The California Sawmill Revitalization Initiative

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UCDAVIS
Graduate Program of
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Project Team:

Sarah Adler
Christina Harrington
Cole Jenson
Thomas Miller
Maria Rechdouni

Clients:

California Governor's Office of Business and Economic Development

The Watershed Center
Hayfork, California

United States Environmental Protection Agency

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EXECUTIVE SUMMARY

In response to the increasing threat of catastrophic wildfires, California and the U.S. Forest Service agreed to jointly treat 1 million acres of California forests and wildlands annually. Forest treatment activities to improve forest and watershed health often produce small-diameter logs, tree trimmings, and other low-value forest biomass that California lacks the capacity to utilize efficiently and sustainably. New forest protection policies enacted in the late 20th century constricted the timber industry, causing closures of sawmills and other forest-related businesses that were important employers for local rural residents. In collaboration with the Watershed Research and Training Center, U.S. Environmental Protection Agency, and California Governor's Office of Business and Economic Development, our team evaluated the potential for redeveloping former sawmill sites to support California's expansion of forest wood-processing capacity for low-value forest biomass to help the state achieve wildfire resiliency, rural economic development, and climate resiliency goals.

Over a five-month period, we implemented a mixed methods approach to evaluate environmental, policy, and social conditions that indicate the suitability of former sawmill sites for redevelopment. We interviewed 17 stakeholders - a mix of public agencies, non-profit organizations, and industry experts working in the forest management and wood products industries - to inform our research and analysis. Starting with an existing database of former sawmill sites developed by the U.S. Forest Service and UC Agriculture and Natural Resources, we narrowed 208 sites to 140 that are not already developed for other purposes. We applied three geospatial datasets to narrow the 140 sites to 10 sites we could reasonably gather detailed information for given a short timeline: (1) recoverable forest biomass within 40 miles, (2) household poverty percentile, (3) and sites with "low" Rural Capacity Index scores, a metric developed by Headwaters Economics. Based on a literature review and feedback from stakeholders, we developed a reproducible weighted prioritization matrix tool to gather and score 17 environmental, policy, and social data points about sites that influence redevelopment success. These data points, such as recoverable forest biomass, land use zoning codes, proximity to electric substations, existing water infrastructure serving a site, among others, were weighted based on feedback from our clients and surveyed expert stakeholders. We share detailed information for 9 sites shared between Inyo, Siskiyou, and Trinity counties. These sites do not necessarily represent the best sites in the state, but rather an example of our tool used with the data and methods that were available to us. Each new facility will be unique and require different conditions, making the flexible interpretation of our results imperative.

Due to the complexity of redeveloping former sawmill sites and the need for advanced planning and partnerships, our project included an analysis of the policy context surrounding this work. We identified seven key policy considerations that influence the redevelopment of former sawmill sites and strategies that stakeholders can use to navigate the policy landscape. We developed a brownfields grant preparation guide to assist communities interested in redeveloping former sawmill sites into wood utilization businesses.

This research is a starting point for other stakeholders to build upon. We encourage stakeholders to further evaluate all former sawmill sites in California, engage community residents and landowners, and coordinate with other stakeholders who are leading parallel and synergistic efforts to enhance momentum for advancing California's wood processing capacity to support wildfire resilience, rural economies, and climate resilience.

Key Definitions

Bioenergy: produced by converting biomass- agricultural waste, wood waste from forest thinnings or sawmills, urban wood waste, and municipal waste- into electricity, biofuels, or biogasses.

Brownfield: a property with environmental contamination or potential contamination resulting from the past use of the property, complicating the successful reuse of the property. Former sawmill sites are often considered brownfield properties.[107]

Capacity: the ability for a community, organization, and/or network of stakeholders to marshal and leverage a dynamic set of resources, skills, and relationships to achieve goals and objectives.

Community-scale facility: a facility scaled to the needs and operational capacity of one rural community, rather than to an investor-return driven business plan.

Environmental justice: the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation and enforcement of environmental laws, regulations and policies.[103]

Feedstock: residues from forest treatment activities (e.g. masticated logs) or sawmills (e.g. wood trimmings) that can be used for (or "feed" into) bioenergy production.

Forest treatment: forest management activities that aim to improve the forest composition and reduce combustible biomass to reduce wildfire risk, improve watershed health, and/or support wildlife habitat. Activities include mechanical thinning, prescribed/cultural burning, pruning, and mastication or mowing of understory biomass.[45]

Forest-based woody biomass/forest biomass: material produced from the harvest of trees and production of lumber, such as tree tops and limps.[58]

Small-diameter trees: less than 10 inch diameter-breast-height, diameter of a standing tree at four and one-half feet from the ground.[55]

Stakeholder: anyone that has a vested interest in and/or influence on site redevelopment and supporting the expansion of wood-processing facilities, such as Tribes, policymakers, agency leadership and staff, community organizations and residents, and industry experts.

Thinning: a forest management process that removes slower-growing or defective trees in order to reduce wildfire risk, reduce competition among trees, and maintain healthy forests.

Value-added wood products: byproducts of other higher value products, such as merchantable timber. Examples include posts and poles, landscape chips and bark mulch, tree stakes, compost, animal bedding, biochar, and biofuels.[64]

Wood processing facility: a light, medium, or heavy industrial facility that primarily converts forest wood biomass into value-added wood product(s), such as fence posts, wood chips, construction materials, or other, or bioenergy and/or associated byproducts, such as electricity, hydrogen, biofuels, and/or biochar.

BACKGROUND

This project was a prerequisite for us (the authors) to graduate from the Environmental Policy and Management master's program at the University of California, Davis. Our three clients - the California Governor's Office of Business and Economic Development, the U.S. Environmental Protection Agency, Region 9, and the Watershed Research and Training Center proposed this research project to our graduate program. We initiated the project in January 2023 and concluded on June 8, 2023. During the approximate five-month project timeline, we collaborated closely with our clients to develop the scope, refine our methods and results, and connect with as many stakeholders as possible.

Project Goal. Evaluate the potential for redeveloping former sawmill sites to support California's expansion of forest wood-processing capacity for low-value biomass to help the state achieve wildfire resiliency, rural economic development, and climate resiliency goals.

This is a starting point. Our intention and hope is that the analysis we developed here will be adopted or expanded by future researchers and stakeholders who can continue evaluating former mill sites across California. While we report detailed data on several former sawmill sites, **we do not suggest eliminating the remaining sites** strewn across California without further investigation and community engagement. Please review our Methods and Limitations sections for more discussion.

INTRODUCTION

California needs to expand its wood-processing capacity as part of a strategy to reach wildfire resilience, rural economic development, and climate resiliency goals. Decades of misguided forest management practices, fire suppression, pest damage, and drought have contributed to sweeping tree mortalities and accumulation of forest fuel that intensifies wildfire risk.[20,47] In 2020, wildfires claimed thirty-three lives and burned 4.3 million acres in California[19] - more than twice the acreage burned in the state's history since European settlement.[80]

California is improving forest health across the state, but there are insufficient outlets for using the resulting forest biomass.[83] The U.S. Forest Service and California entered a shared stewardship agreement to jointly treat 1 million acres of forest and wildland every year.[72] These increased forest treatments result in low-value woody biomass like small-diameter logs (<10 inches diameter-breast height), trees damaged by pests, droughts, and fires, and woody material referred to as "slash". California lacks the amount of infrastructure required to process the estimated annual production of 15.1 million bone dry metric tons of forest biomass.[6]

The lack of a market for low-value forest biomass deters this infrastructural development.[25] The cost of collecting and transporting the forest material outweighs the material's value in the current wood products market. Without a cost-efficient alternative, land managers commonly burn the harvested forest material in open piles, releasing

greenhouse gasses and noxious air pollutants, or would have to leave biomass in forests where they heighten wildfire risk.[88] This is a problem throughout the Western United States, where states are generating more low-value woody biomass from forest treatments, but have inadequate processing capacity, particularly for small-diameter wood.[55] Examples of products that can be produced from low-value forest biomass include firewood, posts and poles, and biofuels.[64] With investments and implementation of strategies to expand the state's wood processing capacity of low-value forest material, California could become a leader for solutions for the Western region.

Improving forest management practices and expanding wood-processing capacity is aligned with current federal and state priorities. In January 2021, the Biden-Harris Administration released an Executive Order on Tackling the Climate Crisis at Home and Abroad addressing the need to achieve net-zero emissions by 2050 as a part of national security and international foreign policy goals, including improving resilience to wildfires, investing in sustainable infrastructure, and generating well-paying jobs.[94] The 2021 Infrastructure Investment and Jobs Act (the Bipartisan Infrastructure Bill) allocated at least $33.7 million to the U.S. Forest Service for supporting the wood products industry and sustainable forest management.[109] Several state policies and plans align with these efforts - Governor Brown's Executive Order B-52-18,[49] the 2018 Forest Carbon Plan (Goal 3.3),[47] the 2021 Wildfire and Forest Resilience Action Plan (Goal 3),[20] and the 2022 Scoping Plan for Achieving Carbon Neutrality (Chapter 4),[13] and a proposed continuation of a $2.7 billion wildfire and forest resilience package in the 2023-24 state budget.[61]

APPROACH & METHODOLOGY

This is a starting point. Our intention and hope is that the analysis we developed here will be adopted or expanded by future researchers and stakeholders who can continue evaluating former mill sites across California. While we report detailed data on several former sawmill sites, **we do not suggest eliminating the remaining sites** strewn across California without further investigation and community engagement.

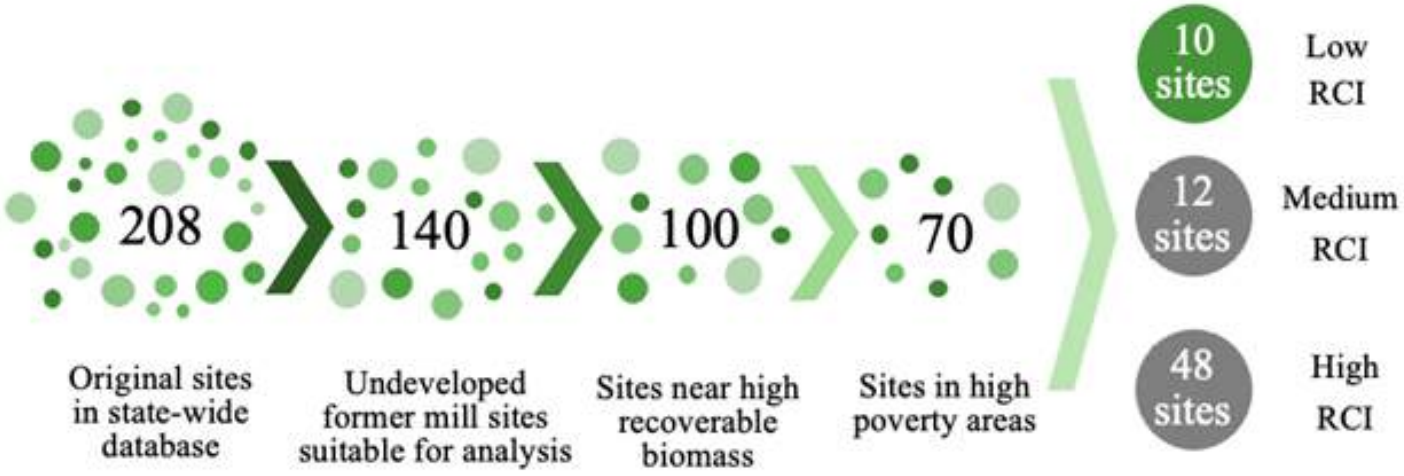

Figure 1. Overview of how our Project Phase 1 methods narrowed down a database of 208 former sawmill sites to 10 sites we evaluated in more depth in Project Phase 2. We applied three existing geospatial datasets - recoverable biomass, poverty percentile, and rural capacity index (RCI) scores - that resulted in three groups of sites with "high", "medium", or "low" RCI scores. Our team decided to evaluate the 10 sites further in Project Phase 2. Headwater Economics developed RCI scores based on a variety of indicators that can support a community's ability to attain public grants. RCI scores do not capture features of community capacity like trusted relationships, strength of networks, and community cohesion.

This analysis does not recommend wood-processing facility types. We did not approach this analysis with any particular wood products, processing facilities, nor supply chains in mind. Our goal was to evaluate sites that could accommodate wood processing facilities that can handle the kind of low-value forest biomass (slash, small-diameter logs, drought/fire/pest damaged trees) that we anticipate federal, state, and local partners will be harvesting from the forests to improve forest health.

Adopting an environmental justice lens. We understand environmental justice to be "the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation and enforcement of environmental laws, regulations and policies."[103] Many of California's rural communities have experienced disinvestment, significant losses in industries that provided employment, and intense wildfires that devastated lives. It is important to us that our research, and any future efforts that build on this research, focuses on the needs of those who are not only vulnerable to impacts from climate-related disasters like wildfires, but who also stand to benefit from investments in wood facilities that can provide well-paying jobs, support forest restoration efforts, and reduce the risk of wildfires. Our methods describe how we practically applied an environmental justice lens in this research

Figure 2. Example of former sawmill sites we visually assessed using Google Earth Pro. We eliminated the site on the top from our analysis due to significant existing development, but retained the site on the bottom due to sparse development and portions of undeveloped space on the parcel.

Methods

Project Phase 1 Analysis

Database Refinement

We began with a database developed by the U.S. Forest Service and UC Agriculture and Natural Resources consisting of 208 former wood processing (sawmill) facilities in California. To prepare the database for geospatial analysis, we visually confirmed that each site was still relatively viable for redevelopment. We used Google Earth Pro and OnX Maps to visually assess whether a site was fully redeveloped or not. This allowed us to determine which of the former sawmill sites are currently populated with dense commercial, residential, or other types of urban development, which would impede the possible development of a new wood-processing facility (see Figure 2). By using OnX Maps, we were able to verify the full ownership boundary of the parcel that coordinates are located on. This allowed us to make better determinations of site feasibility with respect to site acreage and access to main roads. As a result of our two-pronged assessment, we removed 70 sites from

our Project Phase 1 geospatial analysis based on our visual determination that the existing developments would bar any development of wood-processing facilities. From the original 208 sites, 140 sites moved onto our Project Phase 1 geospatial analysis.

Criteria Development

Our primary goal for Project Phase 1 was to produce a subset of the database using a set of baseline criteria aligned with our project objectives. This had the dual purpose of 1) creating a reproducible screening tool for sites, and 2) being able to reasonably reduce the quantity of sites in our Project Phase 2 analysis in order to fit our timeline and capacity as a
team. Our criteria development process began with an informal review of literature on the siting and development of wood utilization infrastructure. The literature reviewed came both from our own research as well as resources provided by our clients and other stakeholders. Concurrently, we began interviewing expert stakeholders across the many intersecting fields involved in wood utilization, with a focus on factors they believed were important to the siting of wood utilization facilities. We developed a draft list of criteria based on the literature we reviewed and stakeholder feedback. We iteratively refined the list based on client and stakeholder feedback. Stakeholders interviewed later in the process reviewed the list directly.

We went through multiple frameworks for Project Phase 1 criteria, but, in order to broaden the utility of the analysis as a screening tool in the future, we ultimately landed on a simpler GIS workflow centered on recoverable biomass, rural capacity, and need for economic revitalization. Other criteria initially envisioned for Project Phase 1, such as proximity to transportation infrastructure, permitting, and pollution, were preserved for the Project Phase 2 weighted matrix.

Geospatial Analysis

Based on a range of environmental and social equity criteria, we applied geospatial methods using ArcGIS Pro to narrow the 208 sites to 10 sites. We determined that surrounding recoverable biomass, household poverty levels relative to other regions of California, and a rural capacity index are effective criteria to refine our list and identify the most suitable facilities for redevelopment. For biomass recoverability within the state, we used California Biomass Residue Emissions Characterization (C-BREC) model developed by Schatz Energy Research Center to identify six counties with the highest quantity of recoverable biomass. These results were confirmed by Baker et al.'s report Getting to Neutral, [6] which used the BioSum and Forest Vegetation Simulator tools developed by the U.S. Forest Service. San Bernardino County was included due to the region's potential to process shrub and chaparral biomass from fuel reduction treatments. We applied a 20 mile buffer around the six counties in ArcGIS Pro to incorporate sites that could still reasonably acquire forest biomass from these regions. Applying this biomass layer reduced our site list from 140 to 100 (see Figure 3).

Next we incorporated social equity criteria layers. First we applied a poverty percentile from CalEnviroscreen 4.0, developed by the California Office of Environmental Health Hazard Assessment, to identify sites existing in extreme poverty. Poverty percentile indicates the percent of households, relative to the rest of the state, that meet a threshold of two times the federal poverty levels. For this step in our analysis, we selected census tracts where the number of households above 200% of federal poverty was greater than 75% of other census tracts in California. A five mile buffer was applied to account for and incorporate former sawmill sites that are located just outside the census tracts. This poverty layer was intersected with counties that have high recoverable biomass to identify sawmills positioned in regions that will benefit from forest thinning as well as economic revitalization. Applying this poverty layer reduced the sites from 100 to 70 (see Figure 4). We included the poverty indicator to position regional economic development as a primary goal of our analysis and later site selection and to account for communities still may still be experiencing the economic impacts of the reduced timber industry.

The final social equity criteria layer we applied was the Rural Capacity Index developed by Headwater Economics. We acknowledge that determining rural capacity is a complex and sensitive issue, and screening tools do not capture trust between community stakeholders, a community's initiative, nor the presence of individual champions. This Index relies on an imperfect snapshot of measurable variables, but many components of community

capacity are not easily quantified. The resilience of people, the power of community cohesion, the depth and breadth of informal networks, and a community's story are difficult to capture in a number. Headwater Economics determines a community's rural capacity mainly by its ability to obtain grants to fund infrastructure improvements that could benefit rural communities. Index scores are based on the presence and status of a variety of community aspects, including: metropolitan status, having a head of planning, having college or university, adults with higher education, families above poverty level, households with broadband, people with health insurance, voter turnout, income stability score, and population change. The mapping tool assigns regions according to three tiers: "low", "medium", or "high" capacity. For the purposes of our analysis, we intersected the three capacity tiers individually with our biomass and poverty intersection. We clipped the former sawmill facilities that existed on the intersection of our multiple criteria layers. For a step-by-step methodology of our Project Phase 1 geospatial analysis, see Appendix 1.0.

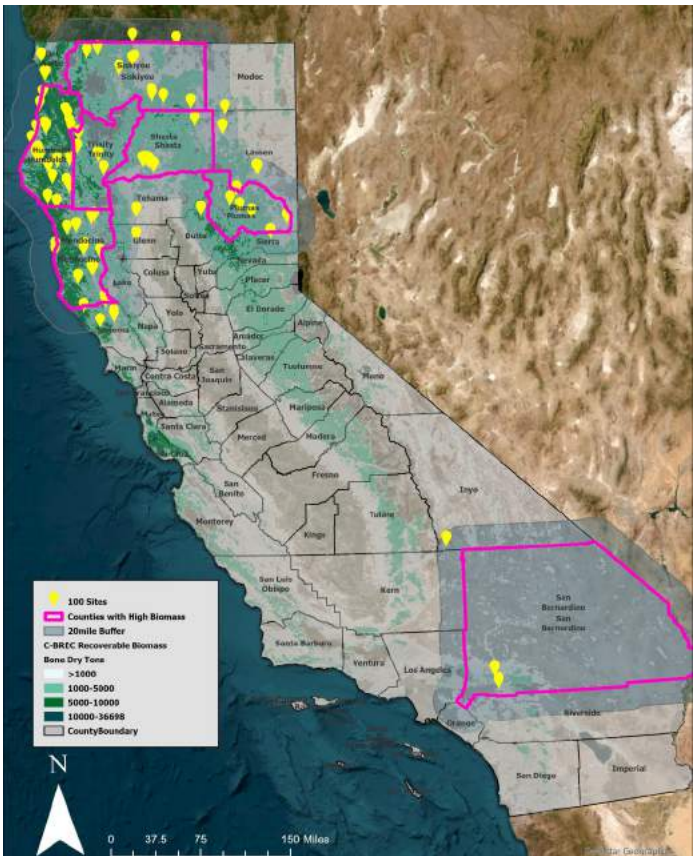

Figure 3. California Biomass Residue Emissions Characterization (C-BREC) model was applied to identify seven counties with the highest quantity of recoverable forest biomass. A 20-mile buffer was applied to county boundaries to incorporate nearby sites. This allowed us to reduce sites from 140 to 100 sites. Counties include Humboldt, Mendocino, Siskiyou, Trinity, Shasta, Plumas, and San Bernardino.

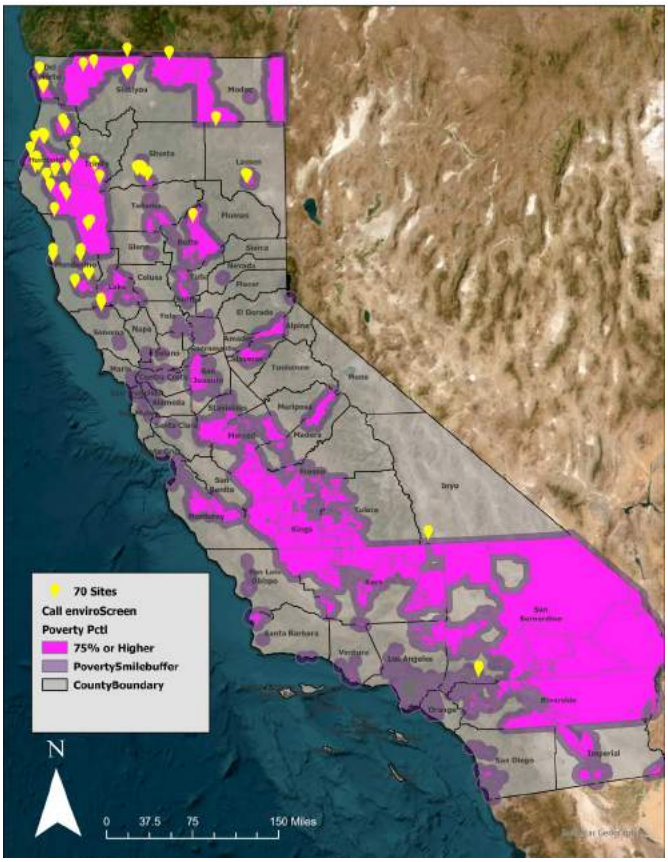

Figure 4. Poverty percentile (>75th) and 5-mile buffer intersected with the 100 sites resulting from the biomass recoverability step, further reducing site count to 70. Poverty was important for identifying sites that exist in communities that could potentially benefit from the economic benefits of new wood-processing facilities.

Project Phase 2 Analysis

Criteria Development

Our goal for Project Phase 2 was to provide more detailed information on the sites identified in Project Phase 1, as well as a tool for using that data to prioritize sites. The approach we selected for this was a weighted prioritization matrix (see Table 1). First a set of criteria are defined and data points are collected for each criterion for each site. Then, scoring thresholds are defined for each criterion, and the thresholds are used to assign scores for each site. Each criterion is "weighted" in the analysis by using a higher or lower amount of total possible points for the criterion based on its importance to the analysis. For instance, a very important criterion might be scored on a scale of 0-5, whereas a less important criterion might be scored on a scale of 0-2, so that the more important criterion has a larger effect on the total score for the site. We added the individual criterion scores for a final score to rank a site's suitability for redevelopment.

As in Project Phase 1, a list of draft criteria was produced based on literature review and stakeholder feedback. Some that were not implemented during Project Phase 1 were adopted in Project Phase 2. Clients reviewed and provided suggestions for the list, after which we sent a survey on the draft criteria to stakeholders in order to expedite feedback. We assigned preliminary weights to the criteria and compared them to stakeholder rankings of the criteria from the survey. Concurrently, data were collected on each criterion for each site, and each team member defined scoring thresholds for the criteria that they collected data for. Finally, scores were assigned and totaled to produce the prioritization matrix.

