Resource Partnership (NCRP) and the Watershed Research and Training Center (WRTC); the North Eastern Sierra-Cascade Pilot, led by the Fall River Resource Conservation District (RCD), the Tahoe Central Sierra Pilot, led by the Placer County Water Agency, the Southern Central Sierra Pilot, led by the Mariposa RCD, and the Marin County Pilot, led by Marin RCD. The areas and entities represent a broad area of forested lands and communities with a diverse group of entities managing the grants that will provide the state with information on how different organizations can work together across counties to support innovative solutions to long-term wood feedstock aggregation, contracting, and economic development activities.

Based on the action item identified by the Governor’s Forest Management Task Force, the urgency measures of Senate Bill 85, and the direction from the Joint Institute, LCI provided contracts to the identified regions and entities for the required Pilot Projects. In support of forest restoration, community vegetation management, fire resilience and rural economic development, pilot projects developed regional strategies, economic plans, and governance structures to establish reliable access to woody feedstock through a variety of feedstock aggregation mechanisms and organizational innovations.

Figure 1 – Statewide LCI Feedstock Aggregation Pilot Project Regions Map





BACKGROUND: NCRP, WRTC, AND THE NORTH COAST REGION

Established in 2004, NCRP is a successful long-term collaboration among Northern California Tribes, counties, and diverse regional partners. NCRP integrates the priorities of Tribal, federal, state and local partners into its planning and implementation framework. The NCRP Leadership Council is comprised of appointed representatives from North Coast Counties and Tribes, and makes decisions regarding NCRP policies, plans and funding awards. NCRP has a long history of active collaboration with Tribal, local, state and federal governments, integrating the shared priorities of all partners into a shared vision for the North Coast region. For more information about NCRP, please see the [North Coast Resource Partnership story map](#).

NCRP has a long history of focusing on a set of integrated, multi-benefit outcomes for the region's watersheds and communities – ranging from the protection and enhancement of biological diversity, local economic development, enhancement of built infrastructure, water quality and supply, human community health and safety, and climate action – including sequestration, emissions reduction and climate adaptation. For more information on the region, please see the [North Coast Region story map](#).

The North Coast region covers over 12% of the California landscape – including Tribal lands and the counties of Del Norte, Humboldt, Trinity, Siskiyou, Modoc, Mendocino and Sonoma. It is a source region for clean water, carbon sequestration, and biological diversity, and these benefits flow beyond the region to other parts of the state. Nearly 70% of the region consists of forests. Of the 12.5 million acres burned in California over the past 10 years (2014–2023), 3.4 million were in the North Coast region. This represents 27% of the burned area in California.



In addition to LCI, NCRP is actively collaborating with the Governor’s Wildfire and Forest Resilience Task Force, California Resources Agency, California Department of Conservation, CAL FIRE, California State Coastal Conservancy, United States Geologic Survey, NASA, and an array of Tribal, state, federal, and local agencies and entities to achieve California’s ambitious objectives for fuel load reduction, healthy forests, climate action, vibrant communities, functional ecosystems, and vital economies. With Department of Conservation/Resource Agency Regional Forest and Fire Capacity Program (RFFC) funding, the NCRP has developed a data-driven Regional Priority Plan, the [Vision for North Coast Resilience](#). One of the key strategies identified in the Vision Plan, [Forest Biomass Residuals](#), directs NCRP to “Develop and implement a regional plan for forest biomass residuals from hazardous fuel reduction that supports ecological and economic resilience through community-scale and community-support actions.” This North Coast Forest Biomass Strategy addresses that Vision Plan strategy, as well as the goal in the Governor’s [Wildfire and Forest Resilience Action Plan](#) to “Create a Sustainable Wood Products Market in California” which can in turn help catalyze fuel reduction and the goal of “Strengthening the Protection of Communities.” Through this pilot, NCRP and WRTC are actively engaged in expanding capacity for feedstock aggregation and processing, which are crucial factors in developing a thriving wood utilization sector. The region is severely economically challenged, and the impacts from fires and extreme events have disproportionately affected the region’s economically disadvantaged and underrepresented communities. The North Coast has also received significantly less investment from the state of California in forest health and resilience compared to other forested regions, such as the Sierra.

NCRP regularly collaborates with an array of partners to enhance the communities and watersheds of the North Coast region. NCRP uses the best available science, data, and local expertise and information to guide development of plans as well as the prioritization of projects, activities, and investments in the region. NCRP has developed a rigorous and adaptive process that ensures fairness, equity, inclusion, and transparency in all activities, from planning through project implementation. This process helps to ensure that the highest priority projects and activities are implemented, and that all partners – including historically underserved and economically disadvantaged communities – can access the tools, funding, and support needed to build and maintain capacity to achieve regional goals for healthy landscapes and communities. The process is described in the [NCRP Adaptive Planning and Prioritization Framework Story Map](#).

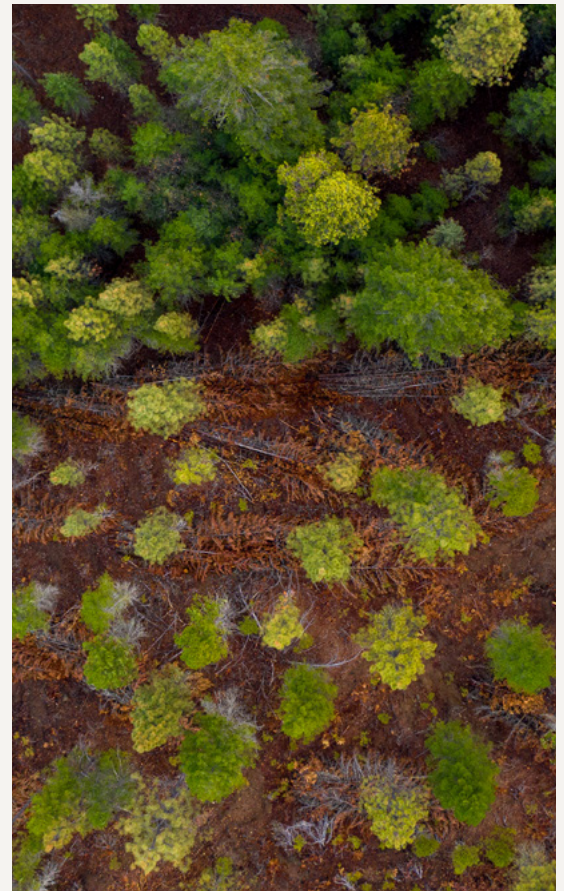
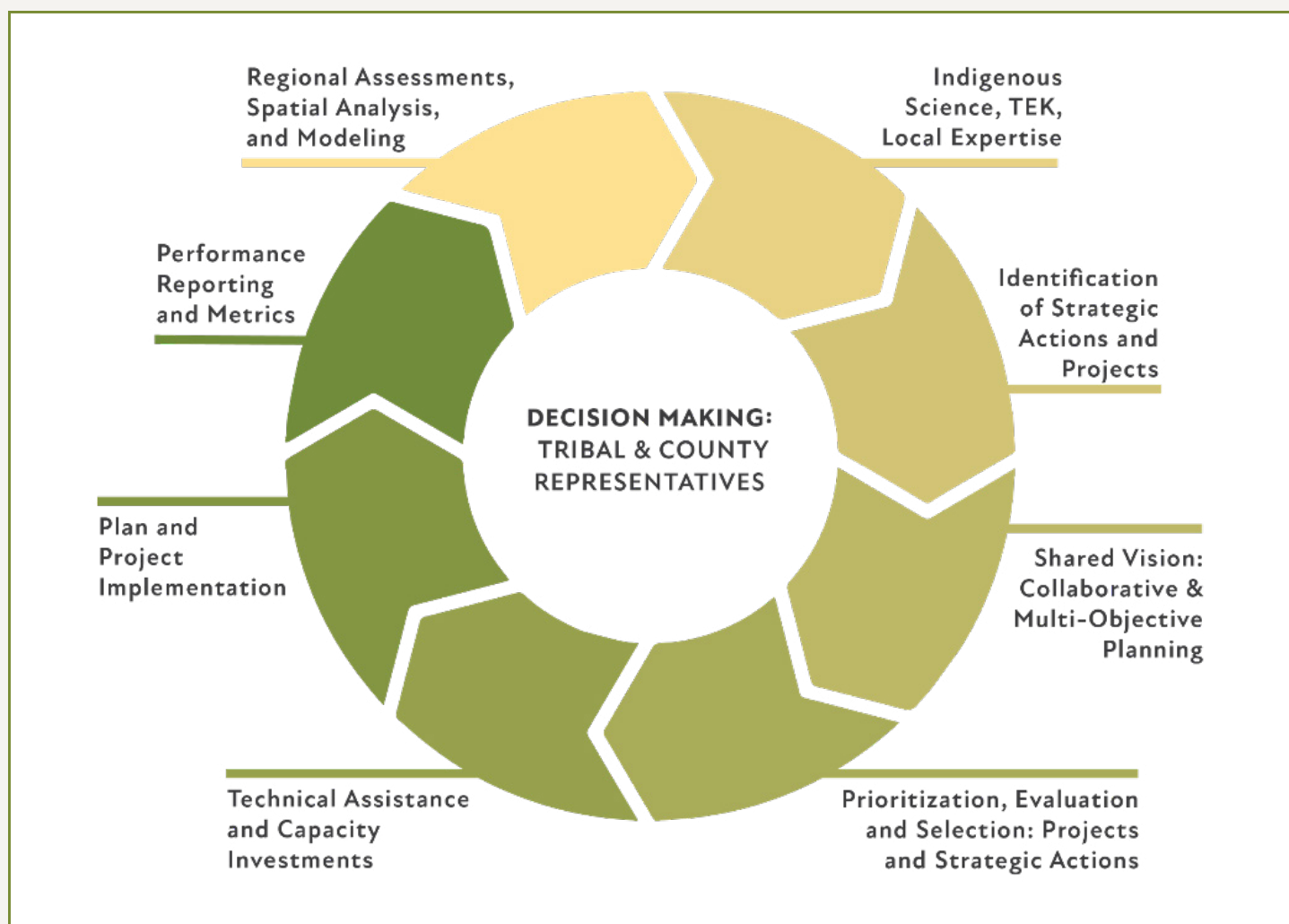


Figure 2. The NCRP Adaptive Planning and Prioritization Framework (APPF)

The collaboration between NCRP and WRTC, and the process by which the North Coast Forest Biomass Strategy was designed and conducted, demonstrates the application of the APPF to partnerships in the region. NCRP and WRTC have collaborated for many years, and WRTC's statewide and regional expertise in wood products utilization complements the skills and expertise of the NCRP team. The two organizations partnered to develop the Strategy and to select and manage the subregional pilot projects. In future phases, WRTC will take the lead in continuing to develop and implement the Strategy, with NCRP as a supportive partner.

WRTC was formed in the early 1990s as a local project to re-train displaced loggers and millworkers. Today, WRTC is a vibrant nonprofit organization that serves the local communities in Trinity County and leads statewide and national initiatives on all aspects of community-based land stewardship. WRTC has been involved in wood product commercial operations, market analyses, technical assistance, policy development, and research, development, and demonstration of wood utilization since its formation.

WRTC's work focused on forest biomass utilization includes:

COMMERCIAL WOOD PRODUCT BUSINESSES

- Small diameter processing integrated wood product campus in Hayfork in the 1990s. Work included small diameter research with the USFS Forest Products Laboratory. Owned and operated an Economizer—a small diameter sawmill mill—to process material at landings. Owned and operated a post and pole peeler. Focused on no-value / low-value material production and commercialized green finger joining of ponderosa pine. Because of this research, Sierra Pacific Industries (SPI) has adopted this product line and now produces this product on a commercial scale.
- Investigated re-firing a bioenergy facility in Hayfork.
- Through 2017, WRTC owned and operated a commercial bundled firewood production line.