Data collection

Data for Project Phase 2 criteria were collected from the following sources:

- Land ownership: OnX Maps
- Transportation Infrastructure:
  - Major roads: Google Earth Pro X
  - Rail: California Department of Transportation - California Rail Network
- Utility Infrastructure:
  - Grid Connectivity/Substations: California Energy Commission–California Electric Transmission Lines
  - Water connectivity: California Department of Water Resources–Public Water Agencies Map
  - Sewer connectivity: Trinity County Parcel Viewer. Happy Camp Community Services District (Water Works). City of Dorris Public Works.
- Permitting/Zoning
  - Water Compliance Permits: State Water Resources Control Board California Integrated Water Quality System Project (CIWQS) Facility At-A-Glance Report
  - Air quality data: California Air Resources Board
  - Zoning data:
    - Inyo County Parcel Map. County Municipal Code
    - Trinity County Parcel Map Viewer. County Municipal Code.
    - Siskiyou County Parcel Map Viewer. County Municipal Code.
    - City of Dorris Municipal Code
  - General Plan data:
    - Inyo General Plan
    - Trinity County Draft 2050 General Plan
    - Siskiyou General Plan
    - City of Dorris General Plan

- Environmental Contamination:
  - Department of Toxic Substances Control Envirostor and State Water Resources Control Board Geotracker Database
- Further Biomass Considerations:
  - Ownership of surrounding forested land: California Natural Resources Agency–California Land Ownership
  - Biomass recoverability: Schatz Energy Research Center–C-BREC model
- Further Social and Environmental Justice Considerations:
  - Pollution data: California Office of Environmental Health Hazard Assessment: California Enviroscreen 4.0
  - Unemployment data: California Employment Development Division; California Office of Environmental Health Hazard Assessment: California Enviroscreen 4
- Current Momentum:
  - Proximity to OPR Feedstock Pilot Projects: personal email communication with OPR staff
  - Forest collaboratives nearby: Exploratory internet search using keywords for nearby watersheds, counties, communities, and other relevant regions plus "forest collaborative" and then "forest partnership"
  - Forest collaboratives nearby: Exploratory internet search using keywords for nearby watersheds, counties, communities, and other relevant regions plus "forest collaborative" and then "forest partnership"

Stakeholder Engagement

Scope of Engagement

Wood utilization, and particularly the siting of new wood utilization facilities, is a complex topic involving a wide breadth of expertise. Staff from multiple federal, state, and local agencies, nonprofits of different scales, and private businesses, as well as community members, tribal members, and site owners, all have important involvement and perspective. Due to the condensed timeline of our project, the scope of our stakeholder engagement was limited, and we were not able to engage with stakeholders from every relevant group. Our team's newness to this field and to the rural areas of California that the project centered also contributed to this. We felt that we could not properly do the groundwork for useful engagement with community members, tribal members, and site owners in the time that we had, and that it was important not to engage ineffectively or without full context and relationship building. That being said, we were able to engage a very wide breadth of experts and professionals within the remaining categories.

Engagement Methods

During Project Phase 1, we relied heavily on the connections of our clients to find stakeholders and begin our engagement efforts. They provided robust networks, and this issue was important to every person that we spoke with, the combination of which smoothed many common issues with engagement efforts. A large wood industry conference, the Forestry Workforce Summit, was held at UC Davis at the end of the first month of our project, and three of our team members were able to attend portions of the conference. Important connections were made by student consultants and clients, and the project received important exposure.

For both phases, we created semi-structured interview guides before stakeholder meetings to guide conversation, with flexibility for stakeholders' areas of expertise and specific experience. As much as was feasible, stakeholder meetings were conducted at a regular time each week with student consultants and clients present, in order to maximize information gathering and connection making. Stakeholder meetings were all student lead, with one or more members of the student consultant team taking notes.

For Project Phase 2, we developed a survey to collect feedback on potential criteria for our analysis. This survey was sent to clients, stakeholders engaged previously, and stakeholders engaged during Phase 2 (after each meeting). Stakeholders engaged spanned five California state agencies, one federal agency, two local agencies, four nonprofits, and four private enterprises. A detailed list of the organizations stakeholders represented can be found in Appendix 2.0.

Table 1. Weighted priority matrix.

Category	Purpose	Factors	Point value
Land Ownership	The type of site owner can affect compliance processes and other requirements. Contiguous acreage affects development options.	Public or private entity Acreage of contiguous parcels	Total possible: 2 points +1: private owner +1: >50 acre site
Transportation Infrastructure	Sites with close access to transportation will face lower costs and fewer hurdles	Major roads (on/off ramps) Rail	Total possible: 4 points +1: highway proximity (<5mi) +0.5: multiple access points to site (more than 1 road) +0.5: access roads that connect to local communities +2: rail on site (partial for close proximity)
Utility Infrastructure	Sites with existing utility connectivity will face lower costs and fewer hurdles	Grid connectivity/sub stations Water connectivity Sewer connectivity	Total possible: 3 points +1: 0.5 if connected to transmission line and 0.5 if adjacent to substation (0.25 for <1/2 mile from transmission line, 0.25 <1 mile from substation) +1: served by water district +1: served by sewer provider
Permitting and Zoning	Acquiring new permits can be prohibitive depending on local regulatory bodies. Even if it is possible, permitting and zoning changes can be time consuming and expensive	Water compliance permits Air quality attainment status (air permit regulation consideration) Local zoning ordinances (e.g. is site industrially zoned?)	Total possible: 4 points +1: site has existing water compliance permit +1: air quality attainment status per state and federal standards +2: industrial zoning (+1 for relevant permitted conditional uses)

Table 1 continued. Weighted priority matrix.

Category	Purpose	Factors	Point Value
Environmental Contamination	Existing contamination can be a barrier.	Contamination identified? What type? Clean up status?	Total possible: 3 points +3: site contamination assessed and clean up plan initiated (partial for only assessment)
Further Biomass Considerations	Phase 1 selected for recoverable biomass, but other important biomass factors are outstanding	Ownership of surrounding forest Recoverable Biomass within 15 mile radius	Total possible: 2 points +1: >50% of surrounding land is public +1: >5,000,000 BDT within 15 mile buffer (0.5 for between 1,000,000 - 5,000,000 BDT)
Further Social and Environmental Justice Considerations	Income and regional capacity were major factors in Phase 1 analysis, but at this more granular level other factors may be useful and important	Pollution Unemployment	Total possible: 2 points +1: >70th percentile unemployment +1: >50th percentile PM 2.5 concentrations or asthma rates
Current Momentum	Investment from other agencies and nonprofits has been highlighted for us as a good indicator of forward momentum	Proximity to OPR feedstock pilot projects Nearby forest collaboratives?	Total possible: 3 points +2: site within OPR feedstock pilot project boundary +1: forest collaborative nearby

Limitations

Project timeline. Due to a tight five-month timeline for planning and implementing our project, we could not practically evaluate all 208 former mill sites in California. We do not consider the product of our analysis to be a holistic recommendation, but rather a partial assessment of sites using limited data. We developed the evaluation criteria and step-by-step geospatial analysis guidebook (see Appendix 1.0) to enable researchers and stakeholders to continue a state-wide assessment.

Datasets. We acknowledge the data and screening tools we used have their own limitations. Data does not capture all site conditions nor experiences and resources a surrounding community possesses. Census tracts and county subdivisions do not typically represent the community that residents inhabit and resonate with. CalEnviroScreen is a widely adopted tool to assess "disadvantaged communities" in California. Staff at the Sierra Institute for Community and Environment emphasized that the tool's limitations imply that rural forest communities are not experiencing severe poverty, unemployment, pollution, and other environmental justice considerations. The Sierra Institute is considering how to develop new methods for evaluating conditions like poverty, unemployment, and rural capacity within California's rural forested context.[8] While our datasets are not placed-based, they are the best tools we had for our allotted timeline. We highly recommend future researchers conduct robust community engagement and resident interviews when further evaluating sites.

Available Biomass. We used the CBREC model to evaluate recoverable forest biomass but (1) timber harvest plan data layer was available but not editable, limiting analysis to acreage instead of biomass quantity (BDT); (2) we did not have the time or resources to calculate practically available biomass. LIDAR data to account for tree species and distribution, and further assessing wood sheds and access to biomass, and accounting for wood-processing capacity at other nearby facilities would augment the analysis. CLERE Inc. is consulting on several OPR feedstock aggregation pilot projects and has adopted several of these parameters to calculate "practically available biomass".

Community-level engagement. Due to the condensed timeline, we concluded we could not reasonably nor respectfully conduct community engagement within the rural communities where the former sawmill sites are located. Understanding residents' perceptions, histories, needs, and desires related to wood-processing businesses would have enriched this analysis. We highly recommend future researchers and stakeholders evaluating sites and/or pursuing redevelopment conduct meaningful engagement with the local community residents and stakeholders in a transparent process.

RESULTS

Project Phase 1 Geospatial Analysis Results

Initial database cleaning to prepare the data for our purposes resulted in the reduction of 208 original sites to 140 formal sawmill sites with potential for redevelopment. Intermediary steps of our geospatial analysis resulted in reductions from 140 to 95 sites based on recoverable biomass, and from 95 to 70 based on poverty levels. The final step of our Phase 1 geospatial analysis resulted in three categories of sites. The first category included 10 sites with high recoverable biomass, high poverty rates, and low rural capacity index scores. The second category included 12 sites with high recoverable biomass, high poverty rates, and medium rural capacity index scores. The third category included 48 sites with high recoverable biomass, high poverty rates, and high rural capacity index scores (see Figure 4).

We selected the first category of 10 sites to move onto Project Phase 2 of our analysis (see Figure 5). We specifically selected sites located in low capacity regions because, based on the assumptions of the screening tool, low capacity communities would experience the greatest difficulty in acquiring resources to conduct site assessments and pursue the redevelopment of a wood-processing facility. Thus, investing in these regions will have the combined benefit of reducing community's wildfire risk while also providing an economic benefit, increasing capacity, and increasing community resilience. At the beginning of Project Phase 2, we eliminated one of the sites (Coley Lumber Kenneth, Hayfork, Trinity County) due to a large dammed reservoir intersecting the parcel. The following results based on our Project Phase 2 evaluation criteria are for the remaining nine sites. A spreadsheet with our Project Phase 2 results can be found as an attachment with this report.

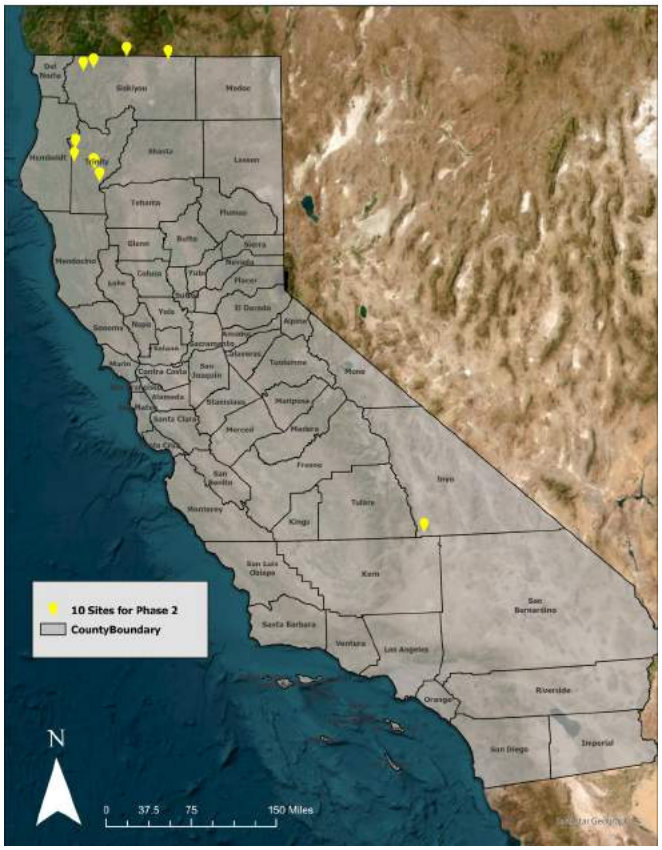

Figure 5. Final site selection from Phase 1 Geospatial Analysis. These 10 sites will be used for the development of the weighted prioritization matrix.

Project Phase 2 Site Analysis Results

The results of our weighted prioritization matrix analysis, including the data collected for each criterion, can be found below. The total points allowable for a site in the matrix was 23. The lowest score was 4.25, and the highest score was 17. Maps of geospatial data gathered for Project Phase 2 can be found in Appendix 5.0.

Project Phase 2 Site Analysis Results

Table 2. Summary of weighted prioritization matrix scores for each site in project phase 2. The maximum possible score for a site is 23.

Community	County	Historic Site Name	Current Owner	Evaluation
Hayfork	Trinity	Sierra Pacific	Murrison Scott	17/23
Happy Camp	Siskiyou	Stone Forest Industries, Inc. (Happy Camp Lumber Oper-	Yeager Daniel R & Debbie G Trust	17/23
Hilt	Siskiyou	Fruit Growers Supply	Fruit Growers Supply Company (pending ownership transfer to New For-	13/23
Burnt Ranch	Trinity	Stone Forest Products	SWF Plywood Co.	11.5/23
Seiad Valley	Siskiyou	Hi-Ridge Lumber	Anthony Bishop	11/23
Wildwood	Trinity	Kimberly-Clark Cor-	BPS Associates 2 LLC	10.75/23
Hyampom	Trinity	Hyampom Lumber	Foster Steven	9.5/23
Dorris	Siskiyou	American Forest Products (Dorris)	Butte, Valley	9.25/23
Pearsonville	Inyo	Louisiana Pacific	State of California	4.25/23

Project Phase 2 Site Analysis

Inyo County– 1 site

Air District: Great Basin Unified Air Protection Control District

Air Quality Attainment Status[2]

- Per the California State area designations, Inyo County is a nonattainment region for particulate matter (PM_{10}) and ozone and either unclassified or in attainment for the other eight state criteria pollutants.
- Per the federal area designations, the county is partially in nonattainment for PM_{10} in the Owens Valley and Mono Basin regions, but in attainment for PM_{10} in the Coso Junction region. All other areas of the county are unclassified for the six other federal criteria pollutants.

Historic Site Name: : Louisiana Pacific (Inyokern)

Evaluation Score: 4.25 out of 23

Community: Pearsonville

Address: 9 mile canyon Rd. (near Highway 395)

Coordinates: 35.842606, -117.870542

Current Owner: State of California

Land Ownership

Parcel size: 123.08 acres

Type: Public

Transportation Infrastructure

Major roads: The site is located adjacent to

Criteria Categories	Score	Total Possible Points
Land Ownership	1	2
Transportation Infrastructure	1	4
Utility Infrastructure	0.25	3
Permitting and Zoning	1	4
Environmental Contamination	0	3
Further Biomass Considerations	1	2
Further Social and Environmental Justice	0	2
Current Momentum	0	3

Table 3. Summary of scores for Louisiana Pacific.

Rail: Trona Railway runs along East and South of the parcel. The site is located approximately 33 miles from the railway when measured at the shortest distance via ArcGIS.

Permitting and Zoning

Water Compliance Permit: No record

Utility Infrastructure

Electric Substation: 10 miles away

Transmission Lines: ¼ mile away

Water: No municipal service provider

Sewer: Unable to identify

Zoning: Industrial and Open Space[53]

- The parcel includes *both* General Industrial and Natural Resources designations and exists in the county's non-groundwater-neutral agricultural region, which aims to regulate groundwater resource use for agricultural activities (Inyo County Municipal Code (I.C.M.C.) §18.67).
- The county designates M1 for general industrial and extractive use, allocating land for manufacturing, processing, and storage facilities that do not "cause pollution of any human or natural resource" (I.C.M.C §18.57.020).
- The county designates open space to protect natural and agricultural lands from deleterious environmental impacts, while also supporting "compatible multiple use" for land owned by state and federal agencies (I.C.M.C§18.12.010 (C)). Generally permitted uses are single-family dwellings, agriculturally-related structures and activities, and wilderness areas. Conditional uses for the zone include a wide range of structures and activities, including "mining and processing of natural resources" (I.C.M.C.§18.12.040(I)).

Environmental Contamination: No record

Further Biomass Considerations

- Forest land ownership: 91.4% federal. 8.3% private. 0.3% other
- Recoverable biomass (BDT in 15 mile radius)**:** 12,348

Further Social and Environmental Justice Considerations

Pollution:

- PM2.5 Concentration: 4.36
- PM2.5 Percentile: 0.635
- Asthma Percentile: 34.75

Unemployment:

- Unemployment Rate: 3.5%
- Unemployment Percentile: 35.02

Current Momentum

Within project boundary? No

Forest collaborative nearby? No

Project Phase 2 Site Analysis

Trinity County– 4 Sites

Air District: North Coast Unified Air Quality Management District

Air Quality Attainment Status[2]

- Per the California State area designations, the county is unclassified for carbon monoxide, hydrogen sulfide, and visibility reducing particles. The region is in attainment for the remaining seven criteria pollutants.
- Per the federal area designations, the county is unclassified for all seven criteria pollutants.

Note about the General Plan. Trinity County approved its last General Plan land use element in 1989. The county is currently updating its General Plan[62] and it is possible this may lead to zoning code changes.

Historic Site Name: Kimberly-Clark Corporation

Evaluation Score: 9.75 out of 23

Community: Wildwood

Address: Old Cold Creek Rd, Platina, CA 96076

Coordinates: 40.38581, -123.064106

Current Owner: BPS Associates 2 LLC

Land Ownership

Parcel size: 142.1 acres

Type: Private

Criteria Categories	Score	Total Possible Points
Land Ownership	2	2
Transportation Infrastructure	1.5	4
Utility Infrastructure	0.25	3
Permitting and Zoning	1	4
Environmental Contamination	0	3
Further Biomass Considerations	1	2
Further Social and Environmental Justice	1	2
Current Momentum	3	3

Table 4. Summary of scores for Kimberly-Clark Corporation.

Transportation Infrastructure

Major roads:

- The site is located adjacent to Highway 36 and has access to the onramp via Old Cold Creek Rd.
- There are multiple points of access to the site: via Old Creek Rd on the northeast side, which connects to Highway 36; and via Hayfork Creek Road on the southeast side, which connects to a network of forest roads.

Rail:

- Northwestern Pacific Railroad runs west along the parcel, located approximately 42 miles from site when measured at the shortest distance via ArcGIS.
- Central Oregon and Pacific Railroad runs east along the parcel, located approximately 48 miles from site when measured at the shortest distance via ArcGIS.

Utility Infrastructure

Electric Substation: 1 mile away

Transmission Lines: ½ mile away

Water: No municipal service provider

Sewer: No municipal service provider

Permitting and Zoning

Air: see above

Water Compliance Permit: No record

Zoning: Rural Residential and Unclassified. Critical Water Resources Overlay District[95]

- Site exists in a mixed base zone designations - Unclassified and Rural Residential - and within the county's Critical Water Resources overlay.
- The Rural Residential designation is generally reserved for single family dwellings with limited agricultural uses. Other certain uses, such as labor camps, campgrounds, and quasi-public uses, are allowed with approved permits (Trinity County Municipal Code (T.C.M.C.)§ 17.15.005-15.020). The county's 2050 draft General Plan notes the designation is for "rural areas where minimal county services are available *and service expansion is not desirable*."[62]
- Unclassified areas are those that do not have determined uses at this time. The county allows single family dwelling, Christmas tree farms, orchards, row/field crops, and forestry. Any other use may be allowed with an approved use permit (T.C.M.C. § 17.11.010-11.030).
- Landowners in the county's Critical Water Resources overlay district have to meet specific water quantity and quality standards as a means of protecting groundwater and surface water resources (T.C.M.C. § 17.29A).

Environmental Contamination: No record

Further Biomass Considerations

- Forest land ownership: 72.2% federal. 27.8% private
- Recoverable biomass (BDT in 15 mile radius): 5,992,359

Further Social and Environmental Justice Considerations

Pollution:

- PM2.5 Concentration: 4.02
- PM2.5 Percentile: 0.448
- Asthma Percentile: 33.33

Unemployment:

Unemployment Rate: 6%

Unemployment Percentile: 88.08

Current Momentum

Within project boundary? Yes

Forest collaborative nearby? Yes, Trinity County Collaborative Group

Historic Site Name: Sierra Pacific (Hayfork Division)

Evaluation Score: 17 out of 23

Community: Hayfork

Address: 31 Mill Ave (near Highway 3)

Coordinates: 40.55016, -123.146741

Current Owner: Murrison Scott

Land Ownership

Parcel size: 81.71 acres

Type: Private

Transportation Infrastructure

Major roads:

- The site is located adjacent to Highway 3 and has access to the onramp via Mill Ave.
- The site has two primary points of access: via Mill Ave running along the north side, which connects to Highway 3; and Morgan Hill Road running along the south side of the property, which is a forest road.

Rail:

- Northwestern Pacific Railroad runs west along the parcel, located approximately 46 miles from site when measured at the shortest distance via ArcGIS.
- Central Oregon and Pacific Railroad runs east, located approximately 52 miles from the site when measured at the shortest distance.

Utility Infrastructure

Electric Substation: None nearby

Transmission Lines: Yes

Water: Trinity County Waterworks District No. 1

Sewer: Trinity County Waterworks District No. 1

Permitting and Zoning

Air: see above

Criteria Categories	Score	Total Possible Points
Land Ownership	2	2
Transportation Infrastructure	1.5	4
Utility Infrastructure	2.5	3
Permitting and Zoning	3	4
Environmental Contamination	2	3
Further Biomass Considerations	2	2
Further Social and Environmental Justice	1	2
Current Momentum	3	3

Table 5. Summary of scores for Sierra Pacific (Hayfork Division).

Water Compliance Permit: No active permit

Zoning: Industrial[95]

The area is allotted for manufacturing and typical industrial uses. Use permits are required for land uses that will require an Authority to Construct Permit from the local air district, a Regional Water Quality Control Board Discharge permit, use more than three gallons of water per minute in the county's Critical Water Resources Overlay region, or will create air emissions, hazardous wastes, and other characteristics that may impact public welfare. This includes secondary wood processing facilities (T.C.M.C.§ 17.23.020). Other relevant uses called out in T.C.M.C. § 17.23.030 requiring a use permit:

- Power generating plant
- Biomass plant
- Cogeneration plant
- Lumber mill

The last Hayfork Community Plan was adopted in 1996. The community is subject to the county zoning codes, but the Community Plan includes several guiding principles to note for future developers, including the desire to avoid development in fire and flood-prone areas, preserve the community's rural character, and *policies that expand workforce training and preserve existing industries like timber*.[62]

Environmental Contamination

The site needs further evaluation according to Envirostor. Clean up of a leaking underground storage tank was completed at the site in 2014 according to Geotracker.

Further Biomass Considerations

- Forest land ownership: 73% federal. 26.9% private. 0.1% other
- Recoverable biomass (BDT in 15 mile radius): 6,556,820

Further Social and Environmental Justice Considerations

Pollution:

- PM2.5 Concentration: 4.02
- PM2.5 Percentile: 0.448
- Asthma Percentile: 33.33

Unemployment:

- Unemployment Rate: 6%
- Unemployment Percentile: 88.08

Current Momentum

Within project boundary? Yes

Forest collaborative nearby? Yes, Trinity County Collaborative Group

Historic Site Name: Hyampom Lumber

Evaluation Score: 9.5 out of 23

Community: Hyampom

Address: 4241 Lower South Fork Rd

Coordinates: 40.639, -123.491

Current owner: Foster Steven

Land Ownership

Parcel size: 36.69 acres

Type of ownership: private

Criteria Categories	Score	Total Possible Points
Land Ownership	1	2
Transportation Infrastructure	0.5	4
Utility Infrastructure	1	3
Permitting and Zoning	1	4
Environmental Contamination	0	3
Further Biomass Considerations	2	2
Further Social and Environmental Justice	1	2
Current Momentum	3	3

Table 6. Summary of scores for Hyampom Lumber.

Transportation Infrastructure

Major roads:

The site is located on Lower South Fork Road, a forest road. There are multiple forest roads and trails which intersect into South Fork Rd.

Hyampom Road is the closest major road, located approximately 5 miles away (driving distance measured by Google Maps).

The site is not located in close proximity to a highway or freeway. The Interstate-5 Freeway onramp is located 102 miles away (driving distance measured by Google Maps).

Rail:

Northwestern Pacific Railroad runs west along the parcel, located approximately 36 miles from site when measured at the shortest distance via ArcGIS.

Central OR and Pacific Railroad runs east, located approximately 75 miles from site when measured at shortest distance via ArcGIS.

Utility Infrastructure

Electric Substation: Yes

Transmission Lines: Yes

Water: DWR lists a water service provider in this area, but is not findable anywhere else online, and doesn't exist on Trinity County Water Resources

Sewer: No municipal service provider

Permitting and Zoning

Air: see above

Water Compliance Permit: No record

Zoning: Rural Residential and Unclassified[95]

Site exists in a mixed base zone designations - Unclassified and Rural Residential.

The Rural Residential designation is generally reserved for single family dwellings with limited agricultural uses. Other uses, such as labor camps, campgrounds, and quasi-public facilities, are allowed with approved permits (T.C.M.C. § 17.15.005-15.020). The

county's 2050 draft General Plan notes the designation is for "rural areas where minimal county services are available *and service expansion is not desirable*."[62]

Unclassified areas are those that do not have determined uses at this time. The county allows single family dwelling, Christmas tree farms, orchards, row/field crops, and forestry. Any other use may be allowed with an approved use permit (T.C.M.C. § 17.11.010-11.030).

Environmental Contamination: No record

Further Biomass Considerations

Forest land ownership: 69% federal. 31% private

Recoverable biomass (BDT in 15 mile radius): 7,766,807

Further Social and Environmental Justice Considerations

Pollution:

PM2.5 Concentration: 4.02

PM2.5 Percentile: 0.448

Asthma Percentile: 33.33

Unemployment:

Unemployment Rate: 6%

Unemployment Percentile: 88.08

Current Momentum

Within project boundary? Yes

Forest collaborative nearby? Yes, Trinity County Collaborative Group

Historic Site Name: Stone Forest Products (Burnt Ranch)

Evaluation Score: 11.5 out of 23

Address: Mill Camp Rd

Coordinates: 40.806801, -123.474496

Current owner: SWF Plywood Co

Community: Burnt Ranch

Criteria Categories	Score	Total Possible Points
Land Ownership	2	2
Transportation Infrastructure	1.5	4
Utility Infrastructure	0	3
Permitting and Zoning	2	4
Environmental Contamination	0	3
Further Biomass Considerations	2	2
Further Social and Environmental Justice Considerations	1	2
Current Momentum	3	3

Table 7. Summary of scores for Stone Forest Products (Burnt Ranch).

Land Ownership

Parcel size: 108.86 acres

Type: Private

Transportation Infrastructure

Major roads:

The site is located adjacent to Highway 299 and has access to the onramp via Mill Camp Road.

The site has three primary points of access: via Mill Camp road connecting to Hwy 299 from the northeast side; there are two additional points of access along the south and southeast from forest roads.

Rail:

Northwestern Pacific Railroad runs west along the parcel, located approximately 35 miles from the site when measured at the shortest distance via ArcGIS,

Central Oregon and Pacific Railroad runs east, approximately 77 miles from the site when measured at shortest distance via ArcGIS.

Utility Infrastructure

Electric Substation: No

Transmission Lines: No (14 miles from nearest line)

Water: No municipal service provider

Sewer: No municipal service provider

Permitting and Zoning

Air: see above

Water Compliance Permit: The site is actively being used as a waste pile.

Zoning: Rural Residential (5 acre minimum)[95]

The Rural Residential designation is generally reserved for single family dwellings with limited agricultural uses. Other uses, such as labor camps, campgrounds, and quasi-public facilities, are allowed with approved permits (T.C.M.C. § 17.15.005-15.020). The county's 2050 draft General Plan notes the designation is for "rural areas where minimal county services are available *and service expansion is not desirable*."[62]

The 5-acre minimum note indicates the minimum parcel size required for subdivision is ten acres (T.C.M.C. § 17.15.110).

Environmental Contamination: No record

Further Biomass Considerations

Forest land ownership: 81% federal. 19% private

Recoverable biomass (BDT in 15 mile radius): 6,969,707

Further Social and Environmental Justice Considerations

Pollution:

PM2.5 Concentration: 4.26

PM2.5 Percentile: 0.56

Asthma Percentile: 36.42

Unemployment:

Unemployment Rate: 6%

Unemployment Percentile: 88.08

Current Momentum

Within project boundary? Yes

Forest collaborative nearby? Yes, Trinity County Collaborative Group

Project Phase 2 Site Analysis

Siskiyou County– 4 sites

Air District: Siskiyou County Air Pollution Control District

Air Quality Attainment Status[2]

Per the California State area designations, the county is unclassified for carbon monoxide, hydrogen sulfide, visibility reducing particles. The region is in attainment for the remaining seven criteria pollutants.

Per the federal area designations, the county is unclassified for all seven criteria pollutants.

Note on the General Plan. The county is preparing to update its General Plan and likely zoning ordinances in the near future. The planning department released a contract bid for preparing the plans and environmental clearance documentation in 2022.[86]

Historic Site Name: Stone Forest Industries (Happy Camp Lumber Operations)

Evaluation Score: 17 out of 23

Address: : 63709 Applegate Dr

Coordinates: 41.800375, -123.36769

Current owner: Yeager Daniel R & Debbie G
Community: Happy Camp

Land Ownership

Parcel size: 127.14 acres

Type: Private

Criteria Categories	Score	Total Possible Points
Land Ownership	2	2
Transportation Infrastructure	2	4
Utility Infrastructure	3	3
Permitting and Zoning	4	4
Environmental Contamination	0	3
Further Biomass Considerations	2	2
Further Social and Environmental Justice	1	2
Current Momentum	3	3

Table 8. Summary of scores for Stone Forest Industries (Happy Camp Lumber Operations)

Transportation Infrastructure

Major roads:

- The site is located adjacent to Highway 96, also known as Klamath River Hwy, and has access to the onramp via Mill Road.
- There are multiple points of access to the site. The site can be accessed via Mill Road from the west, which connects to Highway 96. China Grade Road runs east along the site and is separated by the Klamath River; China Grade Road intersects into Highway 96 via a bridge located about 0.5 mile from the site.
- This site is accessible by local communities; Greyback Road connects into Highway 96 via Jacobs Way, leading into local residences within a 1 mile radius (measured via Google Earth Pro).

Rail: Central Oregon and Pacific Railroad runs east along the parcel and is located about 60 miles from the site when measured at the shortest distance via ArcGIS.

Utility Infrastructure

Electric Substation: Yes

Transmission Lines: Yes

Water: Happy Camp Community Service District

Sewer: Happy Camp Community Service District

Permitting and Zoning

Air: see above

Water Compliance Permit: The site is an active waste pile for fire debris enrolled in Order WQ 2020 -0004-DWQ General Waste Discharge Requirements for Disaster-Related Wastes. The permit expires on 02/17/2030.

Zoning: Heavy Industrial[57]

- This zoning destination generally allows for "almost all" industries. Land uses that can negatively impact public welfare require use permits.
- This zone allows for uses that are also permitted in the limited industrial and light industrial zones. Additional uses are reserved for the heavy industrial zone. Permitted uses span many industry activities, including manufacturing that requires heavy machinery, wholesale sales, cabinet shops, storage facilities, assembly and packaging of wood products, and training/ vocational schools (Siskiyou County, Municipal Code (S.C.M.C) § 10-6.4501-.4702).
- Conditional use permits for heavy industrial areas are allowed for a suite of industries, including sawmills (S.C.M.C § 10-6.4703).

Environmental Contamination: No record

Further Biomass Considerations

- Forest land ownership: 96% federal. 3.7% private. 0.3% other
- Recoverable biomass (BDT in 15 mile radius): 6,280,885

Further Social and Environmental Justice Considerations

Pollution:

PM2.5 Concentration: 2.86

PM2.5 Percentile: 0.037

Asthma Percentile: 16.9

Unemployment:

- Unemployment Rate: 6.3%
- Unemployment Percentile: 96.72

Current Momentum

Within project boundary? Yes

Forest collaborative nearby? Yes, Western Klamath Restoration Partnership

Historic Site Name: Hi-Ridge Lumber (Seiad Valley)

Evaluation Score: 11 out of 23

Address: 44518 CA-96

Coordinates: 41.8404055, -123.1925489

Current owner: Anthony Bishop

Community: Seiad Valley

Land Ownership

Parcel size: 75.13 acres

Type: Private

Transportation Infrastructure

Major roads: The site is located adjacent to Highway 96 and has access to the onramp via a paved road. The site can only be accessed by a single point, via Highway 96 on the northeast. The Klamath River runs along the south side of the site and provides no road access via bridge.

Rail: Central Oregon and Pacific Railroad runs east along the parcel, located approximately 43 miles from the site when measured at the shortest distance via ArcGIS.

Utility Infrastructure

Electric Substation: Yes

Transmission Lines: Yes

Water: No service

Sewer: Within the unincorporated area of Siskiyou County, individual properties are serviced by on-site sewage disposal systems under permits issued by

Criteria Categories	Score	Total Possible Points
Land Ownership	2	2
Transportation Infrastructure	1	4
Utility Infrastructure	1	3
Permitting and Zoning	1	4
Environmental Contamination	0	3
Further Biomass Considerations	2	2
Further Social and Environmental Justice	1	2
Current Momentum	3	3

Table 9. Summary of scores for Hi-Ridge Lumber (Seiad Valley).

Permitting and Zoning

Air: see above

Water Compliance Permit: No record

Zoning: Rural Residential Agriculture, Non Prime Agricultural[57]

This site has portions zoned for Rural Residential Agriculture and portions for Non Prime Agriculture.

Uses for the Rural Residential Agricultural zone include a single family dwelling, greenhouses, small acreage farming, including tree farming. Conditional use permits can be obtained for several uses, including storing heavy equipment and vehicles (S.C.M.C § 10-6.48).

For non-prime agricultural zones, the county allows for general agricultural uses, including farm labor housing, wholesale nurseries, and single family dwellings necessary for agriculture. The zoning code does not mention conditional uses requiring a permit that would likely be related to forest biomass utilization facilities (S.C.M.C. § 10-6.49).

Environmental Contamination: No record

Further Biomass Considerations

Forest land ownership: 80.5% federal. 19.3% private

Recoverable biomass (BDT in 15 mile radius): 6,168,510

Further Social and Environmental Justice Considerations

Pollution:

PM2.5 Concentration: 2.86

PM2.5 Percentile: 0.037

Asthma Percentile: 16.9

Unemployment:

Unemployment Rate: 6.3%

Unemployment Percentile: 96.72

Current Momentum

Within project boundary? Yes

Forest collaborative nearby? Yes, Western Klamath Restoration Partnership

Historic Site Name: American Forest Products (Dorris)

Evaluation Score: 9.25 out of 23

Address: 437 S Butte St

Coordinates: 41.960639, -121.921862

Current owner: Butte, Valley

Community: Dorris

Land Ownership

Parcel size: 45.2 acres

Type: Public

Transportation Infrastructure

Major roads:

The site is located adjacent to Highway 97 and has access to the onramp via 3 unmarked paved roads. Highway 97 runs directly through the community of Dorris and may experience congestion from community traffic.

The site has multiple points of access: via Highway 97 from the northeast and via Richardson Road from the south side.

Criteria Categories	Score	Total Possible Points
Land Ownership	0	2
Transportation Infrastructure	3	4
Utility Infrastructure	2.25	3
Permitting and Zoning	1	4
Environmental Contamination	0	3
Further Biomass Considerations	0	2
Further Social and Environmental Justice	1	2
Current Momentum	2	3

Table 10. Summary of scores for American Forest Products (Dorris).

Rail: Union Pacific railroad is located approximately 0.8 miles from the site when measured at the shortest distance via ArcGIS.

Utility Infrastructure

Electric Substation: No immediate access, ½ away

Transmission Lines: No immediate access, ½ away

Water: City of Dorris

Sewer: City of Dorris

Permitting and Zoning

Air: see above

Water Compliance Permit: No record

Zoning: Planned Unit Development [33,76]

- The PUD zoning code extends from the city's 2007 General Plan designating the zone as a mixed planned development area intended to accommodate a mixture of land uses, including light industrial, commercial, residential, and/or public uses.[76]
- The zoning designation intends to accommodate flexible and/or a combination of developments that could include shopping centers, housing, industrial parks, or other uses. Uses not requiring a planned development permit include parks and single-family housing. There are a suite of conditionally permitted uses, including community centers (Dorris Municipal Code § 18.28.030-28.050).
- Code prohibits uses that the city council and/or neighbors may oppose due to environmental impacts such as vibration, noise, heavy truck traffic, dust, smoke, and others (Dorris Municipal Code § 18.28.070).

Environmental Contamination: No record

Further Biomass Considerations

- Forest land ownership: 24.6% federal. 3% state. 72.4% private
- Recoverable biomass (BDT in 15 mile radius): 370,243

Further Social and Environmental Justice Considerations

Pollution:

- PM2.5 Concentration: 3.44
- PM2.5 Percentile: 0.273
- Asthma Percentile: 2.62

Unemployment:

- Unemployment Rate: 10.8%
- Unemployment Percentile: 89.19

Current Momentum

Within project boundary? Yes

Forest collaborative nearby? No

Historic Site Name: Fruit Growers Supply

Evaluation Score: 12.5 out of 23

Address: 1216 Fruit Growers Rd

Coordinates: 41.994425, -122.631222

Current owner: Fruit Growers Supply Company. Pending transfer to New Forests.[68]

Community: Hilt

Land Ownership

Parcel size: 337.58 acres

Type: Private

Transportation Infrastructure

Major roads:

The site is located approximately 1.7 miles from the Interstate-5 Highway (driving distance measured by Google Maps) and has access to the onramp via Hilt Road.

The site has two primary points of access: via Hilt Road from the east, which eventually connects to the I-5; and via Forest Avenue from the south, which connects to a network of forest roads.

Criteria Categories	Score	Total Possible Points
Land Ownership	2	2
Transportation Infrastructure	2.5	4
Utility Infrastructure	0	3
Permitting and Zoning	2	4
Environmental Contamination	3	3
Further Biomass Considerations	0	2
Further Social and Environmental Justice Considerations	1	2
Current Momentum	2	3

Table 11. Summary of scores for Fruit Growers Supply.

Rail: Central Oregon and Pacific Railroad is located approximately 3 miles from the site when measured at the shortest distance via ArcGIS.

Utility Infrastructure

Electric Substation: No

Transmission Lines: No

Water: No

Sewer: Within the unincorporated area of Siskiyou County, individual properties are serviced by on-site sewage disposal systems under permits issued by the Siskiyou County Public Health Department.[111]

Permitting and Zoning

Air: see above

Environmental/Water Compliance Permit: Fruit Growers Supply is enrolled in one 643-acre Timber Harvest Plan in the Klamath River Upper watershed. New Forests, the new owners of the timberland, formed Klamath Forest, LLC to manage timberland operations.[56] Klamath Forest, LLC is enrolled in one 952-acre Timber Harvest Plan located in Mill Gulch and Skookum Gulch watersheds.

Zoning: Mixed Non-Prime and Prime Agricultural Zones[57]

- Generally the county allows various agricultural uses, including farm labor housing, wholesale nurseries, and single family dwellings. The code does not mention conditional uses that would likely relate to or benefit wood-processing facilities (S.C.M.C. § 10-6.49-10.6.50).
- Both prime and non-prime agricultural zones share very similar permitted and conditionally permitted uses. The code notes non-prime zones will have varying parcel size minimums (S.C.M.C § 10-6.4901).

Environmental Contamination

The site will be undergoing soil excavation due to an exceedance of pentachlorophenol (PCP), a wood preservative, in the former green chain area.

Further Biomass Considerations

- Forest land ownership: 17.3% federal. 1.2% state. 81.4% private. 0.1% other
- Recoverable biomass (BDT in 15 mile radius): 1,295,758

Further Social and Environmental Justice Considerations

Pollution:

- PM2.5 Concentration: 3.43
- PM2.5 Percentile: 0.261
- Asthma Percentile: 45.45

Unemployment:

- Unemployment Rate: 6.3%
- Unemployment Percentile: 96.77

Current Momentum

Within project boundary? Yes

Forest collaborative nearby? No

Stakeholder Feedback

Stakeholders provided a wide range of feedback, sometimes conflicting, which reflects the complexity of this field and the amount of uncertainties that still exist within it. Despite these diverse perspectives, a number of common points and themes emerged, largely centering around major barriers to site redevelopment, intricacies of the California wood utilization context that are less acknowledged in the literature, and major facilitators of site redevelopment. Contact the authors of the report if you would like more detailed information about stakeholder feedback.

The most commonly referenced major barrier to site redevelopment was provable access to adequate, reliable feedstock over the long term. Part of the reason for this issue being that financiers and investors, as well as grantors to a lesser extent, require long term business plans with defined inputs and outputs. Another commonly listed major barrier was the underdevelopment of markets for wood products other than dimensional lumber, namely products from small diameter or low value biomass. This is an essential piece because much of the wildfire resilience related forest treatment activity being planned for produces this type of biomass. Multiple stakeholders also mentioned difficulties arising from the codependence of different pieces of wood utilization supply chains, which necessitates simultaneous development. This was often mentioned in relation to workforce availability, training, and housing, which were also cited as major barriers in their own right. Finally, the inadequacy of current datasets, models, and tools was another common theme, from recoverable biomass models to social equity and economic data in rural regions of California. Many other barriers were relayed to us and are important; these are only the most commonly highlighted as significant in our experience during this project.

Some details about the California wood utilization context were mentioned repeatedly in our interviews, but had not featured prominently in the peer reviewed literature or gray literature that we had access to, and we felt it worthwhile to highlight them here. Many stakeholders highlighted the difference between high value, large diameter wood supply chains, and small diameter, low value wood supply chains. The former are robust in California, mostly saturated, and dominated by large, corporate mill owners and operators. The latter are extremely underdeveloped in California as mentioned above, and are pivotal to California's wildfire resilience-related forest treatment operations. Multiple stakeholders also impressed upon us the importance of avoiding competition between new wood utilization sites and the aforementioned large, corporate mill owners and operators. In California in particular but also elsewhere, there has been a history of the latter going after smaller mills that they viewed as infringing upon their feedstock supply or market and either driving them out of business or subsuming them, reducing community benefit from and voice in forestry and wood utilization spaces. Additionally, keeping sites from competing with anyone for feedstock or market share would at least initially reduce barriers and maximize their potential impact.

Following from this is a major potential facilitator of site redevelopment, namely focusing on community scale facilities. Not only would community scale facilities be less threatening to large, corporate owners and operators, they would be more flexible and resilient, and provide more reliable benefits to communities. Due to their lessened entanglement with financial players, community scale wood utilization facilities have more flexibility to scale their operations to available feedstock types and amounts, rather than requiring certain types and amounts of feedstock to fulfill investor return-driven business plans. They are also more resilient to the risks inherent in new markets due to their smaller size, and more natural alignment with grant missions. While community scale facilities face their own unique barriers and

challenges, the balance of our feedback was strongly in favor of them. Last, the need for local leadership, or a “local champion” to push projects forward was discussed frequently. This, in our opinion, reflects the intensely contextual nature of the development of wood utilization sites and supply chains, and the many unique forms that they (and the barriers that they face) take.

Policy Considerations

How to use this section :

Considerations: Below are seven major policy-related considerations that influence the redevelopment of former sawmill sites in California. Each consideration is followed by strategies that stakeholders can or have been using to navigate the challenge. While our research focused on California, several considerations relate to federal statutes, regulations, and programs that are relevant to communities interested in expanding wood-processing facilities. We do not propose policy changes.

Multilevel Analysis: Forest biomass utilization and site redevelopment exist in a complex policy landscape. The following identify relevant statutes, regulations, public grant programs, and private financing programs with statutory authority operating in and across multiple levels of governance - Tribal, federal, state, and local. We use the symbols on the left to help categorize the consideration and its associated strategies

Highlights

Consideration 1:

Environmental clearance and permitting

- A matrix of federal, state, and local requirements impact site redevelopment, including the National Environmental Protection Act, California Environmental Quality Act, state air district and water permitting regulations, and local zoning ordinances.
- The strategies for navigating this policy and regulatory landscape are diverse. They range from siting projects in industrial zones to opting in for available environmental clearance streamlining to partnering with experts to navigate regulations.

Consideration 2:

Environmental contamination

- As a result of their past use, former sawmill sites are often contaminated and must undergo pre-development requirements before the site can be safely reused.
- To address contamination at sawmill sites, a phased cleanup approach can be implemented to utilize clean portions of the site while other areas are undergoing cleanup. Brownfields grants and technical assistance programs are also available to support redevelopment activities, such as site assessment and cleanup.

Consideration 3:

Long-term feedstock supply

- Securing a long-term and reliable feedstock supply can be a major barrier for bioenergy facilities to obtain financial capital.
- Key strategies to address feedstock barriers

include the Governor's Office of Planning and Research Woody Feedstock Aggregation Pilot Programs, funds to remove forest biomass, stewardship contracts, and utilizing a diverse feedstock supply.

Consideration 4:

Transportation and removal costs

- Removing and transporting forest biomass represents a significant economic barrier for the wood products industry due to the low value of small diameter logs and forest slash.
- Strategies include reducing transportation costs by siting facilities near the forest feedstock and/or rail, leveraging public financing targeting transportation barriers, and tapping into the California county partners currently researching feedstock aggregation strategies.

Consideration 5:

Facility capital and operation costs

- Developers face steep capital and operational costs for wood-processing facilities specializing in low-value forest biomass. To meet the state's capacity needs for processing biomass from forest health treatments, developers can leverage existing policy tools and policymakers should consider how to enhance business development support.
- In addition to developing sustainable business plans, developers can utilize a blend of public grant programs and private financing tools, like California's Climate Catalyst Fund, and leverage the benefits of more innovative models like public-private partnerships.

Consideration 6: Wood products industry workforce

- Lack of training and educational programs for how to process small-diameter wood as well as lack of affordable housing in rural, forested communities hinders the development of the wood products industry workforce.
- Peer learning, state legislation, and state funding can all support workforce development.
- A labor market analysis within the commuter shed of the proposed project can also help the site owner understand the existing industry skills and employment needs of the region.
- There are grants and technical assistance to address affordable housing issues, but affordable housing remains a significant issue for the state to address.

Consideration 7: Capacity

- Stakeholders interested in developing wood processing facilities need a suite of resources - staff, funding, specialized expertise, community trust, organizational partners, and more - to enable their capacity for launching and managing successful projects.
- There are several federal and state grant programs that support capacity-building, but there is a need for additional investments and flexible cost-sharing mechanisms
- Beyond public capacity-building grants, strategies include establishing formalized partnerships with public agencies, non-profits, and/or private industry to enhance and increase access to resources for the parties to meet mutual goals. Several examples are shared

In-depth Consideration Analysis

Consideration 1: Environmental Clearance and Permitting

Public and private entities may hesitate with redeveloping former mill sites into wood-processing facilities because development requires navigating a matrix of federal, state, and local regulatory requirements, engaging in lengthy and costly permitting, and conducting environmental contamination cleanups.[107] Overall, some of the best ways to navigate the regulatory process is to:

- Collaborate with or hire technical experts
- Have the commitment of stakeholders to sustain a potentially lengthy timeline
- Stack sources of funding (public and/or private) to accommodate the multiple costs along the way

1.1 National Environmental Protection Act (NEPA)

For any site development subject to federal environmental clearance, the process can be complex, timely, and expensive, but its purpose is to protect environmental and public health and respect Tribal sovereignty. NEPA provides a procedure by which federal agencies must evaluate the environmental impacts of major federal actions and projects, including those receiving more than "minimal" federal funding, before agencies make decisions (40 C.F.R. §1508.1).[66] The Council on Environmental Quality develops regulations that serve as a floor from which each federal agency then develops its own set of NEPA guidelines.[97] Unless a federal agency considers a typical action "categorically excluded", the agency must conduct an environmental assessment to evaluate whether a more rigorous Environmental Impact Statement is required.[105] NEPA clearance is typically a required precursor before applying and receiving any federal permitting. NEPA critics claim the process can be unnecessarily cumbersome, delaying necessary work needed quickly. In a survey of over 200 stakeholders engaged in forest and/or fire management work in California conducted by the Watershed Resource and Training Center, the majority reported that federal and state environmental clearance and permitting requirements were barriers to their work.[39]

NEPA requires Tribal consultation. Agency leads must consult with federally-recognized Native American Tribes, especially when projects have impacts to historic properties that Tribes may "attach religious and cultural significance to," *whether they are located on Tribal lands or not* (36 C.F.R. § 800.3-800.4).[67] Notably, federal consultation requirements overlook federally unrecognized Tribes. These communities are excluded from federal services and the federal decision-making process accorded to federally recognized Tribes, despite their cultural and spiritual connections to homelands.[60] This has environmental justice implications for how public agencies and other stakeholders engage and collaborate with indigenous communities that may be impacted by development.

Strategies

Advanced planning and Tribal consultation

Redevelopment projects that suspect they may be subject to NEPA should plan early and engage with or hire experts that can navigate compliance, environmental review studies, and Tribal consultation. Early planning, especially with Tribal consultation, could help developers identify challenges they can address earlier and build relationships that support a project long-term. Tribal consultation is particularly important for not only NEPA compliance, but also ensuring projects do not

exacerbate environmental justice issues impacting Tribes and acknowledging their autonomy as sovereign nations.

Federal staffing investments

Investing in more staff capacity among federal units leading NEPA clearance may alleviate potential delays without compromising the integrity of NEPA's goal to protect environmental quality. Fleischman et al. (2020) analyzed 33,976 U.S. Forest Service NEPA projects between 2005-2018 and concluded delays were likely more related to budget inefficiencies and staff constraints than the inherent NEPA review process.[46] Similar constraints may exist in other federal agencies charged with NEPA review and could hinder the development of much-needed wood-processing capacity in the state.