POLICY WORK

- Key participant in the Federal Energy Policy Act of 2005 which created the USDA Forest Service Wood Innovations Grant program.
- Key advocate for wood heating subsidies over the years with the focus on improving efficiencies in existing systems and expanding access to combined heat and power.
- Founding member of the Ad hoc Forest Biomass Working Group in 2011. The focus of its State Wood Energy Team concluded with development of the BioMAT and EPIC programs, two programs which deliver guaranteed revenue for new, small-scale forest bioenergy facilities, and developing a research, development, and demonstration fund for next generation conversion systems for forest biomass.

TECHNICAL ASSISTANCE AND THE DEVELOPMENT OF COMMUNITY-SCALE WOOD PRODUCT MARKETS

- Administration and facilitation of the Ad hoc Forest Biomass Working Group.
- USFS advising on wood products market coordination.
- Advising role to UC ANR Cooperative Extension for the Forest Stewardship Education Initiative.
- Developed and led the Statewide Wood Energy Team for 3 years (2016-2019) which included Technical Assistance and small grants to several wood product campuses.
- Co-chaired the Rural Economic Development Steering Committee/Wood Utilization Working Group and Forest Landowner Outreach and Education Working Group of the Governor's Forest Management Task Force.
- Advisor on TACs for UC Davis's Forest Resource and Renewable Energy Decision Support System (FRREDSS) and PG&E's Wood Management Innovations.
- Founding partner in the Healthy Forests, Healthy Communities Partnership, a technical assistance cooperative for wood market producers in northern California and the Pacific Northwest.

FISCAL AGENT / TECHNICAL PARTNER PROJECTS

- System Impact Study for up to 5 BioMAT power plants (USFS R5).
- North Fork Community Power Forest Bioenergy Facility Demonstration (CEC).
- California Fire Impacts Study, 2018-2021 (USFS R5 and CAL FIRE).

RESEARCH AND DEVELOPMENT

- Steep Terrain Hazardous Fuels Treatment Demonstration in Northern California (USFS R5).
- Expanding the custom grade blue stain wood market in California (USFS R5).
- Project management and analysis on inflation-based feedstock price formula operating under long-term feedstock contracts on behalf of the OPR's Feedstock Aggregation Pilot program.
- Biomass transportation study (USFS R5).
- Use of biochar for mine tailings reclamation (USFS R5).
- Advanced wood building materials and technologies.





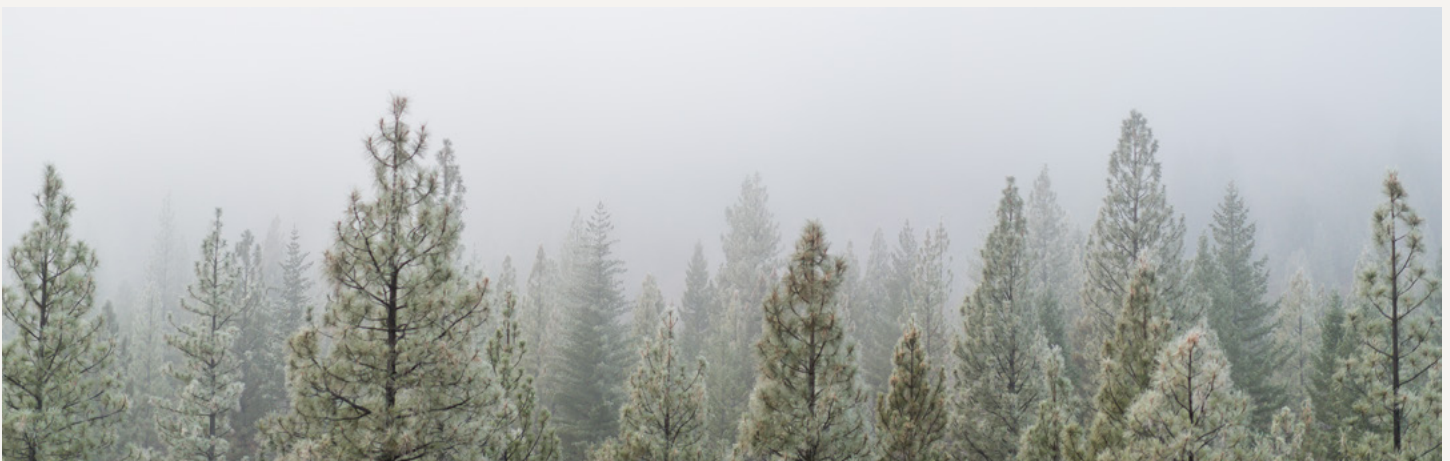
NORTH COAST FOREST BIOMASS STRATEGY

Ecologically sensitive and ecologically viable woody biomass utilization (including feedstock aggregation and wood product manufacturing) is a critical part of the solution set for reducing hazardous fuel loads and fire risk, as well as a key factor in achieving long term forest health and resilience, avoiding carbon emissions, and ensuring viable local economic and workforce development. A successful forest biomass utilization strategy requires a sustained, reliable, affordable biomass supply for businesses, mechanisms to support community vegetation management, and a stable market at prices that make removal and transport a viable option. However, a successful plan does not guarantee implementation. To be actionable, plans require diverse networks of people from within and outside the region willing to act together to ensure plan implementation.

With funding from the CNRA/DOC RFFC program, NCRP has developed and refined regional maps, analyses, and models of fuel loading, vulnerable communities and assets, source areas for biomass, and the location and capacity of existing or shuttered wood processing facilities (relying on partners such as UC ANR to provide foundational data and to refine this information). The current initiative targets feedstock aggregation and biomass utilization at the community scale, particularly as a tool to drive forest and community fire resilience, and rural economic opportunity. The pilot project is part of NCRP's overall goal to balance and optimize the health and resilience of human and natural communities, including community safety, economic development, watershed and ecosystem health, and climate action. This planning and pilot project is designed to explore the potential to integrate feedstock from a diversity of sources - including private, non-commercial parcels, as well as supply from commercial and public lands. While the intention is to look at the whole system of low value feedstock flows, there is an emphasis on exploring a significant gap - how to catalyze community fire resilience by using feedstocks derived from hazardous fuel management activities on private non-commercial lands.

The current LCI Pilot grant was used to fund network development, a baseline feedstock assessment, analysis of built infrastructure and social infrastructure, and site-specific strategy development for three sub-regional pilots, with guidance from an array of technical experts in partner agencies, Tribes, academia, NGOs, and private companies and consultants. NCRP and its partner Tukman Geospatial have developed an updated analysis and modeling of feedstock supply and wood processing facilities. NCRP and WRTC are continuing to develop a shared vision for woody biomass utilization in the North Coast region and, as part of the subregional pilot project, selected three sub-regions within the North Coast region to develop detailed, location-specific plans that reflect the diversity of North Coast landscapes, built and natural infrastructure, and economic development needs. The regional assessment and sub-regional pilots evaluated and recommended specific feedstock aggregation, processing and product opportunities, functional legal and governance structures, and financing mechanisms that can be scaled up to other parts of the North Coast region and other similar areas in California.

The inadequate number and location of wood processing facilities in the North Coast region is a significantly limiting factor in woody biomass utilization. While the area has a robust private commercial wood product industry, there is not currently a strong connection between industrial needs and capacity and the available low-value woody biomass. Increasing the broader capacity for wood product processing is essential, with particular attention to utilizing residual woody biomass. Without a functional commercial infrastructure, using low-value biomass for various purposes becomes unlikely. A critical question is how to leverage and optimize the existing commercial activity to achieve the desired public benefits. These benefits—such as community safety, forest and watershed resilience, and carbon sequestration—extend beyond what current economic markets are willing to pay for, creating an opportunity to explore how a coordinated approach might help close this gap. The analysis also considered the need for public investment or subsidies to integrate community and watershed resilience goals with the objective of improving feedstock aggregation and biomass utilization of low-value woody residues. It was anticipated that the ideal solution for the North Coast likely involves a variety of aggregation strategies and processing facilities, scaled to local resources, and offering a broad range of uses and markets—from small-scale wood heat-to-energy projects to mass timber, wood chips, firewood, post and poles, advanced bioenergy, wood pellets, wood shavings, and biochar.



The network development, baseline analysis, and site-specific strategy development described in this report were performed in a phased manner, following steps described in the Adaptive Planning & Prioritization Framework, and resulted in three strategies, summarized here and described in detail in the next section.

- **Creation of a cross-sector, diverse steering committee** to guide this plan and pilot project and to continue to guide implementation post-project. Members of the steering committee included the diversity of actors necessary to implement site-specific strategies and inform a regional vision and strategy. This includes the business and economic development entities interested in developing feedstock related projects in the region, sustainable forest managers, community fire resilience practitioners, Tribal, local, state and federal governments, landowners at different scales, financing entities, philanthropic organizations, NGOs, RCDs and other relevant entities.
- **Conduct a baseline analysis at the regional scale** to support an integrated, multi-benefit North Coast plan for biomass utilization and sustainable feedstock supply, including an analysis of the types and amount of vegetation that could be mobilized according to community scale vegetation management scenarios. Certain elements, such as fuel loads, GHG analysis, transport, and facilities, were evaluated and documented consistently at the regional scale. This initial phase informed the selection of sub-regional pilots.
- **Development of sub-regional community-specific pilot strategies** that downscaled and refined the regional assessments, considering the unique biophysical and socio-economic features of the selected sub-regions. In addition, economic, legal, and financial analyses support the development of tools and legal structures that support the unique biophysical and socioeconomic conditions of the subregions.

Table 1 – Guide to Contract Deliverables

Deliverable	Description	Plan/Appendix Section
Task 1: Build a durable, diverse network of experts, advisors, and stakeholders to develop shared vision for the Region	Create a cross-sector, diverse steering committee to guide the feedstock project and envisioned to guide implementation post feedstock project.	Strategy 1; Appendix 1
	Development of a regional values framework and principles to guide holistic, integrated approaches that communities will support.	Appendix 1: NCRP Vision Plan; NCRP Adaptive Planning & Prioritization Framework
Task 2: Conduct Regionwide Baseline Assessment – Biophysical & Socioeconomic Landscape	Regional Baseline Assessment	Strategy 2; Appendix 2

Deliverable	Description	Plan/Appendix Section
Task 3: Model Potential Scenarios for Facility Placement/ Enhancement, Aggregation and Business Development to Achieve Multiple Integrated Benefits	Several modeled scenarios (Range from Blue Sky to Business as Usual) for a landscape array of feedstock removal areas and feedstock processing sites.	Strategy 2; Appendix 2
Task 4: Develop Implementation & Policy Strategies at Various Scales	1-3 Community Level Conceptual Strategies & Aggregation Entity Business Models, that integrate the following: • Community scale vegetation management • Sustainable forest management • Economic Development	Strategy 3; Appendix 3 (Subregional Pilot Business Plan Final Reports)
	Legal analysis: How new or existing entities could be organized to do community scale vegetation management, exercise good neighbor authority in coordination with community scale vegetation management and assure that the material is coordinated with the larger stream of feedstock being put to uses that support sustainable forest management, community fire resilience, and local and regional economic opportunity along with any other values identified by the steering committee	Strategy 3; Appendix 3 – North Coast Summary of New Entity Formation for Woody Biomass Management
	Financial analysis: Integrated financing strategy that mobilizes and coordinates existing spending, including private property owner, commercial operation, local government, state government, and federal government.	Strategy 3; Appendix 3 - North Coast Wood Product Development and Economic History Snapshot
	Presentation of findings to key actors in 1-3 Intensive Study Areas and decision makers regionwide <ul style="list-style-type: none"> Baseline, legal, and financial analyses developed in concert with local actors and decision- makers inform next steps and are presented to the key actors with pathways and encouragement to take action. 	Appendix 4

Deliverable	Description	Plan/Appendix Section
Task 5: Share learning within the region and statewide	Summary of steering committee and stakeholder outreach	Appendix 4
	Regional baseline analysis and summary of regional expert recommendations to the steering committee	Appendix 4; Summary of Region-Wide Interviews
	Site-specific conceptual strategies that will include downscaled baseline information, legal, and financial analysis, and a summary of the expert advice offered to the site-specific teams.	Appendix 4 – all reports
	Next steps each site-specific team is contemplating and/or is committed to take.	Strategy 3 – Subregional Pilot summaries; Appendix 3 – Subregional Pilot Final Reports
	Lessons learned from the process	Discussion
	Develop a “menu” of financing, technology, potential products, and organizational structures	Appendix 4 - North Coast Summary of New Entity Formation for Woody Biomass Management



STRATEGIES

Strategy 1 | Build a durable, diverse network of experts, advisors, and stakeholders to develop shared vision for the region

NCRP has a long history of robust stakeholder outreach, inclusion and engagement, including at NCRP quarterly meetings, workshops, small group meetings, conferences, and via polls, surveys and information sharing via the [NCRP website](#). For the purposes of this plan and pilot projects, NCRP used a variety of stakeholder engagement and education tools, including those listed above. NCRP Quarterly meetings included stakeholder panels and presentations on community scale vegetation management and biomass aggregation and utilization to identify opportunities, concerns, incentives and solutions. Field-based stakeholder meetings were held in several communities to discuss community fire resilience and the potential to achieve this goal via biomass utilization to produce environmental, GHG, and other community benefits. Part of the stakeholder outreach process was intended to build understanding of broader community values, how fire resilience and feedstock aggregation align with those values and where there may be tensions. The goal has been to build community confidence and trust that community, regional, and state values, including sustainability, equity, environmental health, and community resilience will be balanced in planning and implementation of woody feedstock plans and projects, and that the community will be engaged during the entire process.



In developing the **Vision for North Coast Resilience**, NCRP solicited input from subject-area experts on woody feedstock and biomass utilization in order to create a draft of what became the **Forest Biomass Residuals Solution**. Several consultants contributed technical papers detailing the issues and opportunities in this sector. Input from consultants was integrated into a draft Solution that was sent to a wide list of experts for review and comment. After multiple rounds of review and revision, the Vision Plan (including this Solution) was shared with over 2000 partners via the NCRP website, and input from partners integrated. The current Solution was approved and adopted by the NCRP Leadership Council as part of the Vision Plan in late 2022. The NCRP Leadership Council directed staff to begin implementing the Vision plan, and the current project was the first step in implementing the Forest Biomass Residuals Solution.

Building on the network of experts who reviewed and commented on the draft Solution, NCRP developed a list of partners from multiple sectors who would be asked to guide and review the development and implementation of this project. The sectors represented include business and economic development, the project development community interested in developing feedstock related projects in the region, sustainable forest managers, agricultural feedstock producers, urban feedstock managers, entities engaged in vegetation management for road/utility clearance, community fire resilience practitioners, representatives from Tribal, federal, state, and local government agencies, landowners at different scales, financiers and the philanthropic community, and NGOs operating in the region with environmental, community health and safety, and economic development interests.

From the initial list of 386 contacts, 50 individuals were interviewed either individually or in small groups. Interview responses helped direct the next stages of outreach and initiative development, which included the formation of a cross-sector, diverse steering committee of 15 members to provide on-going guidance and ground-truthing for the project through meetings, discussions, and document review. Tasks of the Steering Committee included creating a regional values framework and principles to align the Steering Committee and larger stakeholder community that could be used to manage potential conflict or divergent perspectives, reviewing the Regional Baseline Assessment, and advising on the selection of the pilot projects. The Steering Committee also worked with the NCRP Leadership Council to determine project interests and generate resources to support pursuing the next phase of this project, to be led by the WRTC.

A summary of the interviews is included in Appendix 4. It includes insights from over 30 partner organizations across the region. The summarized perspectives reinforce the team's understanding of the recurring challenges and introduce additional historical context regarding biomass utilization in Northern California. The major themes shaping the region's biomass landscape include infrastructure decline, market instability, policy and regulatory challenges, Tribal perspectives, transportation barriers, and workforce constraints. Through these conversations, an emphasis on sourcing material from non-industrial management was identified.

NCRP worked with WRTC to release a request for proposals (RFP) within the region to further a place-based solution set to inform recommendations in 2023. The RFP was derived from key takeaways identified through the interview process. Where appropriate, consultants were brought in for in-depth analysis. WRTC hired the Beck Group to complete a financial analysis of wood product technologies. Additional technical assistance needs were identified by each subregional pilot that were specific to their own place-based solution sets. They each hired their own team of subcontractors to support business, legal, and financial viability of concepts.

Through 2023 and 2024, WRTC reviewed the interview notes and re-engaged select individuals through an unstructured conversation to understand history and context. WRTC maintained contact with the steering committee and developed a newsletter within the first half of the project period to support research efforts and communication. The newsletter was developed specifically for the subregions; however, it was also distributed upon request to interested partners outside of the region as well. WRTC also wrote an article to the Forestland Stewards Newsletter reviewing the nature of biomass markets in California, which can be found in Appendix 4.

One notable connection was the engagement of the California Center for Cooperative Development (CCCD) to support the regions with entity exploration and viability. While not directly hired under this grant, they worked with each region in the submission of a USDA cooperative grant so that CCCD could provide free technical assistance on cooperative development. CCCD produced a slide deck that summarized similar cooperatives throughout the US and advised on key recommendations for the subregions to leverage in their own business strategy. A list of their resources is included in Appendix 4.

WRTC's involvement with the other statewide pilot projects allowed them the opportunity to share research findings as well as embark on new research topics. WRTC used the results of this engagement to provide technical assistance on viable products, technologies, and lessons learned from other projects. WRTC was in constant contact with the subregions as they built out their own communication and marketing strategy for their regions. All subregions directly engaged their communities through community meetings, direct outreach to targeted demographics including Tribes, radio broadcasts, and newspapers. Where appropriate, WRTC participated in supporting the subregions with their outreach through strategy and framing or attending their meetings to speak on behalf of the regional vision. Each subregion developed its own list of marketing material for local public outreach.

Strategy 2 | Conduct a regionwide baseline assessment and evaluate the biophysical and socioeconomic landscape

Regional information is key for context and for understanding big picture flows, processes, and opportunities for integrating a diverse set of goals and objectives into a set of multi-benefit solutions. To develop both “blue sky” and more practical phased solutions for sustainable biomass utilization, there is a need to document baseline conditions that include an array of integrated factors – ranging from community health and safety, ecosystem function, emissions reduction or avoidance, climate and extreme event adaptation, and local economic vitality.



The North Coast region is over 19,000 square miles and is characterized by significant biophysical, socio-political and economic diversity. NCRP has an established approach to evaluating strategies and projects that integrates planning, assessment, and prioritization at both the regional and local scales. This multi-scale approach to evaluation, planning, and prioritization results in the ability to see the big picture and explore solutions from multiple perspectives yet still create actionable strategies and projects at the local level – where most implementation happens. In this way, scenarios can be developed that address unique local needs and circumstances and at the same time support regional and state objectives to achieve large-scale impact. This regional assessment and evaluation informed the selection of the pilot projects described in Strategy 3.

NCRP begins all strategic efforts by performing regional and local spatial analyses to support evaluation and prioritization of strategic initiatives, projects and actions. Work under this grant is built on data and analyses developed for the Vision Plan, which includes refined regional datasets that evaluate fuel loads, vulnerable communities, carbon stocks, highly valued assets (built and natural capital), and mechanical treatment feasibility - see the **North Coast Regional Assessment Story Maps**. Additionally, this pilot project expands on previous work that addresses wood utilization feasibility, including the following:

- Woody feedstock and processing capacity, including UC ANR documentation of past and current processing facilities (https://ucanr.edu/sites/WoodyBiomass/California_Biomass_Power_Plants/)
- **Biomass Working Group** led by Martin Twer of WRTC.
- The bibliography of wood-related studies conducted by various consultants and compiled by the WRTC.
- Establishing Urban Wood Program, by the Urban Wood Network
- California Wood Biomass Improvement Opportunities (CAWBIO) Phase 1 and Phase 2, by the Beck Group
- Mattole Diversified Forest Project, by the Mattole Restoration Council
- Log sort yard planning and feasibility research, by the US Forest Service
- UC Davis Forest Resource and Renewable Energy Decision Support System.
- Schatz Energy Research Center's C-BREC work on quantifying lifecycle assessment on wood utilization systems.
- The Sanchez Group at UC Berkeley and their work on engineered biomass & bioenergy systems that remove CO₂ from the atmosphere.
- The statewide work of OPR and GoBiz, recommendations from the Joint Institute for Wood Products Innovation, local economic development plans, local community wildfire protection plans, as well as other innovative efforts such as the recent Sonoma County biomass competition.
- CalForest WRX, led by Christy Prescott of USFS, used an Innovative Finance for National Forests (IFNF) grant to explore on the North Coast the development and implementation of innovative finance models that can stimulate building materials markets and industries utilizing biomass.
- The Sierra Institute and their work on improving the economics of forest restoration and biomass power in California and rural community economic development.

Summary of Regional Baseline Assessment Findings

(for full report, please see Appendix 2)

Tukman Geospatial conducted a set of regional assessments focused on identifying opportunities for new woody biomass utilization in the region. They used an initial candidate site selection process to locate potentially suitable sites for wood processing and/or biomass energy generation. Once candidate sites for further investigation were located, an additional viability check was performed on each site by using Google Street View and aerial imagery to rule out sites with obvious disqualifying factors. Following this initial selection process, a network analysis was used to examine recoverable woody residues within an economically feasible travel time to each selected candidate site, based on estimates of residues generated from a hypothetical 40% thin from below silvicultural treatment. For this analysis, outputs from the Schatz Energy Research Center's C-BREC model were used as the data source for biomass residues. This feedstock analysis was conducted for four scenarios, each representing a unique combination of the proposed use for the site (i.e., sawmill versus biomass power plant) and the presence or absence of an additional screen to limit recoverable residues to areas deemed feasible for mechanical treatment. These analyses resulted in a suite of deliverables, including features classes containing the candidate site locations as points and polygons, as well as feature classes and summary tables displaying the results of the feedstock analysis for each scenario. The candidate site selection and feedstock analyses are intended as a screening level evaluation - part of a larger, ongoing effort to locate opportunities for biomass utilization in the region. They are not meant to be comprehensive, but rather to serve as the first steps in a process involving subsequent regionwide assessments that incorporate other critical considerations such as impacts on equity and forest health.