1.2 California Environmental Quality Act (CEQA)

It is highly likely developing a new wood-processing facility will undergo an environmental review process per CEQA. The statute essentially functions to publicly disclose a project's significant environmental impacts, identify environmental impact mitigations, explain why a project receives approval, enhance interagency coordination, and seek public input and participation.[48] CEQA applies to any "project" that would cause direct or indirect physical changes to the environment, receives public funding, and/or receives a public agency's discretionary approval (e.g. land use permits).[91] **In short, most public works projects and private construction projects that require permits are subject to CEQA**. State or local agencies lead the environmental review and while the statute outlines how they should proceed with a CEQA process, the agencies retain the authority to determine how to mitigate anticipated environmental harms from projects. CEQA documents, such as Environmental Impact Reports, are frequently litigated and some critics argue that the process unnecessarily slows down development and increases costs.[48]

Similar to NEPA, CEQA requires public agencies to conduct consultation with Tribes that are culturally and traditionally affiliated with the lands where a project may cause "substantial adverse change in the significance of a tribal cultural resource" (Pub. Res. Code § 21084.2). Assembly Bill 52 (2014) requires public agencies to respond to Tribes interested in participating in consultation within fourteen days of deciding to initiate a project or a project application is complete.[23] Readers can find more guidance with the Governor's Office of Planning and Research here.

Strategies

Tiering from Existing CEQA Clearance

If site owners established their businesses after CEQA was approved in 1970, sites may received approval for an Environmental Impact Report (EIR) or Mitigated Negative Declaration (MND) regarding impacts for their construction and operations. Section 15162 of the CEQA Guidelines[4] states, once a project is approved, a subsequent EIR is not required unless substantial changes would occur at that site or new information is available regarding expected environmental impacts. If sites have existing EIRs or MNDs, the lead agency responsible for environmental clearance could prepare a Supplemental EIR or addendum to the existing EIR/ MND as long as the proposed changes are minor or technical. However, the environmental conditions surrounding many former mill sites has likely changed substantially over the past several decades and operators may establish new facilities that would trigger a new EIR or MND.

AB 205: Including Thermal Power Plants in CEQA Streamlining

In 2021, the California Legislature and Governor Newsom approved Senate Bill 7 (Atkins) that streamlined litigation review timelines and administrative processes associated with CEQA for certain housing and renewable energy projects and changed labor requirements for eligible projects.[5] Projects eligible and approved according to the statute's requirements are known as "environmental leadership projects".

In 2022, the California State Legislature and Governor Newsom approved Assembly Bill 205, an energy state budget trailer bill that expanded requirements for eligible projects and CEQA processes under the Jobs and Economic Improvement Through Environmental Leadership Act. The new bill includes renewable energy projects meeting certain requirements, including thermal power plants with a minimum capacity of fifty megawatts that do not rely on fossil fuels or nuclear fuels. The bill streamlines the CEQA process such that the California Energy Commission (CEC) can serve as "lead agency" during the CEQA review for eligible projects. Per the new statute, the CEC's approval of projects' CEQA documentation supersedes any federal, state, regional, or local agency statutes, ordinances, or regulations, with exceptions, including the jurisdiction of the State Lands Commission, the State Water Resources Control Board, regional water quality control boards, Department of Toxic Substances Control, local air quality management districts, the California Coastal Commission, the San Francisco Bay Conservation, and the Development Commission**.** Projects interested in this streamlined CEQA process must opt into the designation by June 30, 2029.[1]

Federal and State Coordination

NEPA and CEQA guidelines encourage federal and state/local agencies to coordinate when both clearances are required. A federal agency can only leverage a CEQA review for its NEPA purposes when the federal agency participated in the CEQA process and the environmental evaluation met NEPA requirements. This includes compliance with federal laws like the Endangered Species Act and National Historic Preservation Act. A state/local agency could leverage a NEPA review for its CEQA purposes only if it was completed *before* a CEQA review initiates and if it meets CEQA requirements. Notably, NEPA does not include mitigation measures like CEQA, so this analysis would need to be conducted and incorporated.[44] Readers can learn more about the distinctions and overlap of NEPA and CEQA here.

1.3 Water Quality Permitting

Depending on the type of facility being built, the facility may need to comply with the National Pollutant Discharge Elimination System (NPDES) stormwater program, which regulates stormwater discharges from construction activities and industrial activities, and/or the Waste Discharge Requirements Program. These programs are implemented and enforced by the California State Water Resources Control Board and the Regional Water Quality Control Boards.

Construction projects that disturb one or more acres of soil or disturb less than one acre but are part of a larger common plan of development that disturbs one or more acres are required to obtain permit coverage under the Construction General Permit. Industrial facilities with a regulated Standard Industrial Classification (SIC) code that discharge stormwater to waters of the United States are required to obtain permit coverage under the Industrial General Permit. For example, Sawmills and Planing Mills fall under regulated SIC Code 2421. For more information regarding stormwater permitting requirements, see Construction General

Permit and Industrial General Permit.

If the facility discharges wastewater to land or surface waters, then it may be required to obtain a waste discharge permit from the Regional Water Quality Control Board. For example, cooling water discharge from a power plant to land or surface waters requires a water discharge permit.[84] A sprinkled log deck may also require a waste discharge permit. For more information, see the Waste Discharge Requirements Program.

Strategy

Advanced planning

To ensure compliance with the NPDES stormwater program and Waste Discharge Requirements Program, projects should familiarize themselves with regulatory requirements early and consider hiring consultants to assist with the application process and submitting monitoring and reporting data. The Industrial and Construction General Permit application and monitoring/reporting requirements are completed in the Stormwater Multiple Application and Report Tracking System (SMARTS). For more site-specific permitting assistance, contact the Regional Water Quality Control Board.

1.4 Air Quality Permitting

Any development of a new or expanded wood processing facility will potentially need to apply for an air permit regulating anticipated air pollutant emissions. Several federal and California statutes (notably the federal Clean Air Act and California Clean Air Act) mandate certain air quality requirements, and multiple public agencies at federal, state, and local scales develop regulations for permissible levels of air contaminants to protect public health and welfare, particularly for children, the elderly, and other populations vulnerable to the severe health impacts air pollutants cause.

The U.S. Environmental Protection Agency (EPA) developed the National Ambient Air Quality Standards (NAAQS), outlining the "acceptable" level of six air criteria pollutants - photochemical oxidants (such as ozone), nitrogen oxides, particulate matter, carbon monoxide, sulfur oxides, and lead.[102] Since January 2023, the EPA has been considering lowering the allowable quantity of fine particulate matter (PM2.5) from 12 to 9-10 micrograms per cubic meter to enhance public health protections.[104] Often stricter than federal standards, the California Ambient Air Quality Standards (CAAQS), regulated by the Air Resources Board (CARB), include three *additional* criteria pollutants - sulfates, hydrogen sulfide, and visibility reducing particles.[2,14] CARB and the U.S. EPA separately determine if a county (or region in a county) is in "attainment", "maintenance", or "nonattainment" for meeting air quality standards. Since each criteria pollutant has a unique compliance standard, a single county could be in "attainment" for ozone, but "non attainment" for carbon monoxide. Certain federal and state criteria pollutant regulations are different, so a county could be in "attainment" for ozone according to the EPA, but "nonattainment" per California's standards.[81]

A region's attainment designation carries weight at the local permitting level. California's thirty-five air quality control districts have permitting authority and oversee development and enforcement of local air regulations based on NAAQS and CAAQS.[89] Whether an area has met its air quality goals can dictate what level of abatement technology an emitting source (e.g., sawmill or bioenergy facility) may be required to implement. New and significant changes to existing stationary sources are required to go through a pre-construction permitting process known as New Source Review to determine the "Best Available Control Technology" (BACT)

required for a source emitting criteria pollutants. In California, each air quality control district has its own rules regarding what BACT may be required based on the designation of each criteria pollutant in the region.[15,81] **In short, the type and quantity of pollutants a facility releases and the county's air quality attainment status can impact a facility's overall capital and/or operational costs due to technology requirements.**[81]

Having the proper permitting can impact whether a new facility can break ground or if an existing facility can expand operations. Blue Lake Power, LLC, a wood-fired steam generation electricity plant in Blue Lake, California, was sued by the US Environmental Protection Agency and North Coast Unified Air Quality Management District for restarting operations without acquiring appropriate permits and not having appropriate pollution control devices. The facility had to pay a $5,000 fine and demonstrate updated pollution abatement technologies.[42,70]

Strategies

Be aware of local context and collaborate with air quality experts

Air quality regulations are complex. Facilities could potentially avoid requirements to install emissions abatement technologies by ensuring new or modified emitting sources are within the emission limits for each criteria pollutant of the region. Practically, however, this is a substantial hurdle.[81] The specific permitting requirements a new or modified wood processing facility would receive is highly dependent on:

- How much and what type of air pollutants it expects to emit
- The air quality attainment designation and regulations of the air district where the facility will be sited
- Whether the facility owner(s) and operator(s) have the available financial resources to comply with potential technology requirements in the district

Those pursuing development of wood processing facilities should consult with air quality experts to assist with navigating the permitting process.

Additional air district support for wood processing

While air district permitting rules do not explicitly support particular emitting sources, some districts directly support forest biomass projects. For example, the Placer County Air Pollution Control District has developed several programs supporting the beneficial utilization of forest biomass harvested for wildfire treatment operations and home protection for energy production and biochar.[75] Air districts such as these could serve as additional support for wood processing facility developers.

1.5 Zoning

The existing zoning ordinances regulating land use for a former mill site can have a large impact on redevelopment efficiency and costs. Locating wood processing facilities in industrial land use zones would be ideal to save time and resources that would be required to apply for conditional use permits or initiate zoning changes. Changing zoning ordinances in California can be a lengthy and expensive process and can trigger environmental review per the California Environmental Quality Act.[48] Staff from the Sierra Institute for Community and Environment told us having their Indian Valley wood campus site in an industrial zone significantly improved the feasibility of development.[8] It is possible former mill sites are no longer zoned for industrial use. Jurisdictions may have designated sites as "nonconforming uses" to recognize the historic industrial use does not align with the surrounding land uses today. Nonconforming uses are generally permitted, *as long as operations do*

not expand or change.[48]

Strategies

Siting facilities in industrial zones

The best option for developing new wood processing facilities is to select sites that are already zoned for industrial uses. Initiating a zoning change in California is technically a legislative process that requires approval from local land use authorities, public hearings, and can be subject to referendum. The proposed change would be subject to CEQA, often a timely and expensive process. Developers could apply for conditional use permits, relying on the discretionary review process led by planning commissions and approved by city councils or county supervisor boards. If a conditional use permit application is successful, developers should be prepared to implement specific requirements local authorities request as part of the conditional approval.[48]

State planning grant opportunities

We see opportunities for two California planning grant programs to support local jurisdictions that want to update zoning ordinances and General Plans to encourage wood-processing facilities in their communities as part of a more holistic climate and wildfire resilience strategy. The Adaptation Planning Grants and Regional Resilience Planning and Implementation Grants differ in scale and eligibility requirements, but overall they both aim to support holistic climate resiliency planning, community capacity-building, and project implementation.[21,22] Administered by the Governor's Office of Planning and Research, the programs could be opportunities for local jurisdictions to update their General Plans and zoning ordinances in such a way that can reduce barriers for siting wood-processing facilities that utilize forest biomass from wildfire treatment operations. This could be one means to address climate resiliency in a community, though projects proposed to these grant programs would likely have to integrate that detail in a larger strategy. At the time of this writing, Governor Newsom's 2023-24 budget proposal includes $5 million for the APG and $100 million for the RRPI during fiscal year 2023-24.[74] Find more information about these grants in Appendix 3.0.

Tribal land use sovereignty

California zoning laws do not apply to federally recognized Tribes living on federal Indian reservations. The federal Indian trust responsibility - a fundamental legal relationship between the United States and federally recognized Tribes- upholds the Tribes' land use sovereignty on their lands.[92] Federally recognized Tribes interested in redeveloping former mill sites may have more flexibility or streamlined land use and permitting processes. Notably, while federal Indian reservations are generally exempt from state jurisdiction, they must abide by federal statutes like the Clean Air Act and Clean Water Act.[100]

Consideration 2: Environmental contamination

Former sawmill sites are often also referred to as brownfield properties due to the presence of contamination resulting from their past use. For example, former sawmill sites often have contaminated soil containing metals like arsenic.[107] Brownfields are underutilized properties that can pose an environmental and public health threat to communities. Redeveloping brownfields is an opportunity to eliminate environmental and public health threats in communities as well as stimulate economic growth and revitalize neighborhoods. However, brownfields must first undergo certain requirements to assess if contamination is present and if cleanup is necessary before the site can be

safely reused. Depending on the level of contamination and funding available, brownfield cleanup can take multiple years. For an overview of the brownfield redevelopment process, see the EPA's Brownfields Road Map to Understanding Options for Site Investigation and Cleanup.

The U.S. EPA, California Department of Toxic Substances Control (DTSC), and the California State Water Resources Control Board and the nine Regional Water Quality Control Boards (collectively referred to as the Water Boards) can all be involved in the cleanup of brownfield sites in California. The EPA's Land Revitalization Program helps address and remove barriers for site redevelopment, and the Brownfields Program administers grants and technical assistance to support the safe and sustainable reuse of brownfield properties. DTSC's Site Mitigation and Restoration Program oversees the evaluation and cleanup of brownfields in California. The Water Boards brownfields cleanup responsibilities consist of four main programs: the Underground Storage Tank Program, the Site Cleanup Program, the Department of Defense Program and the Land Disposal Program. Coordination amongst agencies is needed to ensure the safety of the site for environmental and public health prior to redevelopment. Community and municipal support of the redevelopment project is also needed to ensure the success of the project.

Strategies

Phased cleanup approach

For sites where contamination has been identified and cleanup is required, a phased cleanup and redevelopment approach can be implemented to maximize affordability and utilization of the site. For example, the former sawmill site in Crescent Mills, California, also known as the Indian Wood Utilization Campus, opted for a phased cleanup approach with institutional controls such as fencing and signs in place to alert and restrict site occupants and the public from accessing portions of the site not yet cleaned up. This cleanup option allowed the site owner, Sierra Institute for Community and Environment, to utilize the clean portions of the site for initial revitalization opportunities while cleanup was being completed in other areas of the site. This can be an effective and affordable option for former sawmill sites that are required to undergo cleanup.[85] More information on the Crescent Mills cleanup can be found here.

Brownfields funding and technical assistance

The U.S. EPA's Brownfields Program and the California's Department of Toxic Substances Control (DTSC) oversees a variety of grants that help fund activities, such as site assessment and cleanup, to support redevelopment efforts. In addition to funding, the U.S. EPA and DTSC also provide technical assistance to local, state and tribal governments and nonprofit organizations. The Water Boards primarily provide financial assistance for the cleanup of leaking Underground Storage Tanks (USTs). For an overview of brownfields grants and technical assistance, see Appendix 4.0. For assistance with planning a successful brownfields grant application, see Appendix 4.0.

Consideration 3: Long-term feedstock supply

One of the most significant barriers for developing a bioenergy facility is securing a long-term and reliable feedstock supply to obtain financial capital. Financial entities often require a long-term feedstock supply contract, typically ten to twenty years, to be in place before financing approval. Reliable long-term feedstock contracts are challenging to obtain due to a variety of factors, including high variability in supply predictability each year and lack of funds to remove the material from the forest.[64] The annual amount of biomass

material needed to sustain operations is dependent on the size and type of operation.[90]

The types of forest and woody biomass include[64]:

- Forest thinnings: material removed during harvest activities that cannot be used to produce saw-logs (e.g., small diameter trees and shrubs)
- Forest slash: materials left in forest after harvesting activities (e.g., branches and tree tops)
- Shrubs (or chaparral): typically shrubby evergreen plant material accustomed to a semi-arid climate
- Sawmill residues: by-product materials of softwood saw logs production (e.g., bark, sawdust, planer shavings and trim end pieces)

Biomass feedstock can be obtained from federal, state, tribal, or private forestlands. Approximately 57% of California's forestlands are federally owned by the U.S. Forest Service (USFS), Bureau of Land Management (BLM), and the National Park Service, 40% is privately owned and 3% is State owned.[96] Obtaining supply from a private source is considered simpler but can be risky. Often, private feedstock sources, such as industrial timberland owners, are opposed to entering into long-term contracts.[64]

Public lands have the potential to provide a sustainable feedstock supply, but regulatory requirements and funding forest harvesting activities can be a barrier to obtaining feedstock. Harvesting on federal lands requires NEPA clearance, which can pose a challenge for quick and widespread forest treatments. However, there are several forest management activities that count as categorical exemptions, meaning that they do not require in-depth environmental assessments nor Environmental Impact Statements. Per 36 C.F.R. § 220.6, NEPA categorical exemptions for USFS activities include forest management activities "with a primary purpose of meeting restoration objectives or increasing resilience…to achieve ecological restoration objectives," including vegetative thinning and timber harvesting, but not salvage harvesting. The area is limited to 2,800 acres (§ 220.6 (25)i-ii). Additionally, in an effort to increase forest management activities on public lands, California and USFS have established a state-federal initiative to manage forests long-term and treat one million acres of forest and wildland annually.[72] Through funding from the Bipartisan Infrastructure Law (BIL), USFS has identified high-priority, fire-risk landscapes for initial fuels reduction work in California and other states.[98] These investments indicate where feedstock will likely be coming from in the future.

A biomass availability study can also help to determine the amount of "available" biomass feedstock in a region or the proposed project area. However, factors such as physical access to the feedstock, intensity of removal, costs, land ownership, and regulatory requirements may reduce the amount of feedstock actually available for use. Other timber harvesting constraints include watercourses, steep terrain, lack of accessibility, and endangered species. Site-specific assessments can help projects understand the factors that influence feedstock harvesting in their proposed project area.[64]

Strategies

Governor's Office of Planning and Research Woody Feedstock Aggregation Pilot Program

Funded by SB 85, the Governor's Office of Planning and Research (OPR) is overseeing five pilot projects (see table below) to test new mechanisms for developing long-term feedstock contracts, improving feedstock supply chains, and increasing feedstock aggregation.[24] This work aligns with Goal 3: Manage Forests to Achieve the State's Economic and Environmental Goals of California's

Pilot Project	Counties
Central Sierra Project	Alpine, Amador, Calaveras, Mariposa, and Tuolumne
Marin Biomass Project	Marin
North Coast Resource Partnership	Del Norte, Humboldt, Mendocino, Modoc, Siskiyou, Sono-
Northeast California Project	Shasta and Lassen
Tahoe Central Sierra Initiative	Amador, El Dorado, and Placer

Wildfire and Forest Resilience Action Plan.[20] The pilot projects will help to increase information sharing and peer learning through collaboration among the pilots as they explore opportunities in their region.[24] For example, the pilot projects are studying the benefits and trade-offs of establishing a Joint Powers Authority (JPA) to support feedstock harvesting and insurance,[35] as well as a local market assessment of the net available biomass.[36] The projects are ongoing and OPR expects grantees to have implementation plans ready by 2025 and feedstock material to be theoretically moving in 2026.[59]

Funds to remove forest biomass

Investment in fuels reduction and forest management activities on public lands may indicate future feedstock sources. For instance, funding from the Bipartisan Infrastructure Law (BIL) supports the USFS Wildfire Crisis Strategy to treat 10 high-priority, fire-risk USFS landscapes in California as well as Washington, Oregon, Idaho, Montana, Colorado, New Mexico, and Arizona for FY 2022-2024. A total of $673.8 million will be invested in treating 742,000 acres across these 10 initial priority landscapes during FY 2022-2024. Future rounds of BIL investments will fund fuels reduction work on other high-risk landscapes.[98] The anticipated influx of the agency's thinning operations represents a significant potential feedstock supply for operators searching for supply contracts to support facilities handling small diameter wood and woody biomass.

Stewardship Contracts

Stewardship contracts, administered by USFS and BLM, are a tool community-scale facilities can utilize to secure long-term feedstock contracts needed to obtain financial capital as well as incentivize restoration work on federal land. Stewardship contracts, also referred to as stewardship agreements or stewardship projects, allow USFS and BLM to sell forest products and obtain restoration services under one contract.[78] However, 10-year stewardship contracts require extensive stakeholder engagement and can take three to five years to complete.[64] Stewardship contracts have been utilized by community-scale biomass operations on the West Coast, such as North Fork Bioenergy Plant in North Fork, California.

North Fork Bioenergy Plant is a small-scale (3 megawatts or less) biomass energy project that secured a 10-year stewardship agreement for biomass feedstock, allowing them to obtain the loans necessary to move forward with the project. The North Fork Community Development Council secured the 10-year stewardship agreement with the USFS through years of collaboration with the Bass Lake Ranger District, Sierra National Forest, and the USFS Regional Office. Social, human, and political capital is needed to engage in stakeholder negotiations and secure a stewardship agreement with the USFS.[32]

Diversify feedstock supply

Obtaining feedstock from a range of sources can help reduce concerns over feedstock reliability.

For example, large feedstock suppliers, such as USFS, may be able to provide a long-term, consistent source of supply. Small, local firms, such as a landscaping firm that supplies wood chips, may have less control over their source of supply and volume but may be able to offer more appealing feedstock pricing than large suppliers. To secure a reliable feedstock supply, feedstock supply strategies can consist of feedstock supply agreements from large and small sources.[52]

Other considerations:

- Bufferwood concept for hazard fuel removal (For more information, see Literature and Evaluation of Research Gaps to Support Wood Products Innovation page 83)
- Challenges with harvesting permits may impede removing small-diameter material from the forest for eventual use in a biomass processing facility. For an overview of the laws and regulations affecting forests, see
    - Laws and Regulations Affecting Forests, Part 1: Timber Harvesting
    - Laws and Regulations Affecting Forests, Part II: Activities Other than Timber Harvesting
- To reduce feedstock harvesting challenges, streamlined regulatory approvals such as Programmatic Environmental Impact Reports (PEIRs) have been developed for non federal lands in California. For more information, see
    - Legislative Analyst's Office Report Improving California's Forest and Watershed Management
    - California Vegetation Treatment Program (CalVTP) Programmatic Environmental Impact Report (PEIR)

Consideration 4: Transportation costs

Costs for transporting forest biomass is a large economic barrier for the viability of wood processing and bioenergy production. Project costs vary widely depending on the region, tree species, equipment used, environmental compliance requirements, and labor, but Becker, Larson, and Lowell (2009) found in their cost-benefit modeling of Ponderosa Pine treatments that transportation contributed 64-69% to harvest operation costs.[7] Existing wood processing facilities in California - from sawmills to bioenergy plants use woody biomass feedstock - have nearly or already reached capacity and prices for salvaged woody biomass have dropped from $80 per bone dry ton (BDT) in 2019 to $45-50 BDT.[12] With a decrease in facility capacity, trucking companies haul woody biomass long distances, contributing significantly to the cost of harvests and forest treatments.[58]

Strategies

Locate processing facilities near harvest areas and rail

According to the financial modeling conducted by Becker, Larson, and Lowell (2009), locating dimensional lumber and bioenergy facilities within ten miles of harvest sites was the most effective strategy to support financial feasibility. This approach outperformed seven other policies considered for reducing costs for biomass removal, including a $500 per acre harvest subsidy, price premiums received through product certification, and an equipment cost-sharing program.[7] Baker et al. (2020) found transporting solid biomass by rail instead of trucking is more economical in many scenarios. They estimated rail transport is cheaper than trucking, no matter the distance. In cases where biomass would need to be trucked to a rail transfer

station before a longer rail haul, rail transport is more cost effective if the biomass is traveling more than 45 miles. However, many harvesting and facility sites may not be near rail, so trucking may be more practical, especially if biomass is traveling a shorter distance. Baker et al. emphasize that large-scale facilities like typical pyrolysis or gasification plants using 2,000-4,500 BDT/day should consider investing in new rail spurs ($1-2 million per mile) to cut transportation costs over time.[6] That said, such investments are not practical for community-scale wood processing facilities.

Transportation subsidies

The 2022-2023 California state budget authorized $10 million for the Biomass Transportation Subsidy, a new component of CAL FIRE's Wood Products and Bioenergy Business and Workforce Development grant program.[41,74] The subsidy supports wood processing facilities at risk of closing, reestablishing facility operations, or expanding facilities when feedstock supplies outpace a facility's capacity.[41] CAL FIRE also allocated California Climate Investment funds for a separate transportation subsidy administered by the American Forest Foundation.[65] The Foundation's My Sierra Woods program subsidized costs for transporting woody biomass from forest treatment projects to bioenergy facilities. Since January 2023, the subsidy program supported 158 projects, transporting 97,800 bone dry tons (BDT) of woody biomass with an average distance of 73 miles to a bioenergy facility. The program was relatively successful, but choosing the best subsidy price point to generate sufficient participation was a challenge. My Sierra Woods had to double the subsidy to $8 - $56 per bone dry ton (BDT) and include an option where a lower subsidy rate could be coupled with a cost-share incentive for forest treatments. Subsidy program design requires careful consideration and adaptive governance to reach intended goals.[12]

State feedstock aggregation pilot projects

As discussed in Consideration 3, the California Governor's Office of Planning and Research is administering five regional pilot projects to test new mechanisms for developing long-term feedstock contracts, improving feedstock supply chains, and increasing feedstock aggregation. The program is broadly focused on improving feedstock supply chain logistics and **has the potential to alleviate high transportation costs**.[24]

Consideration 5:

Facility capital and operation costs

Products and technologies exist to utilize small diameter logs and forest slash, but the underdeveloped market for utilizing lower value forest biomass in California presents challenges for facilities seeking financing and a viable market.[20,54] As discussed in Consideration 3, acquiring adequate private financing can be challenging without reliable feedstock supplies. Financing is crucial as businesses typically face steep start-up and significant operational costs related to specialized equipment, maintenance, feasibility studies, business planning, regulatory compliance, and other needs. The following policy tools and funding mechanisms could reduce costs and enhance access to financial capital for wood processing business development.