In total, the candidate site selection process selected 74 candidate sites (35 closed sites and 39 new sites) for further consideration. Of the closed sites, only two were formerly biomass power plants, with the remainder being sawmills. Closed sites were arrayed throughout the North Coast Region but were especially prevalent in Del Norte, Humboldt, Mendocino, and Sonoma Counties. New sites were largely clustered in and around major cities including Eureka, Arcata, Crescent City, Ukiah, Cloverdale, and Santa Rosa, as well as in a few other areas across Sonoma County. Several closed and new candidate sites were also identified in the northeastern portion of the North Coast Region within Siskiyou County. It is important to note that these sites have not been officially selected for the pursuit of biomass utilization operations. Rather, the distinction of “selected” in this context means that they have been selected by the preliminary, regionwide screening process for further investigation that will require the acquisition of more detailed information at the local scale. Due to the inherent limitations of this regionwide screening approach, it is likely that many of these candidate sites will end up being unsuitable for biomass utilization based on factors beyond the scope of this analysis. However, this approach offers a starting point to help narrow down the range of possibilities for subsequent investigation. For the selected candidate sites, a feature class and Excel summary table was produced, displaying the results of each of the four scenarios (biomass power plant without mechanical treatment feasibility screen, biomass power plant with mechanical treatment feasibility screen, sawmill without mechanical treatment feasibility screen, and sawmill with mechanical treatment feasibility screen). The Excel summary tables show the results in two configurations: unsorted and sorted by greatest residue totals within each site type and subregion.

Figure 3 shows the relation between candidate sites and economically disadvantaged communities. Figure 4 shows the relation between candidate sites and carbon stocks. Figure 5 shows the relation between burn probability and the candidate sites. Additional maps are included in the full report in Appendix 2.

Figure 3 – Candidate Sites in Economically Disadvantaged Communities

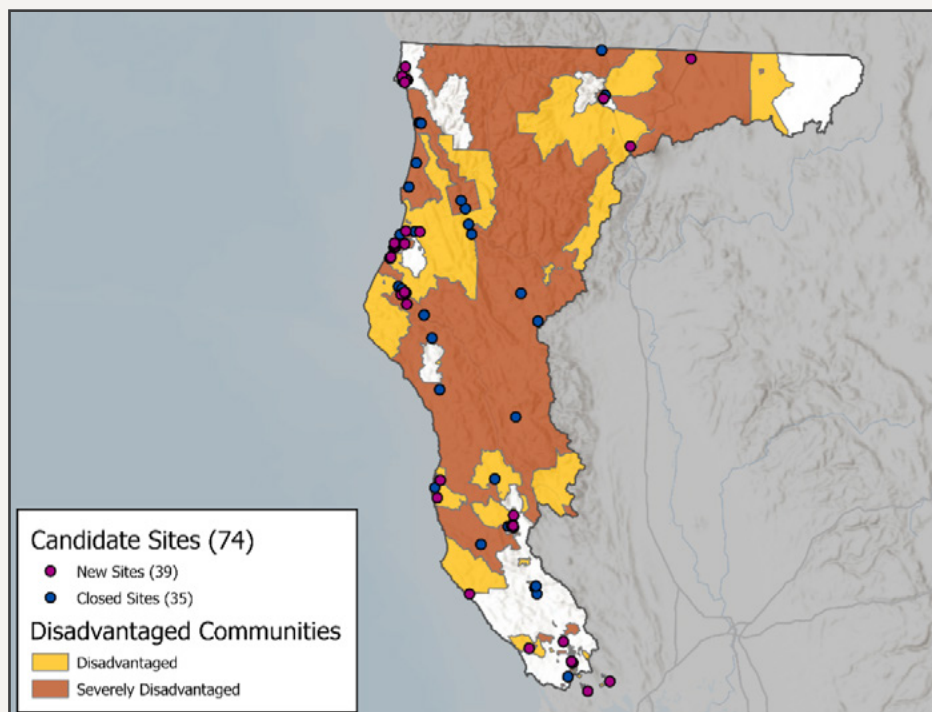


Figure 4 – Candidate Sites and Carbon Stocks

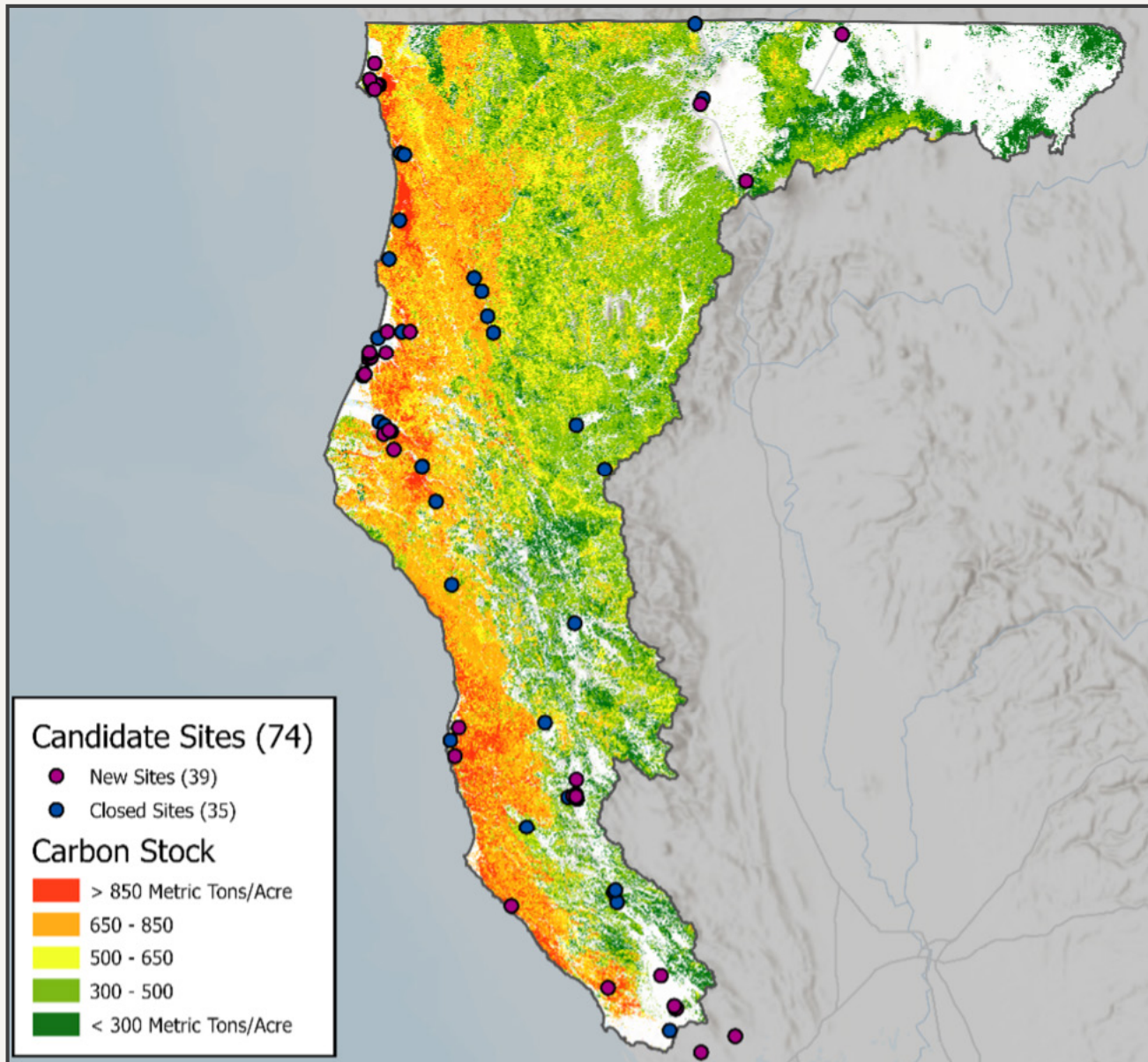
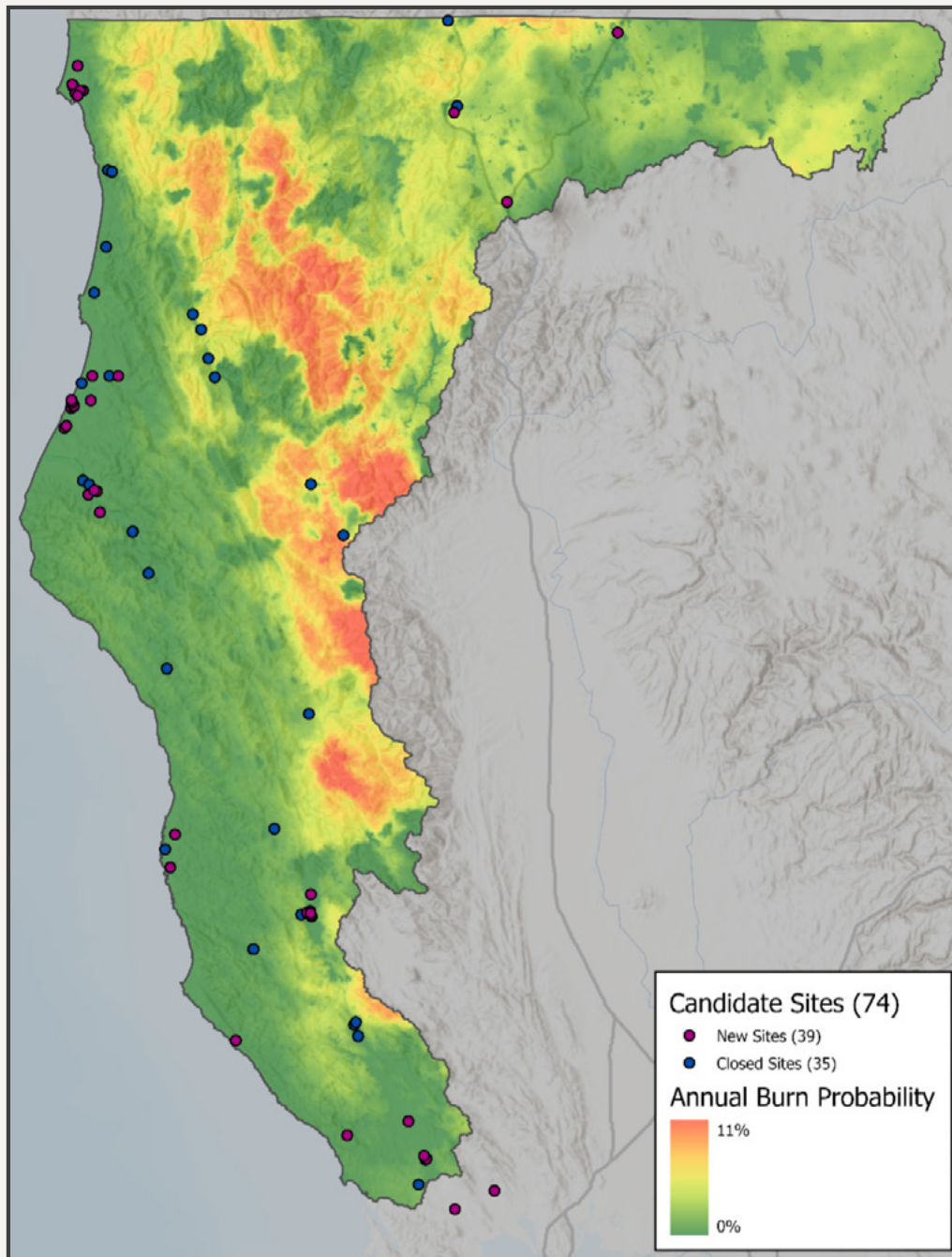


Figure 5 – Candidate Sites and Burn Probability



Demand Analysis

This multi-criteria feedstock analysis comprehensively assesses availability and constraints in the supply of biomass. Biomass supply is not limited; the question is whether there is sufficient demand to make collection, aggregation, and processing cost-effective. Nevertheless, a supply analysis is crucial to prove to lenders that a feedstock supply ratio is suitable for a long-term operation. Quantifying demand is important for any wood-consuming business and can be especially challenging with biomass. Biomass to energy is the dominant pathway by which excess vegetation is managed in California, and alternative markets for biomass can be difficult to estimate. While some markets for biomass rely on low-technology options, they are only viable at a neighborhood scale. As the market demand for alternative markets increases in size (matched to the pace, scope, and scale of forest health treatments) more industrial processes will likely be required to manage production. However, public opposition to large scale biomass consuming businesses is strong – all subregions encountered opposition to their work despite the small scale, non-industrial intentions of their businesses. See Table 2 for a summary of how alternative markets for biomass can be represented at different scales of operation. *Note: scale sizes are representative and not an exact measurement*

Table 2 – Alternative Wood Products Demand Analysis

	Product	Wood Form				Markets	Processing
		Chips, mulch	Rounds, cords	Mill, residue	Bdft, poles		
Backyard utilization (Size: < 1000 people)	Biochar	x	x	x		Work represents the need to dispose of wood through landscaping, maintenance, or the practice of permaculture. Products can be sold in local markets or bundled with other producers	Pile Burning
	Bedding	x					Grinder, chipper
	Compost	x		x			chipper, grinder, dump trailer, tractor
	Mushroom cultivation	x	x	x			Spore inoculation
	Hügelkultur	x	x				Excavation
	Natural building				x		Chainsaw, peeler, woodworking tools
	Lumber				x		Portable sawmill, chainsaw, log loader and trailer
	Firewood		x				Chainsaw, splitter

Community Scale (size: < 100,000 people)	Compost	x		x		Compost Producers, Reclamation Yards, Landscaping Firms	Chipper, Grinder, Dump Trailer, Tractor
	Biochar	x	x	x		Compost Producers, Agriculture, Restoration Groups, Landscaping Firms	Grinder, Chipper, Mobile Conversion System. Small Scale Stationary Conversion Systems
	Thermal heat	x		x		Commercial Building, Microgrids, Greenhouses	
	Local energy	x		x			
	Natural building				x	Custom Home Builders And Architects, Natural Building Solutions	Chainsaw, Peeler, Woodworking Tools
	Furniture, slabs, millwork, artisan products				x	Small Local Sawmills	Local Sawmill, Log Loader And Trailer
	Firewood		x			Firewood Banks, Firewood Vendors	Chainsaw, Splitter
Commercial Scale (size > 100,000 people)	Electricity	x		x		Regional Electricity Markets, Community Thermal System, Large Agriculture	Grinder, Chipper, Stationary Conversion Systems And Grid Interconnection
	Thermal heat	x		x			
	Biochar	x		x			
	Advanced fuels	x		x		Alternative Transportation Fuels, Hydrogen, And Renewable Natural Gas	
	Mass Timber, Lumber cabinetry, furniture, millwork, flooring				x	Log Buyers, Industrial Sawmills For Truckload Quantities	Large Sawmill
	Firewood		x			Regional Markets For Firewood	Large Firewood Processing Mill

Strategy 3 | Develop sub-regional pilot projects and implementation and policy strategies at various scales

A vibrant, locally led industry can effectively use vegetation management byproducts for a variety of beneficial applications, reducing carbon emissions and wildfire risk while enhancing and maintaining forest health and local jobs and revenue. This initiative – including the sub-regional pilots – is intended to support ecosystem health and climate resilience through the lens of local economic vitality via the development of innovative products from low value waste material.

The development of subregional or community-specific pilot strategies was intended to downscale and refine information gathered in the regional assessments, considering the unique biophysical and socio-economic features of the selected subregions. A thorough and inclusive process was used to widely disseminate information about the subregional pilot project solicitation. This included a webinar held on June 7, 2023, attended by close to 100 participants, which provided details about the Request for Proposals (RFP, see Appendix 3) and the availability of WRTC to provide consultation and technical assistance during the grant development period. All applicants who submitted a proposal were required to consult with WRTC to help ensure alignment and to provide support for groups who were applying.

Following the webinar, NCRP released the RFP for project sponsors and partnerships, offering support for subregional partnership organizations to develop a preliminary business plan that included foundational elements of a successful organizational model for feedstock aggregation. Applicants were asked to propose an organizational structure to coordinate new and existing wood markets emerging from a growing need to implement fuel reduction and forest resilience activities and to develop a business plan and include a description of organizational arrangements that have the legal, financial, and operational capacity on the local level to aggregate woody biomass across private and public lands, and to act as a broker for long-term feedstock contracts. NCRP received five proposals in response to the RFP solicitation. All five were reviewed and scored by NCRP and WRTC staff and a slate of recommended projects were presented to the NCRP RFFC Ad Hoc Committee, who were deputized by the NCRP Leadership Council to review and approve pilot project funding awards.

In the fall of 2023, NCRP announced the selection of 3 sub-regional pilot projects (Figure 6). Each subregion received an effective award totaling \$75,000 to begin research on new organizational structures to organize wood selling and procurement while developing funding strategies to achieve community visions for sustainable land management and community safety. Organization structures considered included Joint Powers Authorities, Community Service Districts, Climate Resilience Districts, Cooperatives, or additional legal arrangements that meet program goals. The local pilots were focused on achieving community and watershed resilience and ensuring that the proposed solutions reflected the needs and preferences of local communities in alignment with regional values.

Each subregional pilot project was asked to address the following considerations in their business plans:

FEEDSTOCK CONSISTENCY

- Ensure cost reduction for shared services to forest landowners.
- Buy and sell biomass; enter into direct sales contracts.
- Manage biomass supply contracts between third parties (avoid owning biomass).

LAND MANAGEMENT

- Ensure cost reduction for shared services to contractors and loggers.
- Support the continuity of a forest planning process that enables new markets to develop.
- Lease equipment to small businesses.

MARKET DEVELOPMENT

- Increase market buying and selling power for new product development.
- Own a mill, biochar or energy production facility.
- Own or manage winter storage of biomass for existing and future businesses.

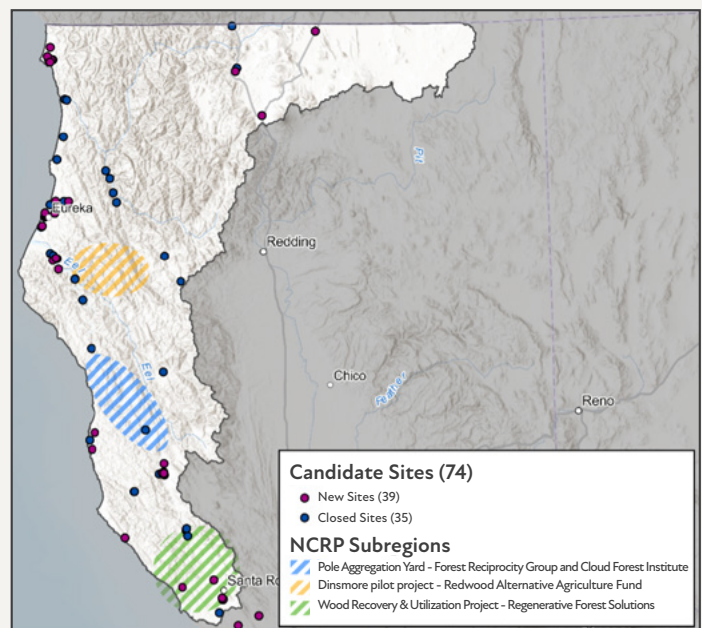
POLICY AND ECONOMIC DEVELOPMENT

- Support new small businesses with tools to avoid long term reliance on subsidies.
- Provide regional markets an ongoing analysis of market trends and workforce needs.
- Bring in new grant dollars at a larger scale, including serving as fiscal agents.
- Advocate at the state and federal level with a consolidated regional voice.
- Focus on community education, including urban centers in California.

As a key component to assessing entity feasibility, each subregion leveraged the multi-criteria biomass siting and feedstock analysis results in their own way. Some regions evaluated feedstock availability based on road management associations, while others relied on dynamic fire safe networks growing within their area and propelled by CALFIRE forest health grants. Each subregion represents a unique “scenario” to be tested within each community, thereby allowing for more direct engagement through established local parties and individuals allowed for a more promising investigation into biomass coordination management than if NCRP-WRTC were to test model runs remotely.

Figure 6 shows the “woodbaskets” of the three selected subregional pilot projects and the relation to the candidate sites mapped during the regional baseline assessment.

Figure 6 – Candidate Sites and Subregional Pilot Areas



Case Studies for the three subregional pilots are included here. Full project deliverables and business plans for each can be found in Appendix 3.

Dinsmore Pilot Project Case Study

Project Sponsor: Redwood Alternative Agriculture Fund.

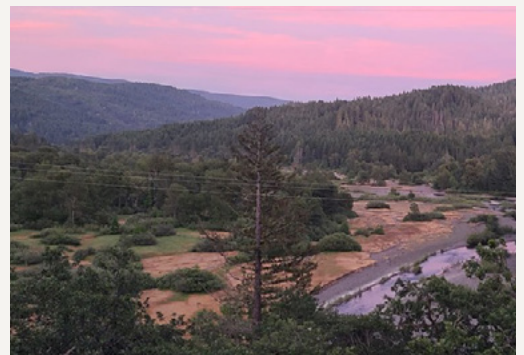
Mission: To investigate the viability of a cooperative model which facilitates the removal, transportation, aggregation, and processing of woody biomass from public and private forest lands in the Eastern Humboldt/Western Trinity regions for the public good.

Regional Characteristics:

The Mad River-Van Duzen-Dinsmore Region (MVD) is a remote and sparsely populated area located within Humboldt and Trinity Counties. A 25-mile circumference called a “wood basket” was defined around the potential location of a wood sort yard in Dinsmore. The town of Hayfork is located to the far east of the wood basket, and Fortuna is located on the far west of the wood basket. Highway 36 is the main transportation corridor. The mixed county jurisdiction of the far east section of the region further compounds challenges to jurisdictional issues such as emergency response and community cohesion. Existing local markets for biomass include Scotia Mill and Schmidbauer Mill (biomass combustion to electricity), Green Diamond (shipping chips overseas via Humboldt Bay, often for wood-pellet production), and local cord-wood heating markets.

Business Model:

This investigation initially examined a cooperative entity to own and operate the Dinsmore facility. This type of entity was chosen because it is a robust way to keep value and ownership of the facility in the local community and minimize economic extraction. Project investigators, however, were aware that cooperative entity development requires a high community capacity among many individuals. It was not clear if that capacity existed in our area of interest. After studying various entity types, it became clear that the important element to maintain for an entity type was the cooperative principles and not the cooperative entity itself. Principles of cooperation (and methods of robustly securing value return to the local community) can be built into other more easily established entity types. Thus, the preferred entity type at this point is to utilize an existing local non-profit (or start another) and have that non-profit be the single member owner of two businesses, one that performs the function of contracting for fuels reduction contracts, and a separate entity to perform the function of operating the Dinsmore aggregation facility.



While the initial plan was to begin with the sorting and aggregation facility, it was decided that the best first step would be to establish capacity in the community to design and implement the fuels reduction projects that will yield the woody biomass needed for the sorting facility. The initial steps include: 1) to reinvigorate the Van Duzen Watershed Fire Safe Council, 2) update the Humboldt County Fire Safe Council's Community Wildfire Protection Plan (CWPP) for the area, 3) acquire funding for projects listed in the CWPP, and 4) implement the projects. At that point there will be biomass for the facility and sorting and aggregation can begin.

The aggregation and sorting facility needs functionality in three areas to be feasible.

1. Require low cost or free sources of biomass.
2. Requires safe and efficient operations at the facility itself.
3. Requires adequate sales and off takes to cover costs.