While obtaining financial capital, including public grants, is essential for starting up a business, it is important to consider the overall sustainability of the business model. Some forest biomass facilities have closed due to questionable business plans and unplanned circumstances, such as Red Rock Biofuels, a planned sustainable aviation fuels facility in Oregon.[73] An understanding of the quantity of available biomass, value-added products that can be viably produced from this material, and

understanding local market competition can contribute to successful business operations.[50] For example, Heartwood (formerly known as Integrated Biomass Resources) is an example of how to successfully connect forest restoration activities to a market for low value timber. The company of twenty-five people utilizes low-value timber to produce firewood, posts and poles, and wood chips. Over the last ten years, USFS granted Heartwood stewardship projects as there are no other business entities in the region that are producing value-added products from low-value timber generated from restoration activities.[77] Heartwood is currently expanding and looking to replicate their business approach in Tuolumne County, California.[16]

Strategies

Public Funding and Private Financing

Grants can be one piece in a funding model. Stacking capital allows developers to use grants, equity, loans, and other funding mechanisms to finance a biomass project.[64] One resource example is California's Climate Catalyst Revolving Loan Fund. The Infrastructure and Economic Development Bank (iBank) provides financing for infrastructure and other public benefit projects to advance climate goals and economic development. The Fund primarily focuses on projects in three industry sectors, including energy and construction materials produced from forest biomass management and the permitting, environmental planning, and infrastructure costs required for clean energy transmission.[26] A more extensive list of public financial and private financing sources are in Appendix 3.0.

Market support for state biomass energy: BioMAT and BioRAM

California's Bioenergy Market Adjusting Tariff (BioMAT) and Bioenergy Renewable Auction Mechanism (BioRAM) represent economic incentives for biomass energy plants interested in connecting to the larger electrical grid. Administered by the California Public Utilities Commission, BioMAT and BioRAM are market-based tools that support bioenergy power plants utilizing forest biomass. BioRAM requires the large investor-owned utilities to procure a collective total of 146 megawatts from facilities that use at least 80% of their feedstocks from sustainable forest management activities, including high hazard fuels, as defined by CAL FIRE.[28] BioMAT supports small -scale (less than 5 megawatts) bioenergy facilities by creating fixed-price contracts with three large investor owned utilities. Of the 250 megawatts that BioMAT reserves for these contracts, 50 of them are dedicated for sites using feedstock from sustainable forest management activities.[27]

Innovative Financing Models

A public-private partnership (P3) can be an innovative model stakeholders can use to generate financing and marshal other resources required for a project. The U.S. Forest Service has been increasingly participating in P3s to accelerate forest health initiatives. In 2020, the agency announced its partnership with Blue Forest Conservation and the World Resources Institute to launch the Forest Resilience Bond, a financing model that leverages contributions from partners benefitting from forest restoration to invest in activities like forest thinning and prescribed burns. The new Bond has reportedly helped the Tahoe National Forest complete its projects in four instead of 10 to 12 years.[110]

The Joint Institute for Wood Products Innovation published a literature review highlighting how P3s should be especially leveraged for existing Master Service Agreements and a diverse set of needs and solutions to tackle regional financing gaps in the forest management realm.[82]

Policy Consideration 7 (below) also discusses how rural communities can leverage P3s to enhance

capacity for achieving economic development and wildfire resilience goals.

Consideration 6:

Wood Products Industry Workforce

The decline in California's timber industry has also led to a decline in the forestry workforce, complicating California's goal to utilize wood waste produced from forest management activities. In addition to building new wood processing infrastructure, a skilled and available workforce is essential for conducting forest management activities and producing value-added forest products. There are a wide variety of forestry sector jobs, including logging, fuels reduction, and primary and secondary processing. State policies have generally focused on increasing workforce training for firefighting, fuels reduction, and forest management. However, there has been a lack of support for advancing workforce training and educational programs for processing small diameter wood produced from forest management activities into value-added bioenergy and wood products. In addition to lack of training programs, lack of affordable housing in rural, forested communities is a significant barrier for developing the wood products industry workforce.[77]

Strategies

Workforce development programs

As training programs for forest management increase, there is a need for more skilled workers to utilize small diameter material produced from forest restoration and thinning activities. Learning cohorts such as the OPR Pilot Projects can facilitate the transfer of knowledge of small-diameter wood processing between communities.[87] Expertise from other counties, states, and even countries can be recruited to expand the wood products industry workforce in California. State legislation can also support wood products workforce development. For instance, SB 85 (section 2), in addition to funding the OPR Pilot Projects, has allocated funding for a statewide wood products workforce assessment.[10] This year, AB 625 (Aguilar-Curry) was introduced to establish the Forest Biomass Utilization Program and develop a workforce training program to meet the state's wood utilization priorities.[9] There are also state and federal grant programs to fund workforce development (see Appendix 3.0).

Labor market analysis for project area

Conducting a labor market analysis within the commuter shed of the proposed project can help the site owner understand the existing industry skills, workforce development and training programs, and employment needs of the region. An understanding of the educational attainment in the commuter shed can help to determine if the population would be interested in pursuing a workforce development program for wood processing. Labor skills and market demand in the area can also indicate viable co-located business opportunities, such as a greenhouse.[52]

Affordable workforce housing

Lack of affordable housing options in rural, forested areas means that even if demand and training for wood products workers increases, workers may not be able to find a place to live near wood products businesses. This complicates the state's ability to support wood products jobs in rural, forested areas.[77] Although there are grants and technical assistance available to address affordable housing challenges (see Appendix 3.0), tackling rural affordable housing issues will continue to be a complex challenge for the state to address.

Consideration 7:

Capacity

We understand capacity as the ability for a community, organization, and/or network of stakeholders to marshal and leverage a dynamic set of resources, skills, and relationships to achieve goals and objectives.[51] Stakeholders interested in redeveloping sites into wood processing facilities will need a supportive and trusted network of stakeholders, champions embedded in local communities advancing projects, and resources to engage in technical project components, including acquiring and administering private financing and public grants. Based on one of our expert stakeholder interviews[87] and research performed by Cashero (2020)[32] on two biomass facilities in the Sierras, capacities key for project success beyond technical expertise include:

- Trusted relationships between a developer and the community
- Abilities to negotiate contracts with government agencies
- Participation in stakeholder networks, including wood processing experts
- Long-standing collaborative relationships with public and private entities that help resolve challenges
- Dedication of a local champion navigating an often long and complex process
- Existing expertise among staff who know how to apply for grants

There is a need to invest in capacity-building among stakeholders, particularly in rural areas, to successfully expand the state's wood processing capabilities. Research organizations like Headwaters Economics have developed screening tools (Rural Capacity Map) identifying indicators of whether communities have access to certain resources - heads of planning departments, proximity to educational institutions, and more - that can strengthen capacity to pursue and leverage federal investments. Their results highlight the need for increased investment in capacity-building among underinvested rural communities.[51] An evaluation published by the Watershed Research and Training Center surveyed the capacity needs for 200 representatives of Tribes and community organizations engaged in forest/fire management work in California. Several skills and resources required for forest/fire management work overlap with those needed in redeveloping former mill sites: staffing, operating budgets, administrative/grants management experience, and outreach. Many respondents reported having several strengths, yet there is a significant need for increased investments that target capacity-building related to regional partnerships and networks, technical skills, and grant-writing.[39]

Strategies

Financial Assistance

There are several federal and state public grant programs supporting capacity-building, either explicitly targeting forest-related initiatives or supporting general capacity-building that can lend to broader conservation and climate resiliency goals. See Appendix 3.0 for a list of relevant programs.

Given the diversity of public financial assistance and breadth of capacity-building needs among stakeholders, federal and state governments should consider how to promote synergy among programs, both across federal agencies and between federal and state programs. Technical assistance for applying and administering grants can increase accessibility for historically underinvested communities. Rural Voices for Conservation Coalition highlights the need for federal agencies

administering the U.S. Farm Bill programs to increase the flexibility of cost-sharing requirements commonly included in grant agreements and providing funding up-front instead of using reimbursements.[79] While underscored for Farm Bill programs, these administrative changes implemented across all kinds of federal and state program could enable greater participation and investment among underserved and low-capacity organizations that have limited financial capital. Technical assistance, including peer-based learning exchanges, can particularly support under-invested stakeholders apply and implement more successfully.

Partnership Models

Agencies, Tribes, private industry, and community organizations in the forest/fire management space are establishing a variety of new partnership models as a tool to accelerate and improve forest restoration projects. These models could be expanded into the realm of developing new or enhancing wood-processing facilities, especially when projects require participation from multiple stakeholders who want to increase resource access.

Several stakeholders we interviewed noted the importance of participating in networks to improve expertise and knowledge for launching wood-processing facilities.[8,87] Partnerships are distinct from stakeholder collaboratives in that two or more entities *formalize* a relationship through a written agreement to generally identify each party's responsibilities, processes, accountability, and how resources are contributed or shared. Partnerships can strengthen capacity for participants if they increase access to expertise, staff time, financial and infrastructural capital, and other resources. While not typically statutory or regulatory in nature, formal partnerships are a form of a policy that organizations can generate to outline an agreement with public agencies, non-profits, and private entities.

Below are some partnership models occurring in California's forest management realm today that could be adopted and adapted to expand wood-processing capacity across the state.

Public-Public Partnership

Established in 2018, the Eastern Sierra Sustainable Recreation Partnership is a formalized partnership between federal and local public agencies to enhance recreation in the Inyo and Humboldt-Toiyabe National Forests. The US Forest Service, Town of Mammoth Lakes, and Mono County signed the agreement to cooperatively maintain, improve, and operate programs and infrastructure. The agreement outlines their responsibilities, rules for access to US Forest Service resources, information-sharing, commitment of staff time, and more.[43,63]

Multi-Organizational Partnership

Nine entities comprise the North Yuba Forest Partnership - a mixture of federal and local agencies, the Nisenan Tribe, and non-profit organizations focused on forest conservation and sustainable financing. Operating under a Memorandum of Understanding since 2018, the partnership focuses on "forest health projects" on 275,000 acres of the Sierra Nevada forestlands. The partnership has been able to leverage their members' financing expertise to launch the Forest Resilience Bond to finance $100 million worth of forest restoration.[71,110]

Public-Private Partnership

Public-private partnerships (P3) are formalized agreements between public agencies and private entities to leverage the unique skills and resources of each party to achieve a goal. The Fall River Resource Conservation District (RCD) has established a P3 model with Hat Creek Lumber that

provides a reliable feedstock for Hat Creek's small-scale sawmill, while generating revenue for the RCD and other participating NGOs. The participating RCDs serve as implementing entities that treat U.S. Forest Service land, sell the small diameter logs and woody biomass to Hat Creek, and then receive some net revenue from Hat Creek's commercial sales. RCDs and the NGOs then plan to reinvest these funds into community projects where they source the woody biomass.[87]

More to Consider

While the preceding section tackles a substantial portion of policy-related dynamics influencing wood-processing facility development, it is not a complete list. Stakeholders, especially policymakers, should consider how federal, state, and local policies and programs could incentive and/or constrain the following to expand wood-processing capacity.

- Policies and strategies that enable the success of community-scale facilities that are utilizing local available forest resources and serving local rural communities through job-creation and revenue reinvestments.
- Investments in wood products research and development at California colleges and universities to stimulate innovation in converting low-value forest biomass (small-diameter logs, damaged trees, and slash) into value-added, socially beneficial products.
- Enhancing a project's financing strategy by leveraging carbon and conservation credit sales that could be generated from using an avoided wildfire emissions methodology[11] or using carbon capture and removal technologies for hydrogen production.

DISCUSSION

Determining whether sites are suitable for redevelopment requires more expansive environmental and policy analysis and local stakeholder engagement than our team had time to accomplish during a condensed project timeline. Results from the nine sites highlighted in this report indicate some locations may be more worth investigating further than others. However, **these results do not indicate these are the best sites in California**. Our intention is that future researchers and stakeholders adopt and expand the evaluation tools we developed to assess the suite of former

Community	County	Historic Site Name	Current Owner	Evaluation
Hayfork	Trinity	Sierra Pacific	Murrison Scott	17/23
Happy Camp	Siskiyou	Stone Forest Industries, Inc. (Happy Camp Lumber Oper-	Yeager Daniel R & Debbie G Trust	17/23
Hilt	Siskiyou	Fruit Growers Supply	Fruit Growers Supply Company (pending ownership transfer to New Forests)	13/23
Burnt Ranch	Trinity	Stone Forest Products	SWF Plywood Co.	11.5/23
Seiad Valley	Siskiyou	Hi-Ridge Lumber (Seiad Valley)	Anthony Bishop	11/23
Wildwood	Trinity	Kimberly-Clark Cor-	BPS Associates 2 LLC	10.75/23
Hyampom	Trinity	Hyampom Lumber	Foster Steven	9.5/23
Dorris	Siskiyou	American Forest Products (Dorris)	Butte, Valley	9.25/23
Pearsonville	Inyo	Louisiana Pacific (Inyokern)	State of California	4.25/23

Table 12. Summary of scores for all sites in phase 2.

sawmill sites throughout California.

According to our Project Phase 2 evaluation criteria, a site could receive a maximum of 23 points. Table 1 shows that of the nine sites, four received half or more (11.5+) of the total maximum points: Hayfork (Trinity County), Happy Camp (Siskiyou County), Hilt (Siskiyou County), and Burnt Ranch (Trinity County).

The **Hayfork (Trinity County)** and **Happy Camp (Siskiyou County)** sites scored the highest at 17 points each. While they did not receive the maximum allowable points per our evaluation criteria, their locations have several conditions - such as access to highways, existing utility infrastructure, and industrial zoning - that imply these sites are worth analyzing further in future analyses to determine redevelopment feasibility. Both sites are privately owned, have significant nearby recoverable forest biomass (6,556,820 BDT and 6,280,885 BDT, respectively), and are located within the boundaries of a feedstock aggregation pilot project overseen by California OPR. Recoverable biomass does not indicate whether the biomass would be *practically available* for a new facility; that is, other nearby wood-processing facilities may have already claimed material, present tree species may not suit the needs for all facility types, and/or it may be challenging to secure a sustainable feedstock supply contract. However, the OPR feedstock pilot project currently underway in these regions implies there may be support for feedstock supplies from the counties in the near future. The surrounding forests are primarily federally-owned (73% and 96%, respectively), so facility developers could establish supply contracts with implementing agencies and/or the U.S. Forest Service that may be conducting forest treatments nearby. Both sites are serviced by local water and sewer providers, have transmission lines nearby, and are zoned for industrial uses. These conditions imply land use permitting could occur more quickly and cost-effectively and the sites already have access to critical services. Though neither site is in close proximity to rail lines (46 miles and 60 miles, respectively), they are both located adjacent to a highway (Hwy 3 and Hwy 96, respectively) and have nearby on/off ramps providing faster access to and from the highway. Both sites are located in census tracts with high unemployment (88th and 96th percentile, respectively), indicating new wood-processing businesses offering well-paying jobs could provide economic benefits to local residents.

The other two high-scoring sites - **Hilt (Siskiyou County)** and **Burnt Ranch (Siskiyou County)** - scored relatively lower than Hayfork and Happy Camp due to the lack of transmission lines, lack of water and sewer services, and being located in non-industrial land use zones. While the Hilt site has relatively lower recoverable nearby biomass than Burnt Ranch (1,295,758 BDT and 6,969,707 BDT, respectively), the site exists within the boundaries of an OPR feedstock aggregation pilot project that has the potential to support feedstock needs. New Forests, a private forestry management company, also recently purchased the Hilt site along with nearby private forestlands. The site is primarily surrounded by privately-owned forests and if New Forests is a significant holder, the company could potentially provide the low-value forest biomass resulting from any forest treatments occurring on their lands. Both sites are located in census tracts with high unemployment (96th and 88th percentile, respectively), indicating new wood-processing businesses offering well-paying jobs could provide economic benefits to local residents.

The remaining five sites - **Seiad Valley (Siskiyou County), Wildwood (Trinity County), Hyampom (Trinity County), Dorris (Siskiyou County),** and **Pearsonville (Inyo County)** - scored less than half of the maximum allowable points (<11.5). They are all generally lacking transmission lines, lacking water and sewer services, do not have available environmental contamination records, and do not have an active water compliance permit. The Dorris

and Hilt sites are the only ones that scored positively for being close to rail lines. All except the Pearsonville site in Inyo County are located in non-industrial zones, indicating developers would need to rely on lengthy (and often expensive) discretionary land use review with local planning commissions and County Boards of Supervisors. Inyo County zoning ordinances allow conditional use permits for "processing natural resources" at this site, which represents the potential to accommodate some type of forest wood-processing as long as the facility and operations align with community priorities. Despite this potential, the Inyo County site scores the lowest at 4.25 points. It is the only site owned by a public entity (State of California), which may create more obstacles for coordinating redevelopment compared to private ownership. It is also the only site that exists in a county with non-attainment for criteria air pollutants (PM_{10} and ozone). This indicates that polluting facilities may face additional challenges from attaining air permits depending on the facility's operations and regulations from the Great Basin Unified Air Protection Control District. The site has significantly less recoverable biomass (12,348 BDT) compared to other higher-scoring sites and is the only site that is neither near an OPR feedstock aggregation pilot project nor near a forest collaborative.

NEXT STEPS

Expand the analysis

Our role with this project concludes here, but we implore stakeholders to adopt and expand our analysis. The intention of this project was to be a first step towards evaluating former sawmill sites throughout California. Our Project Phase 2 analysis focused on 10 low-capacity sites, but there are 130 other sites that also deserve attention, 60 of which reached the same biomass recoverability and poverty rate thresholds as our final 10. Future stakeholders could also refine the site evaluation criteria to increase their accuracy and applicability. For example, our water connectivity criterion was not able to include the existence or lack of private wells due to time constraints. This would require either contacting a site owner or finding assessor parcel numbers for every parcel within each site for local environmental offices to query their databases. The inclusion of more in depth information such as practical availability of forest biomass, feedstock characteristics, regional market conditions, buy-in from stakeholders and communities, site history, and workforce considerations would also improve the analysis.

Community engagement

While our project timeline limited us from conducting community-scale engagement with residents and hyperlocal organizations, we recommend future researchers and local stakeholders advancing this work to do so as part of site analysis and long before any redevelopment occurs. Scaling facilities and business plans based on accurate assessments of community needs, capacities, and preferences is important for the long term success of any redevelopment project. Early and consistent community engagement that is paired with direct avenues for change based on community needs can also prevent obstacles often faced by developers. Engagement at a community scale can help to identify and activate local champions, whose leadership can be pivotal to projects.

Brownfields grant preparation guide for former sawmill sites

If and when a community embraces site redevelopment for wood-processing facilities, applying for grant funding is an important step towards acquiring a diverse set of funding sources required for redevelopment needs. Policy Consideration 2 discusses the assessment and cleanup of former sawmill sites in California due to environmental contamination, as well as the public financial assistance available. Our guidance document in Appendix 4.0 is for stakeholders unfamiliar with the grant preparation and application process, particularly for what public agencies expect in a Brownfields application.

Enhance coordination with synergistic efforts

There is significant synergy between results from this research and efforts led by a diverse set of public agencies, non-profits, and industry partners. Organizations like the Rural County Representatives of California and Golden State Natural Resources have been evaluating former sawmill sites for redevelopment potential and the state Office of Planning and Research continues stewarding the five feedstock aggregation pilot projects in northern California. As of May 2023, the Environmental Protection Agency awarded a total of $1 million to two Brownfields grant projects focused on assessing clean up for former sawmill sites in California. The projects will be led by the Sierra Institute for Community and Environment and Blue Forest Finance Inc. in collaboration with the Watershed Research and Training Center. We encourage these organizations and other partners seeking to advance California's wood-processing capacity to regularly engage with each other to enhance coordination, collaboration, and information-sharing.

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APPENDICES

Appendix 1.0
Guidebook for Phase 1 GIS Analysis:
Criteria, Data Sources, Methodology

Reducing a List of 208 Former Wood Processing Facilities into 10 Sites Utilizing Select Environmental and Socioeconomic Geospatial Data

Abandoned Wood Processing Facilities Database

Source: UC ANR California Closed Wood Facility Database Primary Wood Processing

Description of Data: This database was developed in collaboration by the University of California Agriculture and Natural Resources (UC ANR) and the United States Forest Service (USFS). It lists all abandoned wood processing facilities/sawmills in the state of California. This list does not specify the current development status of the land that these former facilities were located on. Further analysis is required in order to identify which sites are currently able to be revitalized and redeveloped, and which ones have been repurposed into dense commercial, residential, or other urban development.

Purpose and Use: This list comprises 208 abandoned sawmill facilities in California that have been closed over the last several decades. The UC Davis EPM Student Team utilized this database to conduct a visual site analysis via OnX and Google Earth Pro to determine site viability for development. Approximately ~140 sites were narrowed from this list of 208. The list of ~140 sites undergoes extensive geospatial analysis to be reduced to a list of 8-12 final sites. The analysis includes applying biomass data, socioeconomic criteria data, and other data related to environmental conditions, in order to conduct an assessment of site suitability.

Biomass Data

Sources: Getting to Neutral: Options for Negative Carbon Emissions in California; California Biomass Residue Emissions Characterization (C-BREC) from Schatz Energy Research Center

Description of Data: The C-BREC model was developed by a grant from the California Energy Commission (CEC) through the Electric Program Investment Charge (EPIC) program and provides a snapshot of existing and currently recoverable forest residues that can be used for electricity generation. This project uses the recoverable bone dry tons (BDT) data within the C-BREC model to quantify the amount of biomass available within counties and select those with the highest amount of biomass.

The “Getting to Neutral: Options for Negative Carbon Emissions in California” report provides a full assessment of different pathways to remove carbon emissions from the atmosphere in order to help California achieve carbon neutrality by 2045. Biomass to energy is highlighted as one of these pathways, thus the report provides an in-depth assessment of the available biomass in the state. The report identifies 7 counties that have the highest amount of readily available biomass: Humboldt, Mendocino, Siskiyou, Trinity, Shasta, Plumas, and San Bernardino. The C-BREC model confirms this, and also identifies Humboldt, Mendocino, Siskiyou, Trinity, Shasta, and Plumas as counties with the highest amount of recoverable forest biomass. The addition of San Bernardino county is due to its proximity to high amounts of shrub and chaparral fuels reduction.

Purpose and Use: The C-BREC Forest Biomass Layer from Schatz Energy Research Center is first used to identify the total amount of readily available and recoverable forest biomass within each county, to prioritize sites that will likely have access to biomass in order to supply facilities. The results are cross referenced with the counties identified in the “Getting to Neutral: Options for Negative Carbon Emissions in California” report. The findings confirm that both the C-BREC model and the Getting to Neutral report identify the same 6 counties with the highest amount of recoverable forest biomass. An additional 7th county, San Bernardino, is identified in Getting to Neutral, and is added to scope of our Phase 1 analysis. was used in our analysis to highlight the counties with the highest amount of readily available and recoverable forest biomass, to prioritize sites that will likely have access to biomass in order to supply facilities.

Rural Capacity Data
Source: Headwaters Economics

Description of Data: Headwaters Economics developed the Rural Capacity Index screening tool in response to the monumental federal funding flowing from the

Bipartisan Infrastructure Bill. The organization communities can leverage the data to advocate for resources and agencies can use the tool to guide infrastructure investment decisions. The Index determines communities as either “low” “median” or “high” capacity, defining levels of capacity according to national percentile with as less than 33%, “medium” as 33-66%, and “high” as greater than 66%. The Index incorporates ten indicators, including, but not limited to, whether the place has at least one head of planning/zoning, percentage of adults that attained higher education, and whether the place has at least one educational institution offering an Associate’s degree or higher.

Use of Data in Analysis: Communities that are interested in redeveloping former sawmill sites will most likely require a combination of public funding and private financing to prepare the site and construct facilities. This typically requires a community with a certain degree of capacity - staffing, expertise, and other resources - to apply for funding and successfully implement projects.

The use of this tool allows us to filter sites based on their capacity to pursue funding, which allows us to prioritize sites located in communities that otherwise may not have the capacity to acquire the necessary resources for site assessment and redevelopment. As Headwaters Economics notes, communities with less capacity often need greater infrastructure investment due to historical disinvestment and are often overlooked for grant funding; this project presented an opportunity to research site locations in regions that may not have the capacity to do so. To counterbalance this, we conducted geospatial analysis where we still incorporate sites located in low capacity communities. The intended goal is that investing in these regions will have the combined benefit of reducing the community's wildfire risk while also providing a hub for economic development, increasing capacity, and increasing community resilience.