Due to the high cost of start-up at the facility, the inputs of woody biomass need to be addressed first. Then the biomass can be sorted and aggregated at the facility, and then sales and off-takes can be arranged. None of these steps are currently functioning in the community so project investigators decided to start at step 1 and work to build community capacity to acquire funding and implement fuels reduction on local lands.

In 5 years, it is anticipated that active fuels reduction teams employed by the Van Duzen Watershed Fire Safe Council (fiscally sponsored by the Bridgeville Community Center) will be implementing projects and hauling large quantities of biomass to the aggregation and sorting yard in Dinsmore. The Dinsmore Facility (a separate entity also owned and/or fiscally sponsored by the Bridgeville Community Center) will aggregate the material and establish markets for various wood products and off take agreements. Sales revenues from the off-takes will cover facility operation and repay start-up loans. This project is anticipated to provide local employment to over 20 individuals.

Project Team:

- Mika Cook, Clark Stevenson, Drew Barber, Steven "Lance" Berry and Ryan Kochendarfer
- PathLight Law
- Van Duzen Watershed Fire Safe Council
- Mad River Fire Safe Council
- Humboldt and Trinity County Fire Safe Councils
- Humboldt and Trinity County Resource Conservation Districts
- Watershed Research and Training Center
- US Forest Service
- CAL FIRE



Next Steps:

- Continue to develop the Van Duzen Watershed Fire Safe Council and solicit community participation in updating HCFSC's CWPP so the Mad Van Duzen Planning Unit is fully representative of all projects the community would like to see implemented.
- Develop grant proposals and seek funding for some of these projects. Remote rural communities such as the project's area of interest (AOI), need prioritized funding to develop and implement fuels reduction projects before catastrophic fire consumes the forest and the community infrastructure. Often these communities require additional capacity support to design and implement these projects.
- Wood products derived from low quality biomass from fuels reduction and forest health projects provide an exciting opportunity. From an embodied energy or sustainability perspective, these products are many steps ahead of "FSC" certified products and are perhaps worthy of their own higher-level certification.

CFI/RFFI's Mendocino/Humboldt County Forest Reciprocity Collective Woody Feedstock Pilot Project Case Study

Project Sponsor: Cloud Forest Institute for the Forest Reciprocity Group

Mission: The Forest Reciprocity Group (FRG) undertook an investigation of what would be needed to establish a local FRG Pole Aggregation Depot (FRG PAD), with a focus on small diameter Douglas fir trees (6"-14") processed into Structural Round Timber (SRT) for use in housing construction. Smaller diameter saplings and small poles will also be offered for utility uses and furniture. Laying this groundwork will allow forest landowners to utilize these non-commercial and overly abundant trees to cover the cost for log removal and delivery, facilitating forest stewardship. This model will also allow the use of these materials for entrepreneurial endeavors, diversifying the regional economy and generating jobs in rural communities.

Regional Characteristics:

Ecologically, the decimation of Native peoples and their cultural land tending practices (including controlled burns) has fostered unmanaged regrowth and dwindling biodiversity. Later shortsighted logging practices have crippled our forest's moisture regulation capacities, setting the conditions for epidemics of tree diseases. Invasive species introduction has added further imbalances and fire hazards.



Economically, Mendocino and Southern Humboldt are rural, severely disadvantaged communities. There is a low availability of good paying jobs, several abandoned mill sites and a large, growing surplus of small trees being removed from forest health thinning projects. This creates an opportunity to align economic development with positive environmental impacts, truly creating a regenerative economy. Local-market potential exists, with interest from Almquist lumber and Polecraft Solutions in sourcing SRT. Situated between two urban centers, the San Francisco Bay and Eureka, there is even greater market potential, especially for development of Value-Added Products (VAP) like furniture, trusses and small structure kits.

Business Model

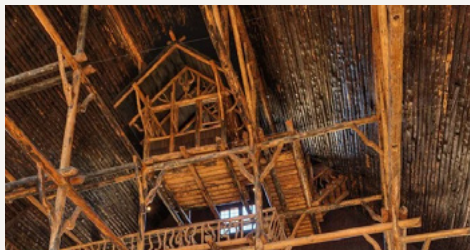
After exploring the pros and cons of shareholder cooperatives and LLC's the project team concluded that the existing 501(c)3 has the greatest chance of success. A non-profit business will allow development of grants and solicitation of donations. Net revenue will go back into the non-profit to further the public benefit mission. This work will benefit the public by ensuring the lowest cost of processed poles to be used to incubate and grow businesses making VAP with these materials.

The initial aggregation services will focus on graded SRT, Utility Grade Posts and Stakes and hand peeled round wood for furniture making. Investigating SRT processing led to the need for a centralized hub, with large, specialized equipment to reduce costs. The FRG PAD will process enough stock to employ an onsite grader. Though the initial investment will be higher, it will enable the best use of these materials - building Firewise homes.

By year 5, the FRG PAD will be providing affordable, cured, and graded poles to a growing network of builders, manufacturers, and the public. This material availability will inspire and enable businesses to produce pre-engineered elements like round wood trusses, ready-to-assemble round timber frame structures, and round wood furniture. Regional development will be supported by a training center and community hub at Tan Oak Park (TOP). FRG's collaboration with TOP will include the creation of educational curricula, the building of a SRT shop/pole storage barn, a wood shop expansion, and the piloting of our mobile unit. The educational partnership will grow to include collaboration with local schools and colleges and a growing library of online learning resources, including building plans and videos for DIYers.

Project Team:

Cloud Forest Institute's (CFI) Board of Directors comprises the Forest Reciprocity Group team. The team collaborates with Redwood Forest Foundation Inc., Usal Redwood Forest Company (URFC), the Institute for Sustainable Forestry (ISF), Northern Mendocino Ecosystem Recovery Alliance (NM-ERA), Trees Foundation, Cal Poly Humboldt, and the Watershed Resource and Training Center (WRTC).



Next Steps:

- Over the next year, FRG will collaborate with RFFI to develop harvesting protocols that will guide the development of the Mobile Unit. Results from this research will be formalized into a curriculum that can be used to train and expand the forest sector workforce. This project will cost \$30,000 to initiate.
- FRG will test whole-log kiln drying techniques with Polecraft Solutions at Whitethorn Construction for Structural Round Timber.
- With support from a Cal Poly Humboldt environmental engineering class, FRG will design a collapsible, controlled drying shed and a power source for our mobile unit pilot at TOP.
- FRG has applied for \$126,835 in R&D funding for the pressure washer debarker blueprint development as part of the Forest WRX Alliance Catalyst Pre-Development Proposal.
- Also in development are R&D proposals for an internal decay scanner, plant layout design, and further business plan development.
- Upon completion of the business plan, the team will seek implementation funding to secure a permanent site and build the FRG PAD.
- To expand the evidence base, the team is seeking University researchers to perform strength testing related to ring density and conduct research about how this project compares to other biomass consumption technologies.
- URFC, our current woodbasket, will incorporate SRT into harvest plans to supply raw material. Polecraft Solutions has many projects in the works that will need interior grade SRT. Almquist Lumber in Arcata is ready to buy utility-grade roundwood bundles. FRG has also started a relationship with Whole Trees, a manufacturer of SRT structures.

Sonoma County Wood Recovery & Utilization Project Case Study

Project Sponsor: Regenerative Forest Solutions / Inquiring Systems Inc.

Project Background: Over the past decade, Sonoma County has been severely affected by multiple catastrophic wildfires along with the broader impacts of ongoing climate change. Current scientific research indicates that these trends are likely to worsen such that proactive measures must be taken to steward the county's forested lands to ensure improved climate resilience. Forests cover nearly half (513,000 acres or 48%) of Sonoma County's 1.1 million acres of land. These areas range in composition from redwood and mixed conifer to mixed hardwood and oak savannah, a potent diversity that presents a significant opportunity (and challenge) to enhance vital positive social, environmental, cultural and economic outcomes.



Addressing the increasing challenges of forest health decline, climate change, and wildfire risk necessitates scaling up forest management treatments across the county's 513,000 acres of forestland. However, limited financial resources, workforce capacity, and infrastructure have hindered progress toward achieving community wildfire and climate resilience goals identified at local and state levels. These constraints underscore the need for targeted solutions and present a significant economic development opportunity: by strengthening the forestry, wildfire resilience, and wood products sectors, a portion of the costs associated with managing these vital forest ecosystems could be offset, enabling the ongoing treatments required for effective stewardship.

During the Sonoma County Wood Recovery & Utilization Project's research, the project conducted investigations regarding the following aspects to increase forest health within the county.

Key Findings:

- Sonoma County's private forestland owners have the highest potential to provide wood resources from their management of 442,968 acres, 86% of the county's forested lands.
- Ninety-three percent, or 13,670 of the 14,670 private ownerships manage parcels less than 100 acres. This landscape of ownership scales presents both an asset and a challenge for treating forested acres and recovering wood resources.
- Enhanced wood recovery and utilization can help material "pay its way" out of the forest for increased wildfire resilience and forest health. Additional resources (e.g. grants, carbon credits, etc.) can be established through a centralized coordinating entity to expand economic offsets.
- 246,365 acres of forested acres were identified as "feasible" to treat, representing an estimated 48.4MMGT of forest biomass.
- 2,800 acres are presently treated annually on private forestlands in Sonoma County. To meet legislative requirements, the county would need to substantially increase workforce and wood processing capacities. For example, to meet the stated goals of AB 1757 (C. Garcia, 2022), the county would need to treat 10,400 acres annually.
- With engaged leadership in the county, but no existing organization interested in managing wood resources and requisite infrastructure, the project determined that the appropriate legal entity to implement recommendations at this time would be a 501(c)(3) nonprofit corporation, likely in partnership with private entities.
- Sonoma County is ideally positioned to create an exemplary model of community-scale wood management with dedicated organizations and agencies working together to care for our forest ecosystems. Establishing a "wood products campus" to increase wood processing capacities will allow the county to meet its goals of achieving successful ongoing, community and wildfire resilience, local economic development and associated climate benefits across its forested acres. Just as other infrastructure is necessary for the production and distribution of food, energy and water, a wood products campus is critical infrastructure to effectively manage our forests.



Business Model:

The project selected a 501(c)(3) nonprofit corporation to implement the next steps and will likely partner with private entities to realize the goal of establishing a wood products campus. The project team is envisioning a similar model to Sustainable Northwest, a nonprofit that incubated Sustainable Northwest Wood. A JPA or other type of government-led organization was not viable for the management of wood resources in Sonoma County at this time for several reasons, the main one being that the county is presently considering the creation of a new entity, potentially a JPA, to manage wildfire prevention activities. The project team plans to continue the work of aggregating and processing wood resources at a larger site, identified in our study. The team has identified preliminary wood products for economic viability and established a need for the campus to provide both primary and secondary wood processing for increased economic viability of the scale of campus being pursued. Once the wood products campus is sited and set up, other financing can be achieved such as carbon credit offsets to diversify the financial support mechanisms for this work.

Next Steps:**Phase I: 2025 – 2030**

- Raise funds for Phase 1 & Phase II actions
- Formalize entity to manage activities
- Develop business plan
- Identify intended Phase 1 products and activities
- Conduct a carbon analysis on selected plan
- Secure lease or purchase land for wood products campus
- Secure contracts and long-term materials supply agreements
- Complete design
- Obtain needed permits
- Hire staff for Phase 1 activities
- Develop marketing, outreach and educational efforts
- Open wood products campus

Phase II: 2030 – 2040

- Secure additional funding needed
- Expand Phase I activities and program offerings
- Begin monitoring and evaluation program
- Grow products and sales/ build regional markets
- Support broader CA local wood products marketing program
- Explore financing of a forest landowner revolving fund to enable in-forest treatments
- Expand operations to include a climate resiliency center
- Expand to multiple aggregation yards and/or wood products campuses depending on impacts, supply and demand



Phase III: 2040 +

- Establish criteria for community-scale mills to participate in shared product marketing
- Grow partnerships to increase success
- Increase sales and program offerings
- Continue to grow community offerings and services
- Establish procurement guidelines and third-party contractor qualifications for harvest (e.g. environmental sustainability program)
- Develop additional programs needed
- Evolve product offerings and service to other community-scale wood products campuses

Project Team:

Temra Costa will continue to lead this next phase as project director with support from RFS’s advisory board of experts. The wood products campus team is in formation and will be determined by funding availability. A list of roles has been identified in addition to consulting needs with firms such as TSS Consultants.

Legal and Economic Analysis

In addition to coordinating the subregional pilots, the WRTC team completed two reports. One report focused on summarizing the full set of legal frameworks available for entity formation, generally referred to as “the legal report”. The legal report built on six separate legal assessments on entity type formation for wood feedstock aggregation developed by other pilot regions throughout the state in addition to what the subregions identified as the most suitable option within their communities. The subregional pilot project sponsors requested that WRTC include research on the legal pathway to procuring wood produced from exemption-based forest practices including cost-share support programs, utility vegetation clearance, and expedited permitting pathways. The second report, referred to as “the economic report,” examined the economic and market conditions in the North Coast supporting community scale vegetation management and local factors to consider for wood product development. To supplement the economic report, WRTC hired the Beck Group to create a Return to Log Analysis on 10 wood product technologies for community scaled operations. The full text of each report is included in Appendix 3. The following section includes a summary of each report.

North Coast Summary of New Entity Formation for Woody Biomass Management (Legal Report)

A total of six reports were developed across the state to assess the legal framework to address entity formation options to support long-term feedstock contract development. Each report highlights the need for new organizational entities and consistently emphasizes economic, administrative, and logistical barriers preventing effective biomass utilization. This summary reviews all six reports and categorizes the 12 legal framework options into 4 distinct entity types: (1) public governance entities, (2) cooperative models, (3) nonprofit organizations, and (4) private sector entities.

A single-entity approach is unlikely to succeed given the complexity of biomass markets, regulatory requirements, and financial constraints. Instead, a multi-entity framework—where public, cooperative, nonprofit, and private-sector entities work together—offers the most promising path forward. The successful management of California’s biomass resources requires a new legal entity to coordinate supply chains, finance infrastructure, and stabilize biomass markets. Recommendations based on the three North Coast Sub-regional project reports, as well as from three reports from other Pilot regions are synthesized and summarized are:

- Form a Joint Powers Authority (JPA) or Climate Resilience District (CRD) for public infrastructure and supply chain coordination.
- Develop a cooperative or nonprofit-owned LLC to engage local businesses and landowners in biomass utilization.
- Secure diverse funding sources through grants, public bonds, member investments, and market-driven revenue models.

Without a centralized entity, biomass utilization remains inefficient, underfunded, and disconnected from larger climate and wildfire mitigation goals. A biomass entity must be directly integrated with end markets to avoid the pitfalls of unstable pricing and oversupply. Long-term contracts, regional processing infrastructure, and transportation coordination are essential to overcoming economic barriers, such as:

- Feedstock Aggregation & Logistics: Small landowners and forestry operators need a centralized supply chain manager to pool resources and coordinate deliveries.
- Market Demand & Product Development: Without a strong demand for wood products, biochar, biomass energy, or engineered wood, feedstock processing will remain unprofitable.
- Public-Private Partnerships: Successful examples, such as the Western Placer Waste Management Authority, show how government and private industry collaboration can ensure consistent biomass utilization.

A biomass entity must be structured to reduce financial risk for participants, provide price stability, and secure long-term off-take agreements with industries such as bioenergy, sustainable building materials, and carbon credit markets. By integrating these approaches, stakeholders can learn from work done in the North Coast and the other pilot regions to develop a scalable, financially viable biomass industry that supports wildfire mitigation, rural economic development, and climate resilience.



Wood Product Development to Support Non-industrial Land Management (Legal Report Supplement)

New business development in the California forest product sector has received an increase in funding support over the last several years. However, a funding analysis of the CAL FIRE Business and Workforce Development program by 3point.yxz (2024) shows that as of December 2023, over \$263 million in funding requests were made but only approximately \$70 million in grant funds were awarded, 27% of the requested amount. This guide regarding wood product development answers questions about the regulatory background on wood procurement from fuel reduction work occurring throughout the state from the perspective of a new wood processing business. Primarily, this guide attempts to illuminate the funding and permit pathways which may restrict the procurement of wood. Additionally, agencies such as the US Forest Service and Investor-Owned Utilities (IOU), like PG&E, have expressed interest in mandating the removal of material from fuel reduction projects (personal communication). This guide reviews “donation-based” disposal in situations where wood removal is mandated but markets are still nascent.

This guide provides answers to the following questions:

- What should a landowner know about existing funding and permitting pathways for procuring wood and generating revenue in California?
- Can the landowner sell the felled wood by right-of-way operations? Including the procurement of abandoned material coming from emergency hazard tree removal along roadways or utility operations
- Does a landowner need a permit if they want to donate woody material (i.e., not financially gain from sales)?
- Will the removal of woody material be mandated?

Local and regional entities offer a unique perspective to address wood product development and utilization. State conversations encourage business development at a scale that can accomplish state-wide forest management treatment goals, but this can be controversial. The development of local and regional entities allows for more community buy-in, with solutions that are tailored to historical, social, and cultural conditions in that community. With billions of dollars being spent to support implementation, insufficient attention is paid to the impact of restrictions on community-scale business opportunities. Yet it may be more apparent now in programs attempting to provide direct support to non-industrial landowners how complicated and difficult it can be to manage for resilience without community scale markets.

North Coast Wood Product Development and Economic History Snapshot (Economic Report)

The North Coast region has a long history of timber production and wood product manufacturing. Many wood utilization efforts have been explored and tested on the North Coast with much written history focusing on the region’s period of timber dominance before 1990. The report attempts to summarize key areas in wood product research on the North Coast that include durable wood products (i.e., juniper, tan oak processing, small diameter timber) and biomass utilization (i.e., biochar, bioenergy, pellets, briquettes) from 1990 to the present day. The North Coast Woody Feedstock Aggregation Pilots (“the subregions”) have encountered many of the same challenges that previous efforts, initiatives, and focused research have encountered over many years. By reviewing what has already been tried in the region in the past, they have been able to reapply old ideas to a new political and social context and move wood product development goals forward, despite present challenges.

Today, extensive public subsidies dedicated to forest health, stream restoration, and the reintroduction of beneficial fire in the North Coast have re-energized the conversation about building an economy of living-wage jobs to support land stewardship projects. Yet a fragmented supply chain, globalized markets, and regulatory burdens challenge business growth in the sector. The report includes three main sections: 1) history of wood product development, 2) financial analysis of wood product hubs, and 3) existing subsidies targeting forest health treatments. Combined they offer a snapshot of what it would take to invest in a wood product hub on both the processing side and the supply side.

A primary research question is: what is the minimum production level (MPL) of a certain technology required to break even? That is, without regard to feedstock availability, what is the bare minimum size a wood product business must be to be considered viable? The answer to this question would provide a baseline for communities for building supply agreements and business strategies. The Beck Group performed a return to log (RTL) analysis, a methodology for estimating the price the manufacturing process can afford to pay for raw material to break even. This included back-calculating estimates to understand how much a landowner could receive (via stumpage value) if a wood product hub were developed. The Beck Group report assessed 10 unique wood product technologies where all the RTL values calculated represent the break-even cost in dollars per bone dry ton of raw material delivered to the manufacturing site. After including harvest and hauling costs, the only revenue generating businesses were for Wood Wool Cement and Post & Pole technologies. This indicates that while wood product operations can be viable at a smaller scale (given a sustainable supply of logs), landowners will not be able to afford the type of land management required to support the wood product demand without subsidies, unless there is a well-managed Wood Wool Cement or Post & Pole facility nearby. See Appendix 3 for the Beck Group's report.

The next question is how much subsidy is being allocated to fuel reduction projects within the North Coast, and what is the price per acre over the last 5 years (2019-2024)? Key information on existing forest health investments in the region was gathered from the California Climate Investments fund (which allocates funds to CALFIRE for their forest health and fire prevention grants), National Resource Conservation Service, CALFIRE's California Forest Improvement Program, the Wildfire and Forest Resilience Task Force Treatment Tracking Dashboard, and NCRP's Project Tracker. Over the last 5 years, the North Coast has seen an average of 145,000 acres treated each year, with a cumulative total of 875,000 acres treated. About half of the acres treated were from beneficial fire, including wildfire management, and over 50,000 acres of the treatments were from mechanical fuel reduction. Timber harvest was a small fraction. Overall, the region invested \$25 million per year over the last 5 years. Total project costs were \$36 million per year which means an additional \$11 million is either leveraged or invested in the region for in-woods forest restoration. The average cost per acre of treatments across the entire region is \$2,917 although when separated by county the cost ranges from \$1,006 per acre to \$8,987 per acre. These are projects that are recorded from grant agreements and often include multiple treatments within a single project area. When compared to an oak woodland restoration treatment funded by NCRP, the costs per acre are comparable to the regional average, although it still required a smaller subsidy to implement for a vertically integrated industrial forest management company (i.e., Humboldt Redwood Company). It should be noted that this case study also had a receiving market for both logs and biomass located within a 60-mile radius of the harvest site.

Currently, existing sawmill and bioenergy facilities are exploring next generation technologies like hydrogen and mass timber, while other networks are attempting to address efficiencies within the supply chain, including efficiencies with software development and partnership building. Meanwhile new businesses are looking to establish during market conditions that are far less friendly to infrastructure development than neighboring states or earlier in California's regulatory past. There are a variety of market and policy mechanisms at the local, state, and national levels that can be used to compensate for the difficult economics of biomass utilization. However, the first step requires recognizing that there may not be a better time to support wood-based infrastructure development than in this moment of subsidy surplus.



DISCUSSION

The objective of this project was to assess woody feedstock utilization opportunities in the context of forest and ecosystem health, to evaluate models for locally led community scale organizational structures, and to document lessons learned and share that information with local, regional, and statewide stakeholders. The project investigated what kinds of legal entities and structures might support the successful management of biomass resources in the North Coast region, including supply chain coordination, finance infrastructure, and stable markets. The results are mixed. The challenges that have inhibited a robust biomass market from developing in the past continue to exist. Specific challenges encountered by the subregional pilots include:

- The Dinsmore subregional pilot team in Humboldt County found that an entire supply chain needed to be built before any coordinating body could effectively support market development. Issues with community capacity, economics of land management, and lack of nearby markets challenged the ability to aggregate material and make it available to more distant markets.
- The Forest Reciprocity Group in Mendocino County found a rather specific niche market to develop their business. This group includes passionate volunteers and retains momentum. Market demand is proving difficult to establish although the team has a strong integrated marketing and demonstration plan to support their business.
- Regenerative Forest Solutions had several niche markets to explore, including coordinating services throughout the supply chain. Strong public opposition, equipment costs, and the difficulty of scaling up a small-scale operation due to regulatory grey areas for wood procurement were all challenges.



A few high-level take-aways from this process include 1) the challenge of building market demand, including public opposition to forest wood product utilization; 2) the challenge of limited capacity in the North Coast to build an intergovernmental entity for supply chain management; and 3) the need for a more balanced investment strategy that incorporates market-driven solutions, or otherwise creates an attractive business climate for forest products, rather than focusing exclusively on fuel management.