Poverty Data

Sources: CalEnviroScreen 4.0 Shapefile Data

Description of Data: CalEnviroScreen is a mapping tool that helps identify California communities that are most affected by many sources of pollution, and where people are often especially vulnerable to pollution’s effects. The current version of CalEnviroScreen, 4.0, was released in 2021. 21 different indicators measure the environmental pollution, health burdens, and social stressors that communities across

the state face. To-date, the CalEnviroScreen 4.0 map has been visited over 1.5 million times.

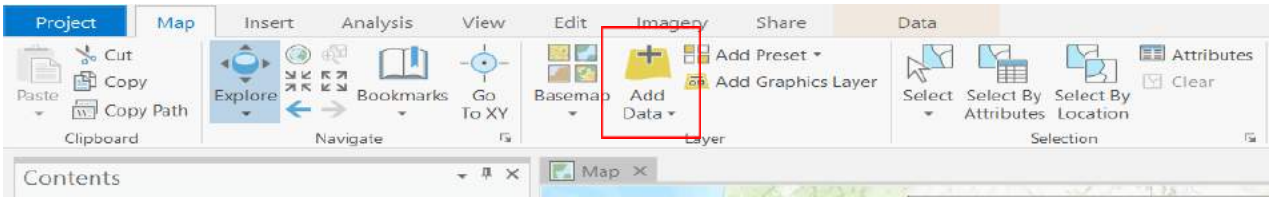
The overall CalEnviroScreen score measures the accumulation of greater burdens through a relative scoring approach. The tool combines the indicators to determine the level of cumulative impacts on a particular community – represented as census tracts. The results map displays the cumulative impact scores of communities across California using a red-to-green color-coded system. Data utilized from CalEnviroscreen for the purposes of this analysis is “Percent of the population living below two times the federal poverty level (5-year estimate, 2015-2019)”, which is an indicator that shows the percent of the population with income less than two times the federal poverty level. This information is updated every year by the US Census Bureau’s American Community Survey (ACS), which provides a more accurate snapshot of household poverty levels compared to the decennial census, because it surveys a smaller sample of the population which provides a more detailed economic and social overview of the population.

Use of Data in Analysis: To help drive economic opportunity to vulnerable communities, this project looks at county subdivisions that are above or equal to the 75th percentile of 200% of federal poverty level. The Poverty Percentile data point was pulled from the CalEnviroScreen 4.0 database and was filtered to display census tracts where the number of households above 200% of federal poverty was greater than 75% of other Census Tracts in California.

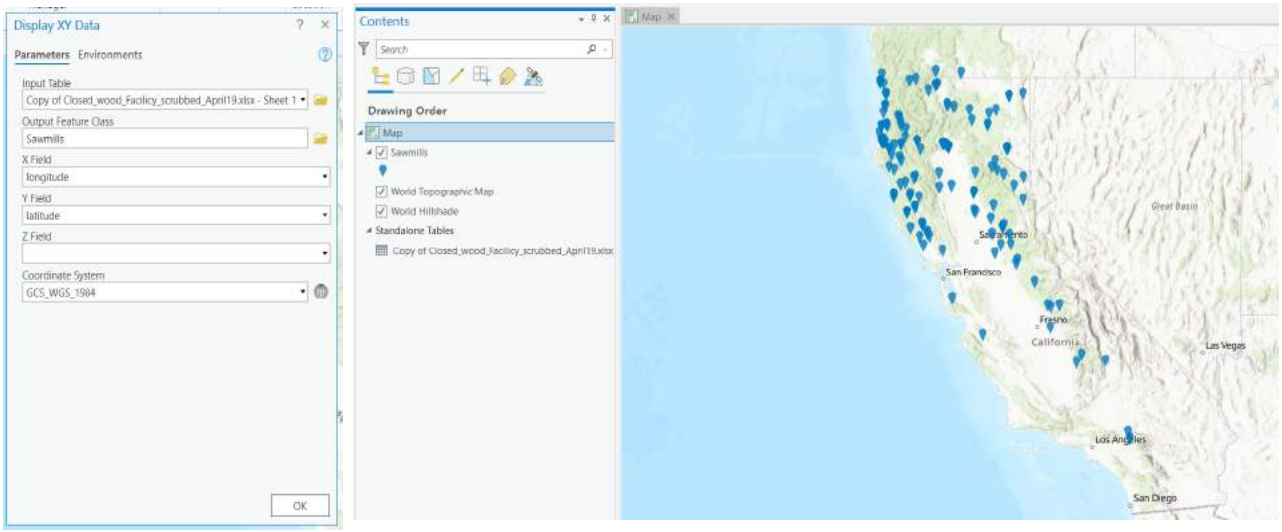
Analysis Process via ArcGIS

Sequencing the layering of several geospatial data layers to evaluate which of the 208 former sawmill sites should be selected to move onto Phase 2 of our analysis, which features collection of more detailed site characteristics.

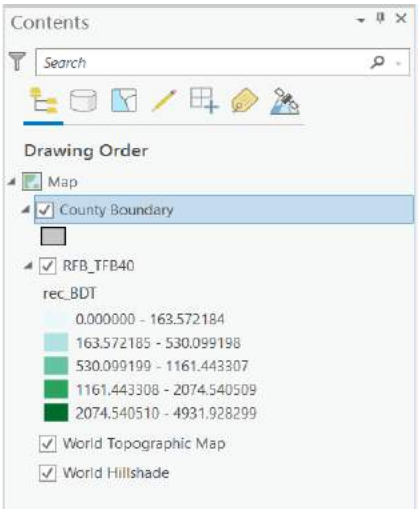
1. Add Data from CSV File of 140 Abandoned Wood Processing Facilities
    a. Download the .csv file and add it to your map through the **Add Data** button.

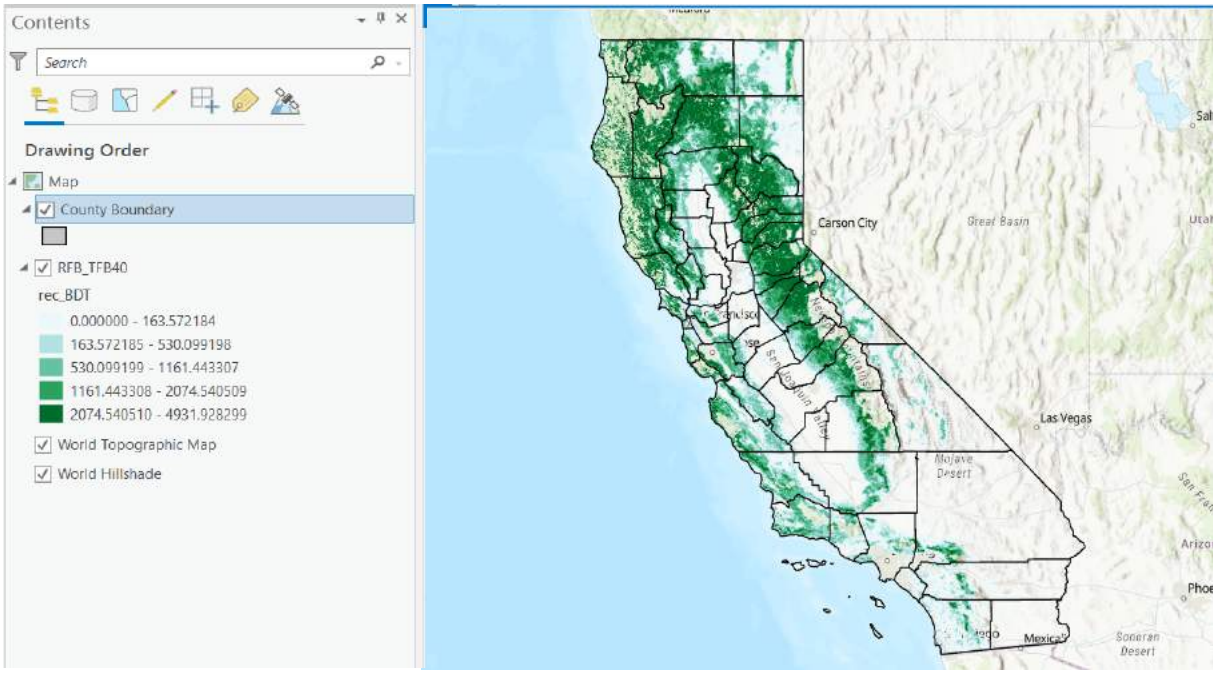


    b. Right click the table on the Contents pane and select **Display XY Data**.
    c. Name the Output Feature Class: “Sawmills”

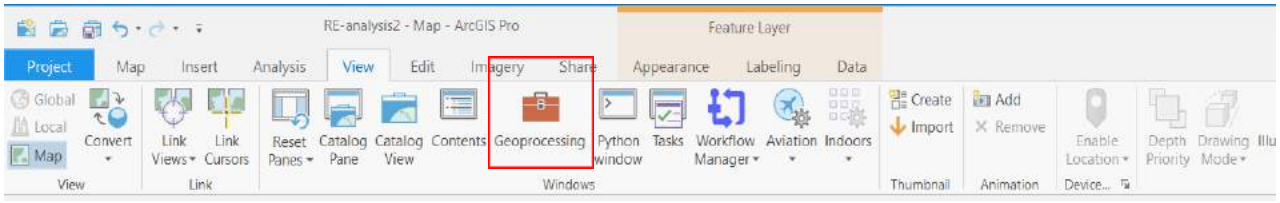


2. Incorporate data from the C-BREC model to quantify the amount of readily available and recoverable forest biomass per county to prioritize sites with access to high amounts of biomass.
    a. Download the “The C-BREC Forest Biomass Layer from Schatz Energy Research Center” and add it to your map through the **Add Data** button.
    b. Download the “County Boundary” layer and add it to the map through the **Add Data** button.
    c. Unselect the “Sawmills” layer in the **Contents Pane** for now.

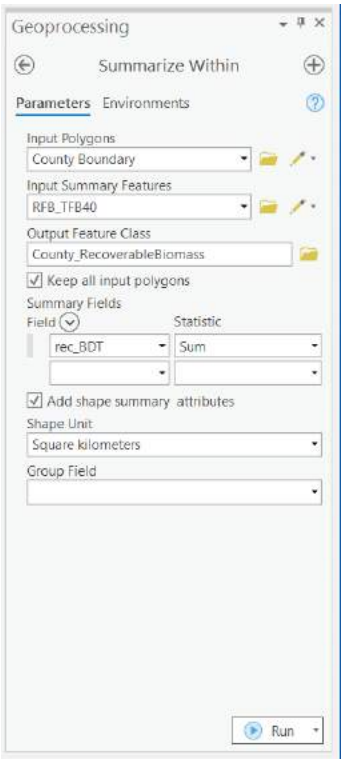




d. Summarize the total amount of recoverable forest biomass in each county. To do this, go to the **Geoprocessing button** and search for and select the **Summarize Within** tool.

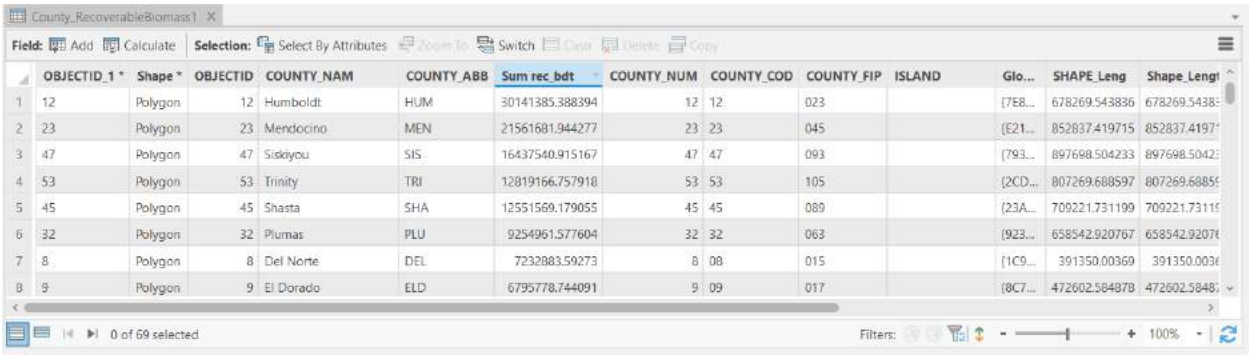


e. Select “County Boundary” as the Input Polygons, and “RFB_TFB40” as the Input Summary Features. This will measure the amount of Recoverable Forest Biomass per county.
f. Name the Output Feature Class “County_RecoverableBiomass”.
g. Make sure to keep all input polygons checked.
h. For Summary Fields, select “rec_BDT” as the Field and “Sum” as the Statistic; this will calculate the total sum of recoverable biomass within each county boundary.
i. Press **Run** when all the fields you have entered match the screenshot on the right.



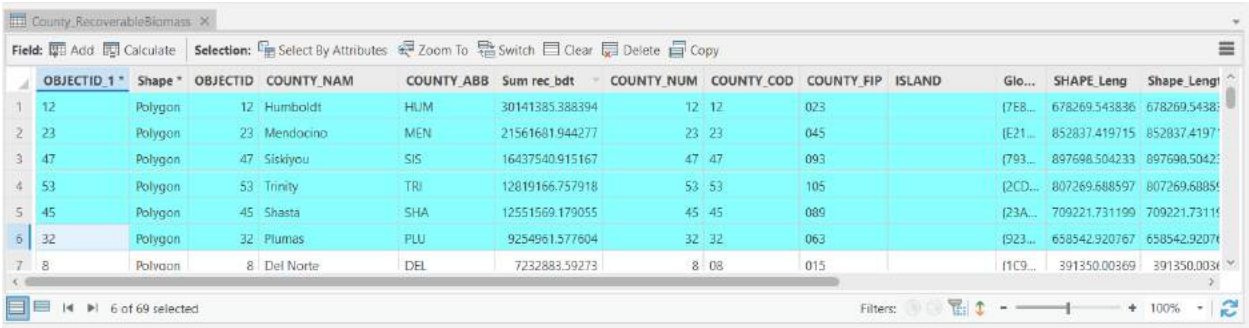
j. Right-click the “County_RecoverableBiomass” layer in the **Contents Pane** and select **Attribute Table.**

k. Locate the “Sum rec_bdt” field, and sort by “Descending” to get a list of counties with the highest amount of recoverable biomass in bone dry tons (bdt).

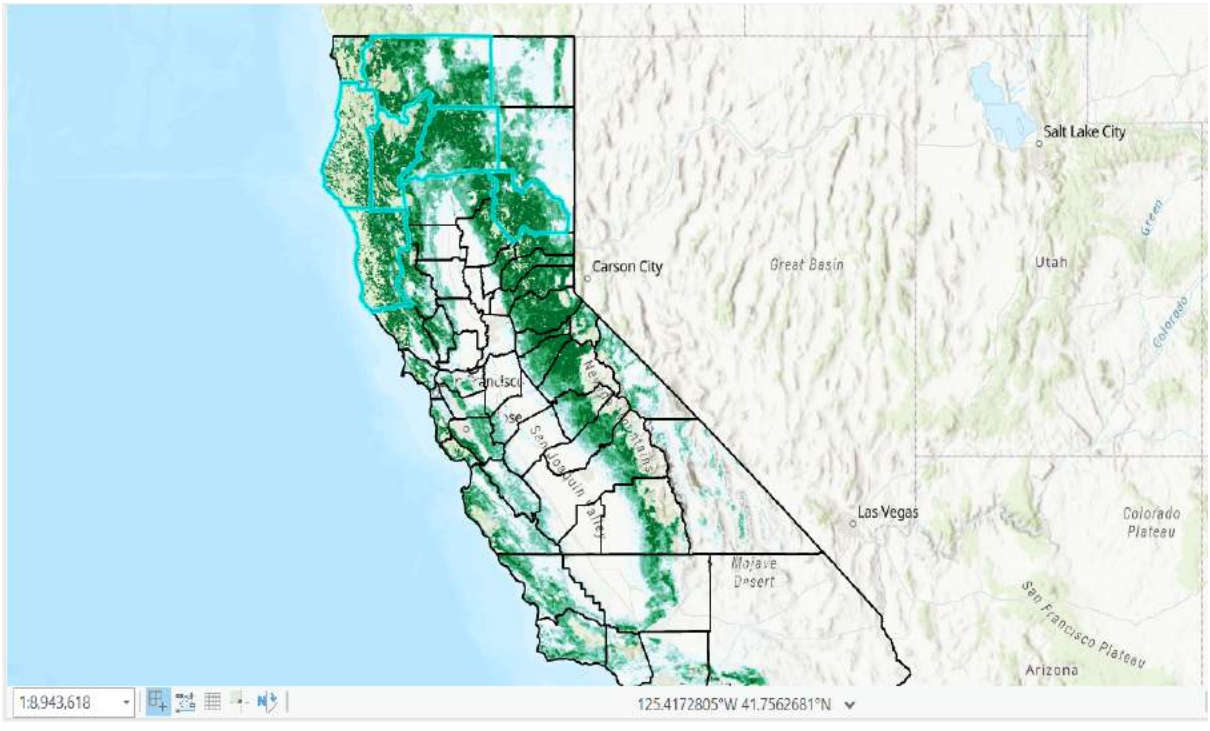


OBJECTID_1 *	Shape *	OBJECTID	COUNTY_NAM	COUNTY_ABB	Sum rec_bdt	COUNTY_NUM	COUNTY_COD	COUNTY_FIP	ISLAND	Glo...	SHAPE_Leng	Shape_Length
12	Polygon	12	Humboldt	HUM	30141385.388394	12	12	023		{7E8...	678269.543836	678269.5438
23	Polygon	23	Mendocino	MEN	21561681.944277	23	23	045		{E21...	852837.419715	852837.4197
47	Polygon	47	Siskiyou	SIS	16437540.915167	47	47	093		{793...	897698.504233	897698.5042
53	Polygon	53	Trinity	TRI	12819166.757918	53	53	105		{2CD...	807269.688597	807269.6885
45	Polygon	45	Shasta	SHA	12551569.179055	45	45	089		{23A...	709221.731199	709221.7311
32	Polygon	32	Plumas	PLU	9254961.577604	32	32	063		{923...	658542.920767	658542.9207
8	Polygon	8	Del Norte	DEL	7232883.59273	8	08	015		{1C9...	391350.00369	391350.003
9	Polygon	9	El Dorado	ELD	6795778.744091	9	09	017		{8C7...	472602.584878	472602.5848

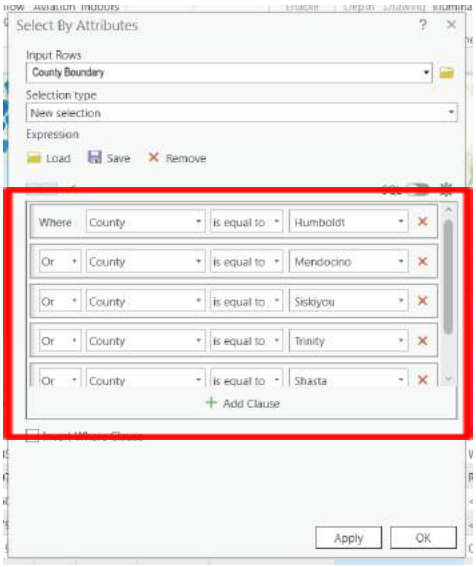
l. You will see that the 6 top counties identified to have the highest amount of recoverable biomass are: Humboldt, Siskiyou, Trinity, Shasta, and Plumas. These are the same counties identified in the “Getting to Neutral” report, with the addition of San Bernardino.

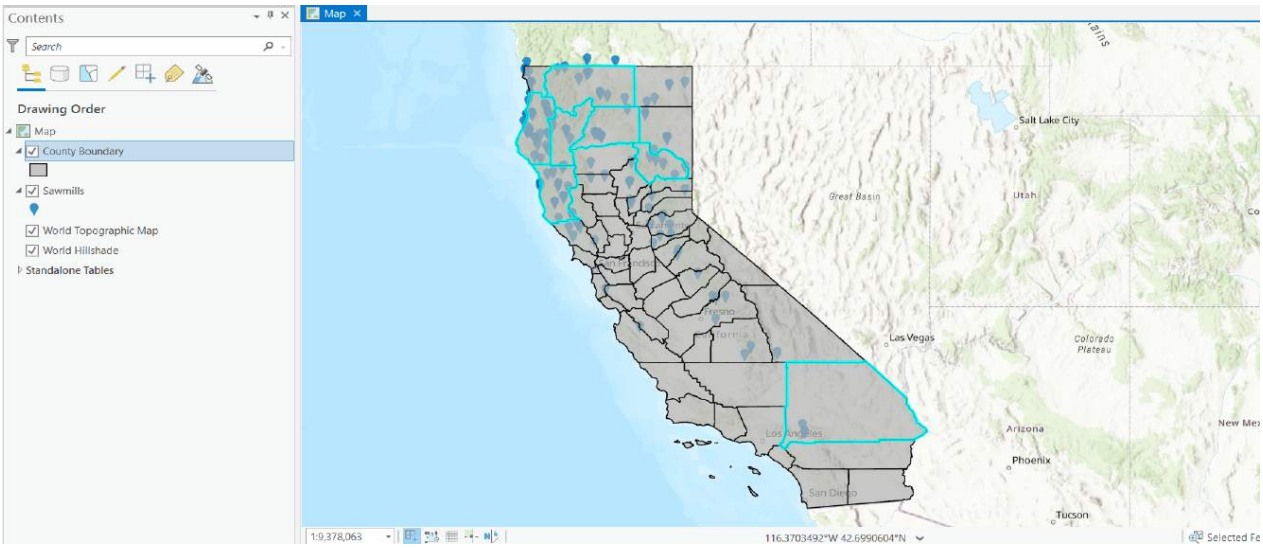


OBJECTID_1 *	Shape *	OBJECTID	COUNTY_NAM	COUNTY_ABB	Sum rec_bdt	COUNTY_NUM	COUNTY_COD	COUNTY_FIP	ISLAND	Glo...	SHAPE_Leng	Shape_Length
12	Polygon	12	Humboldt	HUM	30141385.388394	12	12	023		{7E8...	678269.543836	678269.5438
23	Polygon	23	Mendocino	MEN	21561681.944277	23	23	045		{E21...	852837.419715	852837.4197
47	Polygon	47	Siskiyou	SIS	16437540.915167	47	47	093		{793...	897698.504233	897698.5042
53	Polygon	53	Trinity	TRI	12819166.757918	53	53	105		{2CD...	807269.688597	807269.6885
45	Polygon	45	Shasta	SHA	12551569.179055	45	45	089		{23A...	709221.731199	709221.7311
32	Polygon	32	Plumas	PLU	9254961.577604	32	32	063		{923...	658542.920767	658542.9207
8	Polygon	8	Del Norte	DEL	7232883.59273	8	08	015		{1C9...	391350.00369	391350.003

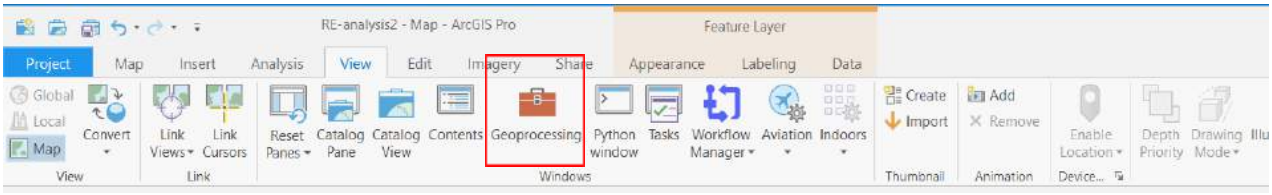


3. Create a separate layer for Counties with High Surrounding Biomass as as Identified by C-BREC model and confirmed in *Getting to Neutral* Report (see Sources for more info).
    a. Unselect the “County_Recoverable Biomass” layer in the **Contents Pane**, and select the “Sawmills” site in the **Contents Pane**, so that only the County Boundaries and Sawmill sites show.
    b. Right click the “County Boundary” layer on the Contents pane and click **Select Layer by Attribute.**
    c. Click **Select by Attributes.**
    d. For Selection Type, select New Selection.
    e. Input Where “County” “is equal” to “Humboldt”, or “Mendocino”, or “Siskiyou”, or “Trinity”, or “Shasta”, or “Plumas”, or “San Bernardino”.
    f. Click Apply and OK.



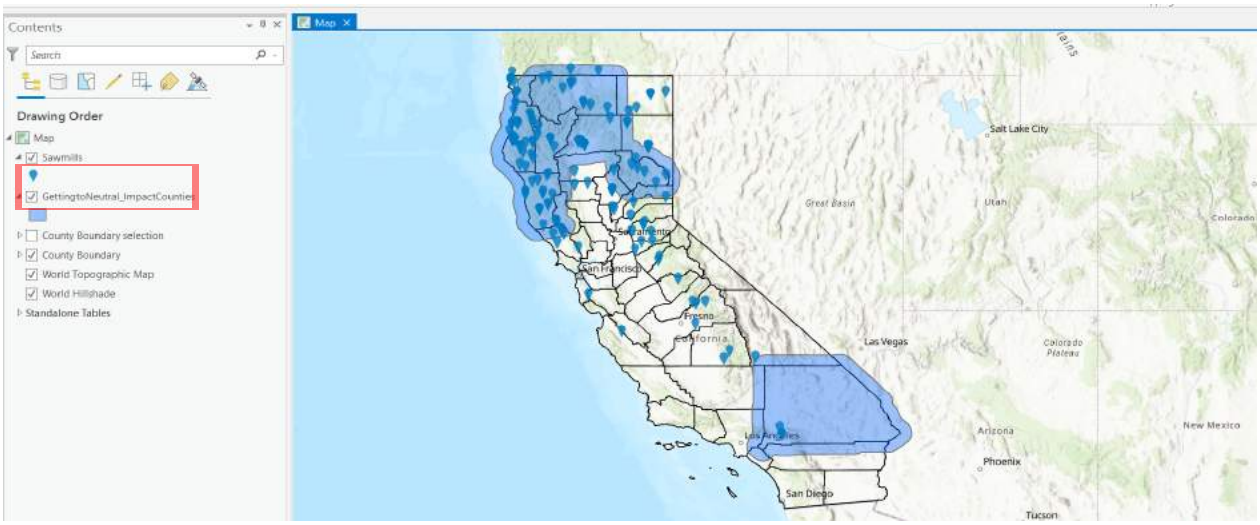


    g. Right Click the “County Boundary” layer in the Contents pane and select **Selection → Make Layer from Selected Features.**
    h. Add a 20 mile buffer to incorporate sawmills located right outside the county boundary.



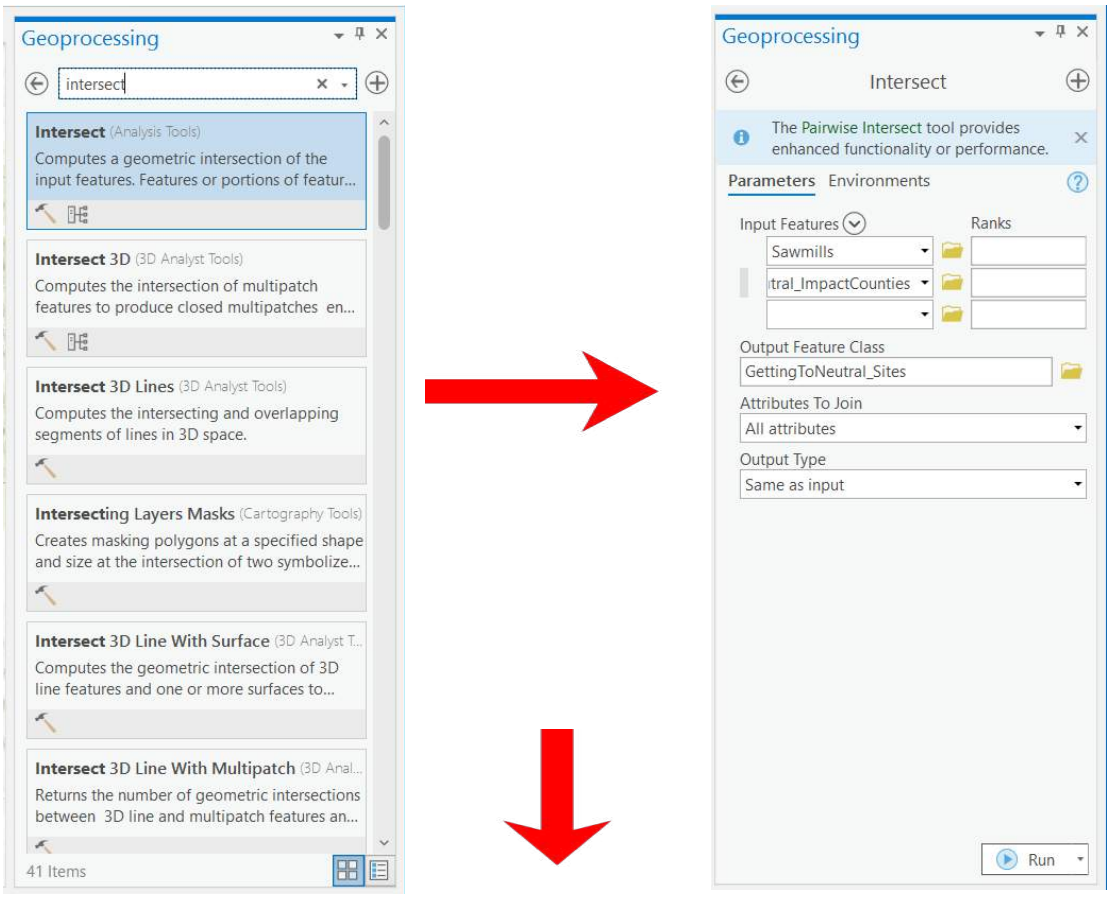
    i. To do this, open the **Geoprocessing** Pane and search and select the **Buffer** tool.
    j. Select “County Boundary Selection” for Input Features. Name the Output Feature Class “GettingtoNeutral_ImpactCounties”.
    k. Set the Distance to 20 Miles.
    l. Make sure Dissolve Type is set to “Dissolve all features into a single feature”.

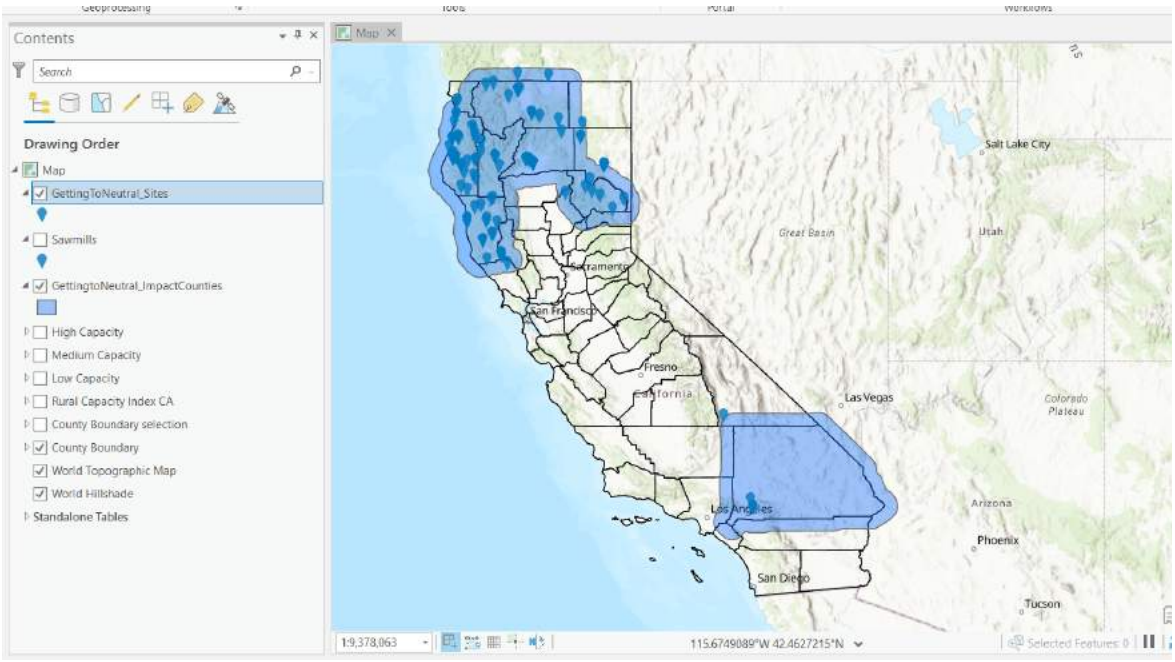
m. Click **Run.**



4. Intersect Sawmill Sites with Getting to Neutral Impact Counties to Select Sites that are Located Amid High Biomass Regions.

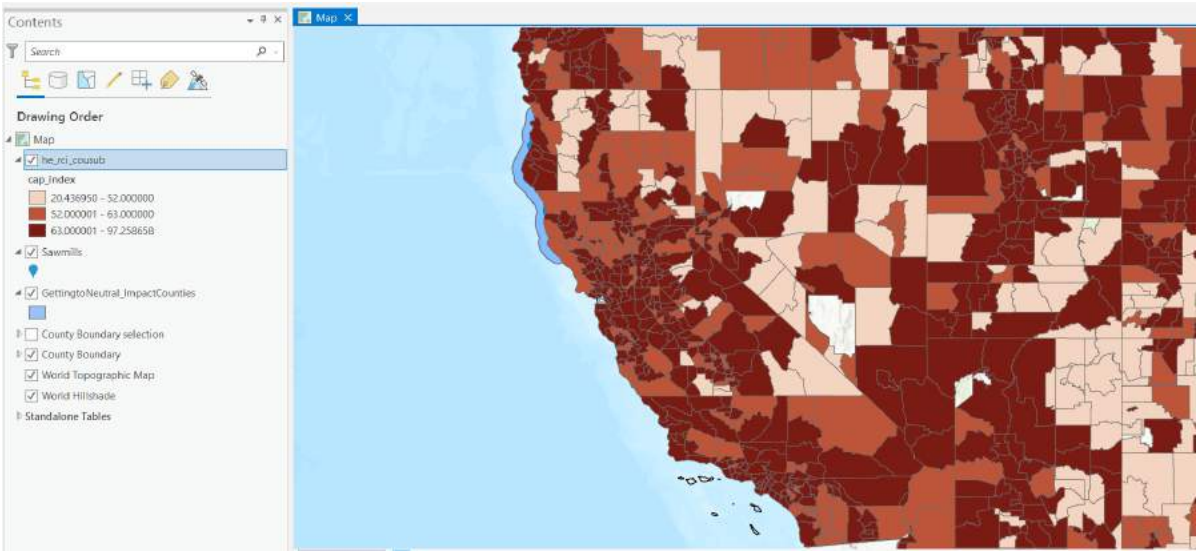
a. Open the **Geoprocessing Pane** and select the **Intersect** tool.
b. For “Input Features”, input “Sawmills” and “GettingToNeutral_ImpactCounties”.
c. For “Output Feature Class”, select “GettingToNeutral_Sites”.
d. Click **Run.**





5. Incorporate Data from Headwaters Economics Rural Capacity Index Map.

a. Download the data from the Headwaters Economics website and insert the shapefile into your Map by clicking **Insert** → **Add Folder**, and search for the file on your computer.

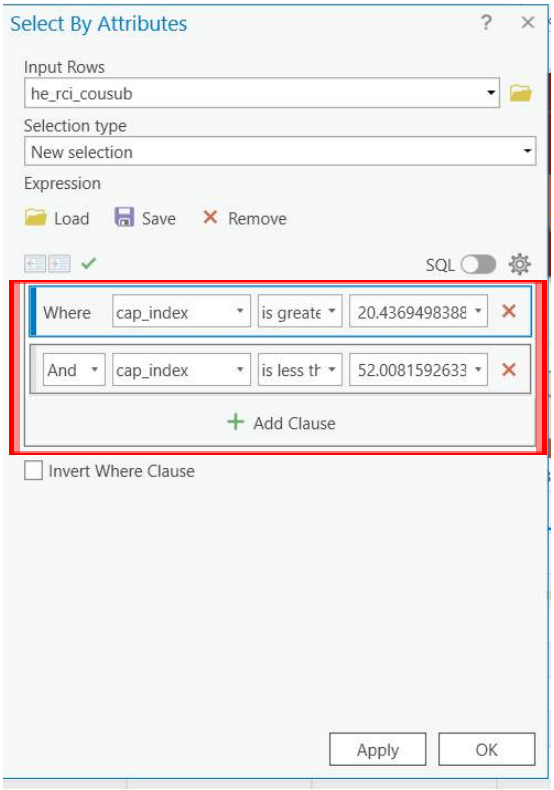


b. Create a new layer for data only in California. Right click the layer and **Open the Attribute Table**, click **Select Layer by Attribute.**

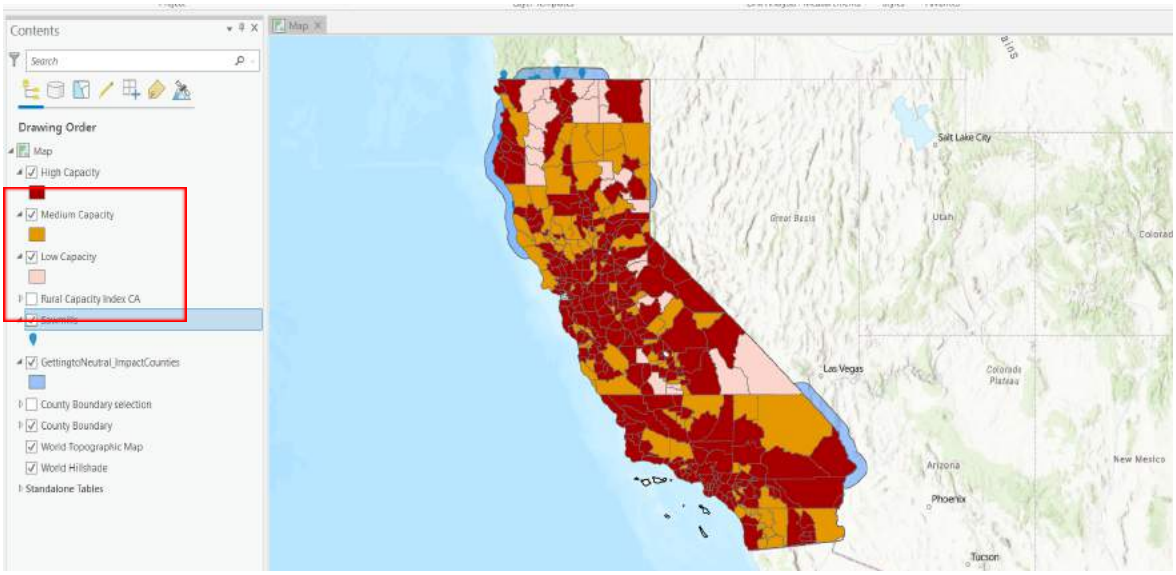
c. Input “Where State” is equal to “CA” and Click OK.

d. Right Click the Rural Capacity Layer and click **Selection** → **Make Layer from Selected Features.** Name the new layer “Rural Capacity Index CA” and delete the old one.

e. Create individual layers for Low, Medium, and High Capacity county subdivisions.
f. First for Low Capacity, right click the layer and **Open the Attribute Table**, click **Select Layer by Attribute**
g. Input “Where Cap_Index” is greater than or equal to “20.4”, and “Cap_Index” is less than or equal to “52”. Click OK.
h. Right Click the Rural Capacity Layer and click **Selection → Make Layer from Selected Features.**
i. Name the new layer “Low Capacity”.

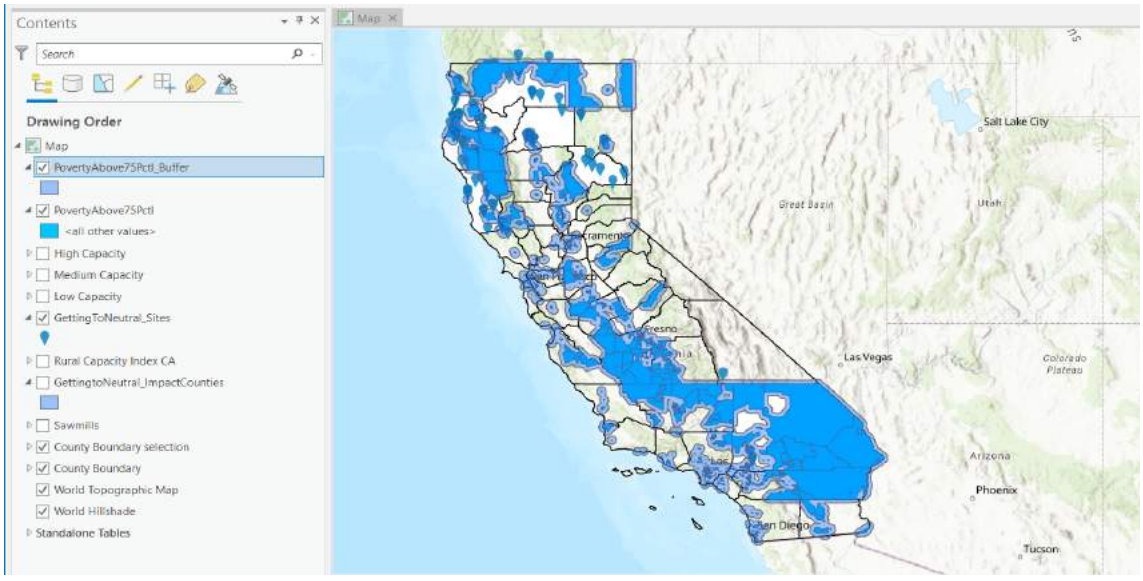


j. For Medium Capacity, right click the layer and **Open the Attribute Table**, click **Select Layer by Attribute**
k. Input “Where Cap_Index” is greater than or equal to “52.001”, and “Cap_Index” is less than or equal to “63”. Click OK.
l. Right Click the Rural Capacity Layer and click **Selection → Make Layer from Selected Features.**
m. Name the new layer “Medium Capacity”.
n. For High Capacity, right click the layer and **Open the Attribute Table**, click **Select Layer by Attribute**
o. Input “Where Cap_Index” is greater than or equal to “63.0001”, and “Cap_Index” is less than or equal to “98”. Click OK.
p. Right Click the Rural Capacity Layer and click **Selection → Make Layer from Selected Features.**
q. Name the new layer “High Capacity”.
r. You should have 3 separate layers for Low, Medium, and High Capacity on your map. Adjust **Symbology** to display a single field.

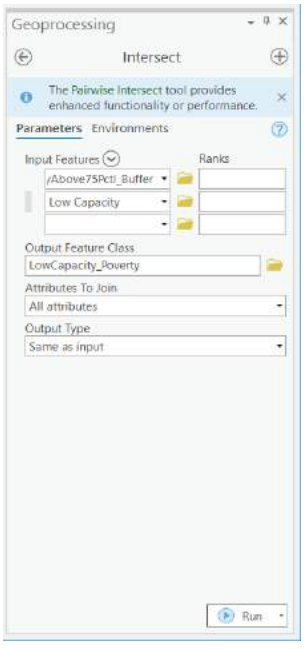


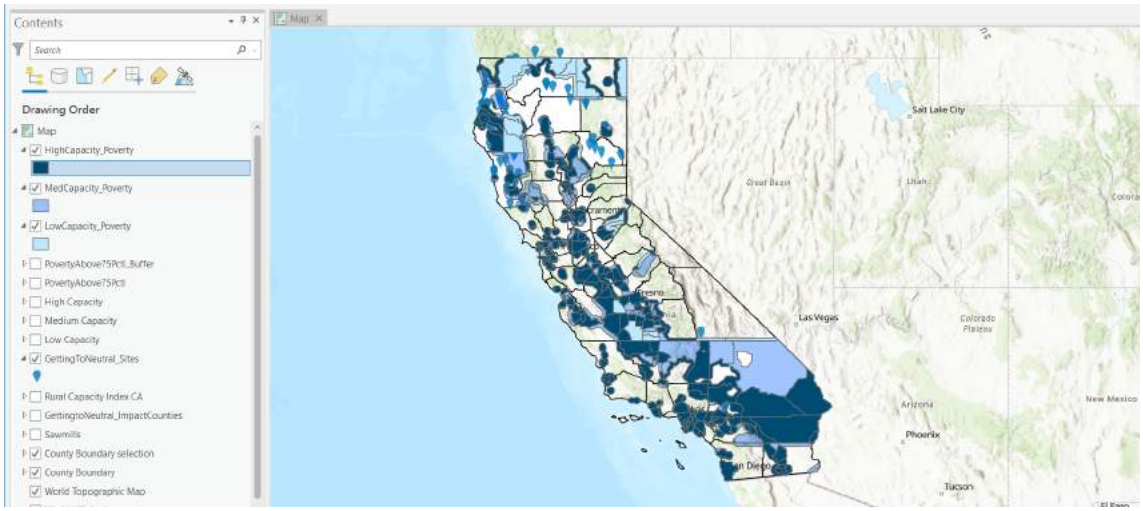
6. Incorporate CalEnviroScreen Poverty Data (Percent of individuals below 200% Federal Poverty Levels)
    a. Download the data from the CalEnviroScreen website and insert the shapefile into your Map by clicking **Insert** → **Add Folder**, and search for the file on your computer.
    b. Right click the layer and **Open the Attribute Table**, click **Select Layer by Attribute.**
    c. Input “Where Poverty Pctl” is “greater than or equal” to “75” and Click **OK**.
    d. Right Click the CalEnviroScreen layer in the Contents Pane and click **Selection** → **Make Layer from Selected Features.** Name the new layer “PovertyAbove75pct” and delete the original CalEnviroscreen layer.

7. Apply a 5 mile buffer on the new Poverty layer to keep investments and capital within communities most affected.
    a. In the **Geoprocessing pane**, select the “Buffer” tool.
    b. Input “Poverty75pct” as the “Input Layer” and add a Distance of 5 miles.
    c. Make sure to select “Dissolve all output features into a single feature”.
    d. Name the new layer “Poverty75pct_Buffer”.



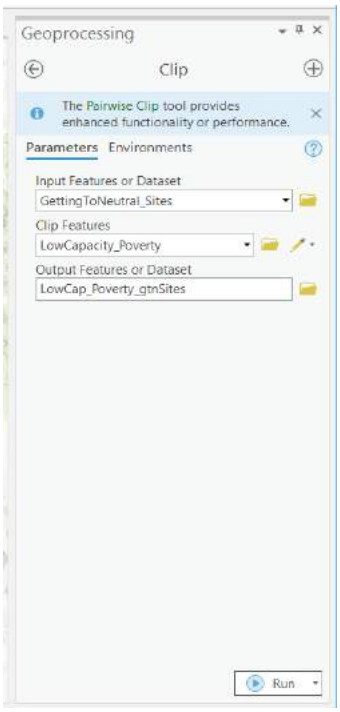
8. Intersect the Low, Medium, and High Capacity layers individually with the new buffered 75% income percentile layer, to extract regions with high biomass availability and high poverty amid areas with low/med/high rural capacity.
    a. Open the **Geoprocessing Pane** and select the **Intersect** tool.
    b. For Input Features, input “Low Capacity” and “Poverty75pct_Buffer”.
    c. For Output Feature Class, select “LowCapacity_Poverty”.
    d. Click **Run.**
    e. Repeat the same process, alternating “Low Capacity” with Medium, then High, to get 3 new layers.

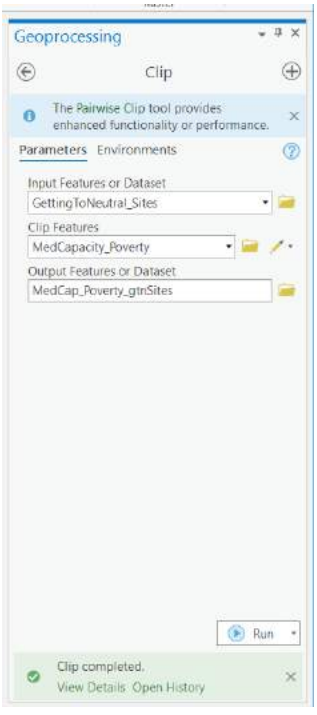


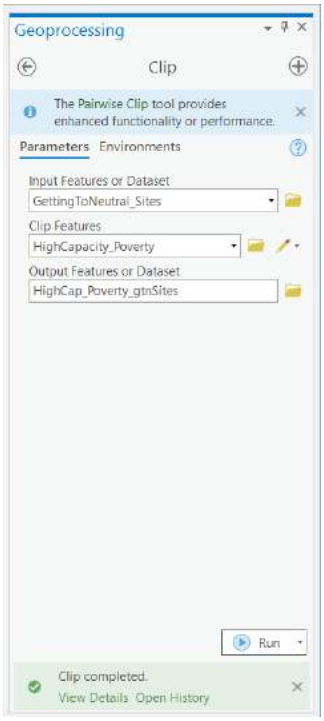


9. Identify the Getting to Neutral Sawmill Sites that are located within LowCapacity_Poverty, MedCapacity_Poverty, and HighCapacity_Poverty and Create 3 Separate Layers.