Market demand remains a key challenge across all regions in a globalized economy. In a sparsely populated rural region like the North Coast, where limited markets are already a challenge, this grant's focus on aggregation did not allow sufficient resources to be focused on building a product line and market development. There are parts of the region with no existing markets for wood products. This situation requires markets to be created, for both bioenergy and wood products, alongside the aggregation of supply and the creation of products. While other pilot regions investigating this concept throughout the state are specifically looking at how to prop up bioconversion facilities, the nuance of identifying the "highest, best use" of material on the North Coast ultimately resulted in a significant barrier to aggregating wood supply. Across all primary and secondary wood product markets there are options for innovation. However, more coordination, more incentives, and more funding will be required for the proposed wood product hub infrastructure to be established.



Coordinating across large regions and sharing mutual services remains an attractive idea to support the growth of small-scale operations. However, cooperatives may not be a viable solution in California's forest sector due to the thin margin of return on wood products. On the other hand, nonprofits and special private sector entities that commit to the spirit of cooperative services are valuable alternatives or supportive entities. A JPA that coordinates multi-county efforts also is a viable option for some areas in California, although a prerequisite is the administrative capacity to focus efforts. Regardless, the appetite for some regions to establish a JPA in support of industry remains difficult without a strong entrepreneurial presence. Economic development departments or multi-county councils offer a viable avenue to expand and advocate for wood product development through building code reform, identification of potential sites for development, and general information on relevant actors in the region to contact.

Without a centralized entity, biomass utilization remains inefficient, underfunded, and disconnected from larger climate and wildfire mitigation goals. Constant engagement with generating market interest and demand for products, regional processing infrastructure, and transportation coordination are essential to overcoming economic barriers. The state has dedicated millions towards land management in recent years. Restoration of forests, reintroduction of fire, and the strategic placement of fuel breaks will be a constant need for California to maintain a fire-resilient landscape. Priorities for consideration include the enhancement of small-scale wood product businesses, an emphasis on more balanced financial strategies of funding both implementation projects as well as climate-smart, market-based solutions, and building a business climate that attracts wood product entrepreneurs.





APPENDICES

Note: All reports listed below can be found on the **NCRP North Coast Forest Biomass Strategy web page**.

Appendix 1 - Task 1 Deliverables

- Steering Committee Members
 - Rex Bohn, Humboldt County Supervisor
 - Nancy Ogren, Siskiyou County Supervisor
 - John Anderson, Mendocino Redwood Company
 - Elicia Goldsworthy, Green Diamond
 - Leaf Hillman, Karuk Tribe
 - Gregg Foster, Redwood Regional Economic Development Council
 - Ryan Heitz, Humboldt County Economic Development Department,
 - Kathleen Moxon, Redwood Forest Foundation
 - Josh Harrison, FABRICS
 - Yana Valachovic, UC Extension Advisor
 - Christy Prescott, USFS
 - Dan Blessing, Shasta Valley RCD
 - Jason Wells, Sonoma RCD
 - Raymond Baltar, Sonoma Biochar Initiative
 - Giselle Nova, Fire Safe Council of Siskiyou County
- **A Vision for North Coast Resilience: Priorities for Enhancing Watershed, Fireshed, Forest, and Community Resilience in the North Coast Region**
 - North Coast Resource Partnership Story Map
 - North Coast Region Story Map
 - Adaptive Planning and Prioritization Framework Story Map
 - Regional Assessment Story Map
 - Forest Biomass Residuals Solution

Appendix 2 - Task 2 & 3 Deliverables

- Regional Baseline Assessment

Appendix 3 - Task 4 Deliverables

- Woody Feedstock Subregional Pilot Request for Proposals
- Redwood Alternative Agriculture Fund Final Report
- Forest Reciprocity Group Final Report
- Regenerative Forest Solutions Final Report
- North Coast Summary of New Entity Formation for Woody Biomass Management (Legal report)
- Wood Product Development to Support Non-Industrial Land Management (Legal Report Supplement)
- North Coast Wood Product Development and Economic History Snapshot (Economic report)
- Return to Log Values for California's North Coast Region (Beck Group report)
 - RTL Tables for each technology

Appendix 4 - Task 5 Deliverables

- Summary of Region-Wide Interviews
- Shared Services Co-Ops - California Center for Cooperative Development
- Enhancing California's Timber and Biomass Industry – Forestland Steward Newsletter
- North Coast Forest Biomass Strategy Program Update, January 2024
- Subregional Pilot Cohort Newsletter #1
- Subregional Pilot Cohort Newsletter #2
- [North Coast Forest Biomass Strategy website](#)
- Webinars:
 - NCRP Ad Hoc Committee Introductory webinar - April 27, 2023
 - Webinar describing pilot project RFP- June 7, 2023; 186 registrants.
- Regional meetings:
 - NCRP shared information at multiple quarterly meetings attended by hundreds of regional partners, including panels focused on this initiative and the findings from the initiative. NCRP and WRTC shared this information with all sub-regional pilots and the steering committee.

- NCRP organized and hosted a 2-day event focused on Climate Resilience in the North Coast of California, sponsored by the Federated Indians of Graton Rancheria and held on January 29 and 30, 2025 at the Graton Rancheria Casino and Event Center. The Meeting Agenda included presentations and panels on Climate Resilience Tribal Leadership, Sonoma County Climate Resilience Initiatives, California’s Fifth Climate Assessment, California’s Climate Future with State Agency Leadership and Strategic Initiatives, Collaborative Action on Climate Resilience, and the Siskiyou Climate Collaborative. Speaker topics are detailed in the Meeting Agenda. The event included a Resource Fair with 50 tabling groups with posters and other educational materials to share information and network. The NCRP, WRTC and the sub-regional pilots shared information regarding the NCRP-WRTC regional woody feedstock initiative during the resource fair tabling. The 420 total participants that attended included 18 members of local, state and federal agencies, 45 members from 22 Tribes, 53 representatives from 11 cities and counties, 27 Resource Conservation District staff, 8 University and UC Cooperative Extension faculty, and representatives from 64 non-governmental organizations and 18 consultant firms. A complete list of presenters and partner attendees, and resources, is provided at the [Climate Resilience in the North Coast of California – January 2025 NCRP Event](#) webpage. The North Coast Resource Partnership also developed a Climate Resilience Priorities Survey for the event intended to collect input to identify the North Coast region’s climate vulnerabilities, current resilience strategies, and support needs for building a more climate-resilient future.
- Outreach to sub-regional partners during NCRP Quarterly Meetings in 2023 & 2024
- Learnings from this effort shared at the August Wildfire and Forest Resilience Task Force meeting in Sacramento
- **Local meetings:**
 - Lake County Board of Supervisors
 - Community Economic Resilience Fund kickoff meeting held in Ukiah on September 20th, 2023.
 - WRTC was part of a Climate & Disaster Resilience panel at the “State of the Redwood Coast Regional Conference: Our Elemental Economy” on September 21, 2023, to speak about forest stewardship economy and the need for wood product markets
 - Maintained constant engagement in the Forest Business Alliance
 - NCRP co-sponsored a biomass symposium in Sacramento hosted by Conservation Strategies Group. WRTC presented the topic of biomass utilization and represented subregions at the event.
 - NCRP & WRTC co-sponsored a Biomass symposium in May 2023 in Hopland at the UC Hopland research station.
 - WRTC engaged and represented the OPR pilot subregions to interested groups such as the California Center for Cooperative Development, the Buckeye Conservancy, Redwood Region CERF sector tables, and Cal Poly Humboldt.
 - Maintained communication on and participated in sector round tables on building a stewardship economy within the North Coast with special interest in representing the subregion’s interest. Connected the subregions to sector leads.

- ForestWRX (formerly called CalForestWRX) engaged Sonoma and Mendocino subregions and brought them into their regionwide strategy
- Kickoff meeting for the Mendocino Forest Collective Pilot Project on November 4th, 2023. Called the Forest Extravaganza, a region-wide stakeholder group got together to discuss the multi-million-dollar implementation project occurring in the Ten Mile Watershed.
- Kickoff meeting in Willow Creek on November 8th, 2023, to launch the process for the Community Wildfire Defense Grant occurring in the Lower Trinity and in partnership with the USFS.
- Engaged and facilitated a capstone research project with Cal Poly Humboldt's engineering department to look at portable co-gen bioenergy conversion systems in an attempt to look at low-tech options for biomass utilization in Willow Creek.
- Held conversations with foresters, loggers, utilities, compost facilities, and chip facilities regarding best practices when procuring wood from operations operating under Environmental Impact Reports (EIR) (rather than the Forest Practice Rules) and the legality of wood donations when setting up a feedstock aggregation yard.
- Attended Redwood Coast Energy Authority's (RECA) Biomass Technical Advisory Group meeting and monitored RECA community discussions on biomass to electricity use on the North Coast
- **Cohort meetings:**
 - The NCRP woody feedstock pilot has participated in four subregion cohort meetings organized by WRTC and one statewide cohort meeting organized by LCI
 - The NCRP and WRTC woody feedstock team attended the Wildfire and Forest Resilience Task Force meeting in Grass Valley, the Joint Institute for Wood products Innovations meeting, the California Ad Hoc Biomass Utilization Working Group, and has participated in numerous Regional Forest and Fire Capacity webinars and meetings where this initiative was discussed.
 - The NCRP team has continued to participate in the California Ad Hoc Biomass Utilization Working Group and has participated in Wildfire and Forest Resilience Task Force meetings and Regional Forest and Fire Capacity webinars and meetings where these and similar initiatives were discussed.
 - Coordinated, developed, and facilitated discussions on OPR's Round 3 funding. This process was time-consuming and required regular conversations with up to 6 different contractors on scope development and alignment. As a component of this, Clarke developed a visual systems diagram to explain the contracting pathways, subcontractor responsibilities, and various features included in the Digital Marketplace. The Digital Marketplace will be further developed through R3 funding and will be available for community workshops in 2025.

Sub-regional Pilot Project Outreach:

- Regenerative Forest Solutions
 - Held monthly working group meetings with key partners on strategy
 - Held 4 community stakeholder workshops to announce or update the community on the vision and goals of the project and to solicit feedback.
 - Presented at the Sonoma Mendocino Economic Development Department (SMEDD) Biomass Symposium
 - Presented at
 - Attended the Rural Voices for Conservation Coalition (RVCC) to discuss sawmill business structure
 - Engaged public agencies– State and Regional Parks, Permit Sonoma, Public Infrastructure and the Water Agency – on woody material resources for procurement from public lands (e.g. Title 11, liability, and bidding process for haulers and subcontractors) is ongoing.

- Forest Reciprocity Group
 - Held monthly working meetings with up to 10 different regional partners on the development of their concept.
 - Hosts a radio show on a regular basis which focuses on wood utilization.
 - Hosted a demonstration workshop at Tan Oak Park
 - Hosted timber frame building workshops displaying their material
 - Engaged the California Center for Cooperative Development on entity formation
 - Engaged county staff on site development and zoning
 - Showcased their product line at Big Time event in Mendocino
 - Entered into a partnership with Cal Poly Humboldt’s engineering department to look at sustainable and local energy design, including a mobile kiln, for their aggregation depot

- RAAF and the Dinsmore group
 - Have participated in WRX alliance meetings and attended the NCRP quarterly meetings on behalf of their concept
 - Participated in local group meetings for the Volunteer Fire Department and Fire Safe Council
 - Hosted a 100+ community event to announce their final plans for reinvigorating the local FSC

- RFS, FRG, and Dinsmore attended the Hopland Biomass Symposium Conference and the NCRP quarterly meeting on climate change