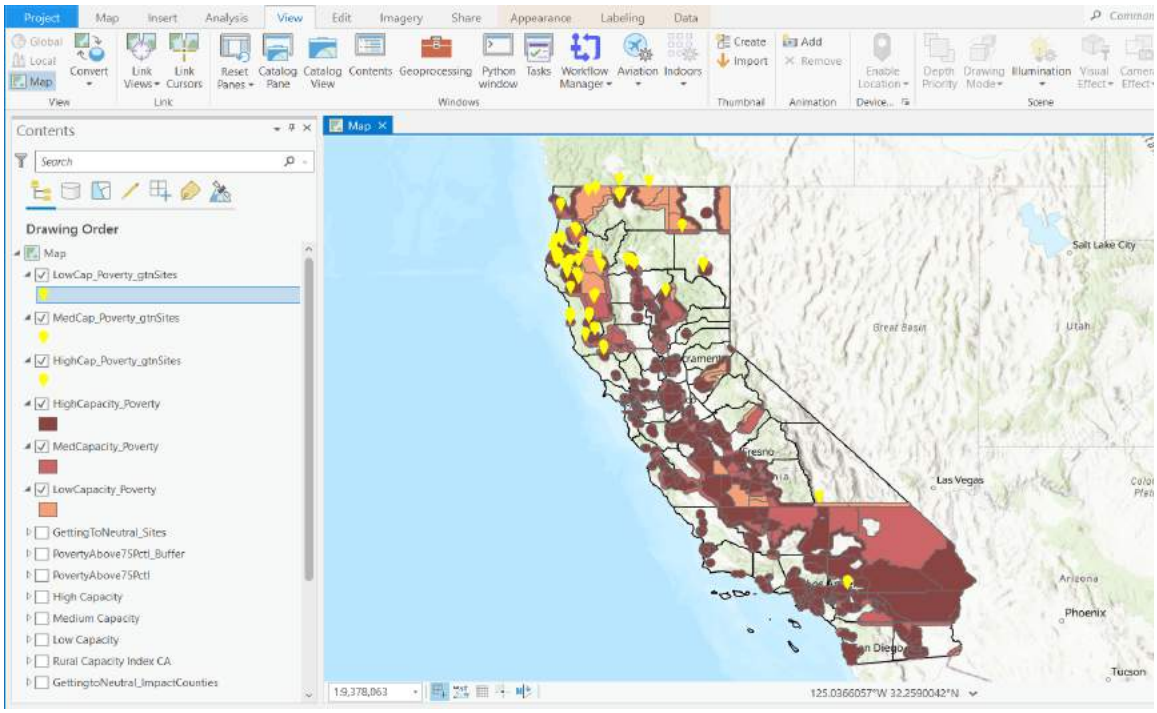
a. Select the **Clip** tool from **Geoprocessing pane**; For the input features, enter the "GettingToNeutral_Sites" layer and for Clip Features, select "LowCapacity_Poverty".
b. Name the Output Features "LowCap_Poverty_gtnSites". Click **Run.** Repeat for Medium Capacity.
c. Select the **Clip** tool from **Geoprocessing pane**; For the input features, enter the "GettingToNeutral_Sites" layer and for Clip Features, select "MedCapacity_Poverty".
d. Name the Output Features "MedCap_Poverty_gtnSites". Click **Run.** Repeat for High Capacity.
e. Select the **Clip** tool from **Geoprocessing pane**; For the input features, enter the "GettingToNeutral_Sites" layer and for Clip Features, select "HighCapacity_Poverty".
f. Name the Output Features "HighCap_Poverty_gtnSites". Click **Run.**







10. Now, you will have 3 individual layers for sites. If all goes correct, there should be 10 identified for Low Capacity, 12 identified for Medium Capacity, and 48 identified for High Capacity.



11. To view the individual sites at this stage that fall in Low, Medium, or High Capacity regions, right-click the individual layers, select **Attribute Table**, and view the corresponding fields.

Appendix 2.0
Stakeholder Engagement

The stakeholders we engaged represent the following organizations:

- CAL FIRE
    - Justin Britton and John McCarthy
- California Governor's Office of Planning and Research
    - Michael Maguire
- City of Mt. Shasta
- Fall River Resource Conservation District
    - Todd Sloat
- GeoConsulting
    - Georgia Reid
- Golden State Natural Resources
    - Terrance Rodgers
- Joint Institute for Wood Products Innovation
    - Katie Harrell
- Nordic Structures
    - Jean-marc Dubois
- PG&E Utility Partnerships and Innovation Department
    - Kevin Johnson
- Quebec Wood Export Bureau
    - Eli Gould
- Rural County Representatives of California
- Sierra Institute
    - Danielle Berry
- Sierra Nevada Conservancy
    - Elissa Brown
- Siskiyou Economic Development Council
    - Alia Roca-Lezra
- University of California Agriculture and Natural Resources
    - Ricky Satomi and Cindy Chen
- U.S. Forest Service
    - Helena Murray
- Wisewood Energy
    - Meagan Hartman

APPENDIX 3.0: Public Financial Assistance and Private Financing Programs

June 2023

Disclaimer: This document is an initial effort to compile public financial assistance and private financing programs that support former sawmill site redevelopment and wood utilization business development. This is not a comprehensive list of every funding source or financing program available.

Table of Contents

Table 1: Brownfield Site Assessment, Cleanup, and Job Training Funding

Brownfields Funding Contacts

- Brownfields Contacts in EPA Regional Offices: https://www.epa.gov/brownfields/brownfields-contacts-epa-regional-offices
- California Department of Toxic Substances Control (DTSC) contacts:
    - For more information on technical aspects of the funding, contact Maryam.Tasnif-Abbasi@dtsc.ca.gov.
    - For more information on financial aspects of the funding, contact Jennifer.Black@dtsc.ca.gov.
- For questions about Equitable Community Revitalization Grant (ECRG), contact the Center for Creative Land Recycling (CCLR) at ECRG@cclr.org and DTSC's Office of Brownfield staff at ECRGinfo@dtsc.ca.gov.

Program	**Maximum Amount Per Grant/ Project Period**	**Purpose**
Site assessment, community engagement, and various planning activities		
U.S. EPA Brownfields Assessment Grants	$500,000 - $2,000,000 Four - five years	Provide funding for a grant recipient to inventory, characterize, assess, conduct a range of planning activities, develop site-specific cleanup plans, and conduct community engagement related to brownfield sites.
U.S. EPA Brownfields Multipurpose Grants	$800,000 Five years	For communities to carry out a range of eligible assessment and cleanup activities, including planning and community engagement activities.
DTSC Equitable Community Revitalization Grant (ECRG): Community Wide- Assessment Grant *For more information on ECRG, see below.*	$350,000, which may include up to $50,000 for activities such as community engagement. Two year funding period	For assessing and investigating the environmental conditions of *at least three sites* in a defined area where there are plans for reuse. Examples of eligible activities: Phase I Environmental Site Assessments, Phase II Environmental Site Assessments or Preliminary Endangerment Assessments, community engagement. Activities that facilitate reuse planning are also eligible, such as developing an inventory of brownfield sites and GIS mapping.
DTSC ECRG: Site-specific	$150,000 – $7,000,000	For cleanup planning at a specific site, evaluating different cleanup

Investigation Grant	Two year funding period	methods, preparation of a cleanup plan, and pilot tests to assess potential remedial technology. Examples of eligible activities: Phase I Environmental Site Assessments, Phase II Environmental Site Assessments, Preliminary Endangerment Assessments (PEA), health and ecological risk assessments.
DTSC Investigating Site Cleanup Program (ISCP)	Low-interest loans of up to $100,000 Three years	For conducting preliminary endangerment assessments of underutilized urban properties. Up to 75 percent of the loan may be waived if redevelopment is not economically feasible.
DTSC Targeted Site Investigation (TSI) Program *Currently on hiatus*	N/A	For assessment, investigation, or cleanup planning of a site where redevelopment or reuse is being considered at no cost to the applicant.
DTSC Brownfields Revolving Loan Fund	Cleanup grants up to $350,000 Assessment grants up to $200,000	Below-market, low interest loans for cleanup of hazardous substances or mixed contaminant sites and petroleum sites. Funds may also be used for pre-cleanup site assessments.
Clean Up		
U.S. EPA Brownfields Revolving Loan Fund (RLF)	$1,000,000 Five years	Loans and subgrants for eligible entities to conduct cleanup activities.
U.S. EPA Brownfields Cleanup Grants	$500,000, $1,000,000, or $2,000,000 Four years	For cleanup activities at one or multiple brownfield sites. The applicant must own the site that it is requesting funding for.
U.S. EPA Brownfields Multipurpose Grants	$800,000 Five years	For a range of eligible assessment and cleanup activities.
DTSC ECRG: Site-specific Cleanup Grant	$300,000 – $10,000,000 Two year funding period	For planning, implementation, and reporting costs for cleanup, pilot tests and sampling/analysis to design the cleanup, public engagement and cleanup-related California Environmental Quality Act (CEQA) activities.

		A regulatory-approved cleanup plan is highly recommended for the application.
DTSC Brownfields Revolving Loan Fund	Cleanup grants up to $350,000; and Assessment grants up to $200,000	Below-market, low interest loans for cleanup of hazardous substances or mixed contaminant sites and petroleum sites. Funds may also be used for pre-cleanup site assessments.
DTSC Cleanup Loans and Environmental Assistance to Neighborhoods (CLEAN) Program	Low-interest loans of up to $2.5 million Seven years	Low-interest loans for property owners, developers, community groups, and local governments to cleanup or remove hazardous materials.
Water Board Underground Storage Tank Cleanup Fund (USTCF)	N/A	For the cleanup of leaking Underground Storage Tanks (USTs).
Water Board Orphan Site Cleanup Fund (OSCF) Program	$1.5 million	For the cleanup of leaking petroleum underground storage tanks where there is no financially responsible party, and the applicant is not eligible for the UST Cleanup Fund.
Job training		
U.S. EPA Brownfields Job Training Grants	$500,000 Five years	For recruiting, training, and placing unemployed and under-employed residents of areas affected by brownfield sites. Graduates gain the skills to work in various fields, including hazardous and solid waste management, sustainable cleanup and reuse, and chemical safety.

Equitable Community Revitalization Grant (ECRG): a one-time investment in California's vulnerable and disadvantaged communities. There are three funding rounds: FY 2022, 2023 and 2024. In the second round, DTSC will be awarding approximately $100 million (up to $7 million per grant) to accelerate the cleanup and reuse of contaminated properties in California.

- ECRG Resources:
    - The Eligibility Self-Check Tool helps applicants determine if they are eligible for the ECRG.

    - Guide for Round 2 Funding
    - Webinar for Round 2 Funding
    - ***Contact Center for Creative Land Recycling for free assistance***

Additional resources:

- Info on DTSC funding
- CCLR funding resources
- Brownfields program policy changes

Table 2: Brownfield Technical Assistance

Program	Purpose
U.S. EPA Targeted Brownfields Assessment (TBA)	The TBA program provides free technical assistance to research historical property uses and evaluate environmental conditions at brownfield properties. The TBA programs are regional with Brownfields and Land Revitalization in EPA's Pacific Southwest (Region 9) providing assistance in California.
Technical Assistance to Brownfields Communities (TAB) Program	There are three regional TAB providers that assist with the acquiring, assessing, cleaning up and redeveloping brownfields properties by providing expert technical assistance and guidance. New Jersey Institute of Technology (NJIT) serves EPA Regions 1, 3 and 4. Kansas State University (KSU) serves EPA Regions 5, 6, 7, 8 and tribal programs nationwide. *Center for Creative Land Recycling (CCLR) serves EPA Regions 2, 4, 9 and 10.

*Center for Creative Land Recycling

- CCLR is also the Brownfields Technical Assistance Provider (BTAP) for California's Department of Toxic Substances Control (DTSC).
- CCLR provides various grant writing resources and has a high success rate of assisting communities with obtaining brownfields grants.
    - See CCLR's youtube video on writing a competitive EPA Brownfields Grant.
        - *Starting early is the #1 thing you can do to develop a successful grant application.*

Table 3: Affordable Housing Financial and Technical Assistance

Program	Purpose
Financial Assistance	
California Department of Housing and Community Development (HCD) Local Early Action Planning (LEAP) Grants	One-time grant funding for cities and counties to update planning documents and implement process improvements to help accelerate housing production.
The Community Development Financial Institutions Fund (CDFI Fund) Capital Magnet Fund	Grants to Community Development Financial Institutions (CDFIs) and nonprofit affordable housing organizations to finance affordable housing solutions and community revitalization efforts in low-income communities.
USDA Rural Business Development Grants in California	Provide technical assistance and capacity building related to housing, community facilities, or community and economic development projects.
Rural Community Assistance Corporation (RCAC) Affordable Housing Loans	Assists developers build single and multifamily affordable housing units for low-income families.
Technical Assistance	
Rural Community Assistance Corporation (RCAC)	RCAC is the U.S. Department of Housing & Urban Development (HUD) technical assistance provider to nonprofit housing organizations and local governments that administer federal funding. Can assist with finance and budgeting, board development, training, and more.

Additional resources:

- California Department of Housing and Community Development (HCD) grants and funding

Table 4: Wood Utilization Business and Workforce Development Funding and Financing

Program	Purpose
Federal	
USDA Rural Business Development Grants in California	Funds activities related to the development or expansion of small and emerging private businesses in rural areas that have fewer than 50 employees and less than $1 million in gross revenues. Eligible activities include: targeted technical assistance, feasibility studies and business plans, leadership and entrepreneur training, business strategic planning, training, and more.
USDA Rural Innovation Stronger Economy (RISE) Grant Program	For eligible low-income rural areas to create high-wage jobs, accelerate the formation of new businesses, support industry clusters and maximize the use of local productive assets.
US Forest Service Wood Innovations grant program	Stimulates, expands, and supports U.S. wood products markets and wood energy markets to support the long-term management of forest lands.
HUD Community Development Block Grant Program	For various activities, including activities related to rehabilitation of residential and non-residential structures and energy conservation and renewable energy resources.
EPA Brownfield Assessment or Multipurpose Grant	Can fund market studies, brownfields area-wide planning, site reuse vision, resource roadmap, revitalization plan, and more.
State	
Sierra Nevada Conservancy Watershed Improvement Grant Program	For projects that restore, protect, and enhance watersheds and communities in California's Sierra Nevada-Cascade region. Grants are awarded through grant programs under four regional goals: Forest & Watershed Health, Strategic Land Conservation, Vibrant Recreation & Tourism, and Resilient Communities.

IBank Climate Catalyst Revolving Loan Fund	For projects that reduce wildfire threats through forest biomass management and utilization. Examples of projects include: sustainable vegetation management, forestry practices, and timber harvesting products.
California Energy Commission EPIC grant program	For the following public interest investments: Applied Research and Development (R&D), Technology Demonstration and Deployment, Market facilitation of clean energy technologies and approaches
Community Economic Resilience Fund (CERF)	For developing and implementing economic recovery plans that generate high-quality jobs in sustainable and diverse industries.
CAL FIRE Wood Products and Bioenergy Business and Workforce Development Grant	For business and workforce development projects in California. Projects may include planning, organizational and business capacity building, and workforce and infrastructure development. Includes the Biomass Transportation Subsidy grant. Example of an eligible project: the manufacture of solid wood products from forest materials, such as post and poles, dimensional lumber, plywood, or other products that allow for continued carbon storage.
Rural Community Assistance Corporation (RCAC) Loan Fund	U.S. Economic Development Administration (EDA) Revolving Loan Fund grantee. Loans for affordable housing development, environmental infrastructure, community facilities and small businesses in rural locations.
RCAC Biomass Utilization Fund	For new or expanding businesses in **Tuolumne County** that utilize available biomass from the surrounding forests and provide permanent employment opportunities to low- and moderate-income individuals.
Superior California Economic Development Business Loans	EDA Revolving Loan Fund grantee. For business located in **Shasta, Siskiyou, Modoc or Trinity County.** Loan programs include Standard Small Business Loans and Microloans for various uses, such as purchasing equipment or working capital.
3CORE Loan Program	EDA Revolving Loan Fund grantee. For businesses located in **Butte, Glenn or Tehama County**. Loan may be used for working capital, purchasing land, purchasing machinery and equipment, and more.

Dept. of Conservation Forest Biomass to Carbon-Negative Biofuels Pilot Program	FYI 21-22 funding for projects in the Sierra Nevada researching and demonstrating carbon-negative hydrogen and/or liquid fuel using forest biomass.
Financing	
CDFI Fund New Market Tax Credits	Tax credits to incentivize community development and economic growth and attract private investment to distressed communities.
California Competes Tax Credit	Income tax credit for businesses of any industry, size, or location that want to stay or grow in California.
EPA Land Revitalization Technical Assistance program	Can assist with business development, economic analysis, and strategic action plans.

Additional Resources:

- U.S. Economic Development Administration Economic Development Directory for California
    - Includes links to Economic Development Districts, Revolving Loan Fund Grantees and more
- Local Air Districts
    - Often provide funding for technologies that reduce air pollution such as bioenergy facilities. Funding may include feasibility studies.

Table 5: Other Capacity-Building and Climate Planning Grants

Program	Purpose
Other Capacity-Building	
CA Strategic Growth Council: Regional Climate Collaborative Program	Funds activities that strengthen local coordination, leadership, knowledge, skills, and expertise, focusing on increasing access to funding resources for project planning and implementation within under-resourced communities to sustain climate action.
Climate Planning	
OPR Climate Adaptation Planning Grants	Funds local, regional, and tribal communities in integrated climate adaptation planning. By facilitating climate adaptation planning, APGP supports the development of climate-resilient projects across the State.
OPR Regional Resiliency Grants	Funds activities advancing resilience and responding to their regions' greatest climate risks through three major activities: capacity building, planning (including identifying climate resilience priorities), and project implementation.

Appendix 4.0
Brownfields Grant Preparation Guide for Former Sawmill Sites

A guide to assist communities interested in using brownfields funding to redevelop former sawmill sites into wood processing businesses

Brownfields grants are administered by the U.S. Environmental Protection Agency (EPA) Brownfields Program and the California Department of Toxic Substances Control (DTSC). Grants can be used for a variety of redevelopment activities, including assessing and cleaning up a former sawmill site. For an overview of the types of federal and state funding available, see Appendix 4.0.

This guide provides a list of components and resources to assist communities with preparing a successful brownfields grant application. The application process can be overwhelming, but preparing for the application process early, approximately 6-12 months in advance, often leads to a greater chance of success.

Please note that this guide does not include a comprehensive list of every component necessary for a grant application. Once a well-defined redevelopment plan has been developed and eligible funding sources have been identified, the applicant should carefully review the specific grant application instructions, provide all requested information, and address all criteria.

Resources for getting started:

- Types of Brownfields Grants Funding
- Upcoming and Closed Solicitations for Brownfield Grants
- Successful EPA Brownfield Grant Examples
- Understanding the redevelopment process and role of community:
    - Land Revitalization Toolkit
    - Brownfields Road Map to Understanding Options for Site Investigation and Cleanup
    - Community Actions that Drive Brownfields Redevelopment
- Tips for starting the application process early:
    - Tips on How to Get Started Early on Preparing Your EPA Brownfields Multipurpose, Assessment, Revolving Loan Fund, or Cleanup Grant Application
    - Center for Creative Land Recycling's Tips for Getting Started on EPA Brownfield Grants Now

For more information or assistance, contact

- EPA Regional Office
- Center for Creative Land Recycling, the technical assistance to brownfields (TAB) provider for EPA Regions 9 and 10, and the Brownfields Technical Assistance Provider (BTAP) for California's Department of Toxic Substances Control (DTSC)

Key Components of a Successful Brownfields Grant Application

When applying for a brownfields grant, the applicant should be prepared to provide detailed information about the project goals, partners, support, costs, other funding sources, community engagement, or other information requested in the funding solicitation. The 17 components outlined in this guide can assist communities with identifying key information for their project and create a successful grant application.

Alignment of Project Goals with Community Goals and Needs

1. The revitalization goals for the site align with community needs and goals.

- What are the goals of your community?
    - Read the community's master plan or general plan to determine broad themes such as sustainability or wildfire resilience.
    - Determine how site reuse can contribute to one or more of these themes and accomplish community goals.
- What are the needs of the community? How have brownfield sites impacted your community?
    - Gather data and information on the brownfield site in your community so you can provide specific details in your application.

2. Identify a community champion.

- Community champion(s): people who want to rally their community to begin the process of clean up and redevelopment
- Brownfield Redevelopment Toolkit for Community Champions

3. Encourage stakeholder and community engagement and involvement.

- Engage and partner with the property owner, community organizations and nonprofit leaders, public officials and business leaders to identify necessary resources.
- EPA's Brownfields Stakeholder Forum Kit

4. The revitalization goals align with state goals.

- Alignment with state goals, such as carbon neutrality goals or wildfire resilience, may increase funding sources and state or municipal support for the proposed project.
- Examples of state initiatives:
    - California's Wildfire and Forest Resilience Action Plan
    - 2022 Scoping Plan for Achieving Carbon Neutrality

5. The project demonstrates state and/or municipal support.

- Request letter indicating state or municipality knows about plan to submit application

6. The project aligns with economic development initiatives.

- Look at Comprehensive Economic Development Strategy (CEDS) for the project region (see below) to determine if the reuse goals align.
    - 3CORE: Butte, Glenn, and Tehama counties
    - Central Sierra: Alpine, Calaveras, Mariposa, and Tuolumne counties
    - Greater Sacramento: El Dorado, Placer, Sacramento, Sutter, Yolo, and Yuba counties
    - Sierra: El Dorado, Nevada, Placer, and Sierra counties
    - Superior: Modoc, Shasta, Siskiyou, and Trinity counties
    - Yuba & Sutter: Yuba and Sutter counties

Community Benefits Resulting from the Project

7. Identify economic benefits (e.g., number of jobs) that the project will create.

- Will site revitalization spur beneficial activity in the project area and nearby locations?
- Economic Benefits of Brownfield Redevelopment
- Local Economic Benefits from Biomass Energy Facilities*: "Biomass energy facilities offer high-paying, long-term employment opportunities for energy professionals in communities that typically lack a local industry that promises year-round employment."*

8. Identify health and environmental benefits that the project will create.

- Will a health and/or environmental threat be mitigated?
- Health and Environmental Benefits of Brownfield Redevelopment
- As explained in the Bay Nature article Logjam: The Supply Chain Problem That's Keeping California From Preventing Catastrophic Wildfires on Private Land, wood processing businesses are essential for improving forest management, preventing wildfires, and preventing the open burning of excess forest biomass.
- Other benefits identified in Biomass in the Sierra Nevada A Case Study for Health Forests and Rural Economics include energy resilience, higher water yield for downstream communities, and alternative waste stream for green waste.

Favorability of Physical Site Aspects

9. Current site owner is willing to sell or redevelop the site.

- Is the site owned by a private or public entity?
- Consider ownership requirements for grants. For example, the Cleanup Grant application requires the applicant to be the sole owner of the site.
- Brownfields Redevelopment Scenarios

10. The zoning for the site has been identified.

- What uses are permitted? Would that zoning need to be changed?
- Restrictions on Property Use: Zoning and Permitting

11. The site is able to accommodate the proposed business and other potential developments.

- Is the site large enough and oriented well geographically to accommodate a business or other development?
- Biomass utilization facility feasibility assessment: Site Suitability: Electrical and Substation, Water Supply, Access to Roads

Cost-Effectiveness of the Wood Utilization Project

12. Identify opportunities to leverage funding and other resources for brownfields revitalization.

- Leveraging: using existing resources or funding to attract additional resources or funding
- Strong partnerships and an assessment of how to best utilize and leverage local dollars and investments can help gain additional funding.
- Compile documentation of the leveraged funding (e.g., a letter from a partner organization stating the resource they plan to provide). This may be required in the grant application.
- Guide to leverage funding and other resources: Setting the Stage for Leveraging Resources for Brownfields Revitalization

13. Identify and address woody biomass requirements and costs.

- Woody biomass requirements vary by the type of wood utilization facility. A long-term and reliable woody biomass supply is often needed to sustain business operations.
- Annual Raw Material Needed (BDT) for Business Types - California Biomass Utilization Facility Economic Assessment: Table 1.1 outlines 5 wood product business types, annual BDT required yearly, capital expenses, etc.

14. Identify business opportunities and estimate project costs.

- Examples of potential wood utilization businesses and capital costs:
    - Low capital business investments: fire wood, landscaping/erosion control mulches, and compost
    - Mid capital business investments: biochar, post and poles, and densified wood products

    - High capital business investments: electricity, biofuels, roundwood products (e.g., doweled posts, poles, fencing materials, stakes), cross-laminated timber (CLT) factory utilizing small diameter trees
- An overview of uses of woody biomass can be found on pages 5-8 of Biomass Energy in the North Coast Region: An Assessment and Strategy for Ecologically and Socially Compatible Development
- Examples of value-added wood production projects: Wisewood Energy

15. Conduct a market study.

- Identify market conditions for the site. Match the site reuse plan with market information.
- Example: Market Review of Potential Co-located Businesses at the Forest Biomass Business Center in Camptonville: Includes feedstock specifications, jobs provided, equipment needed, competition for a range of wood products.
- Market Assessment and Feasibility Analysis for small-scale biomass facilities.

16. Consider the scale of operation and opportunities to scale up the business.

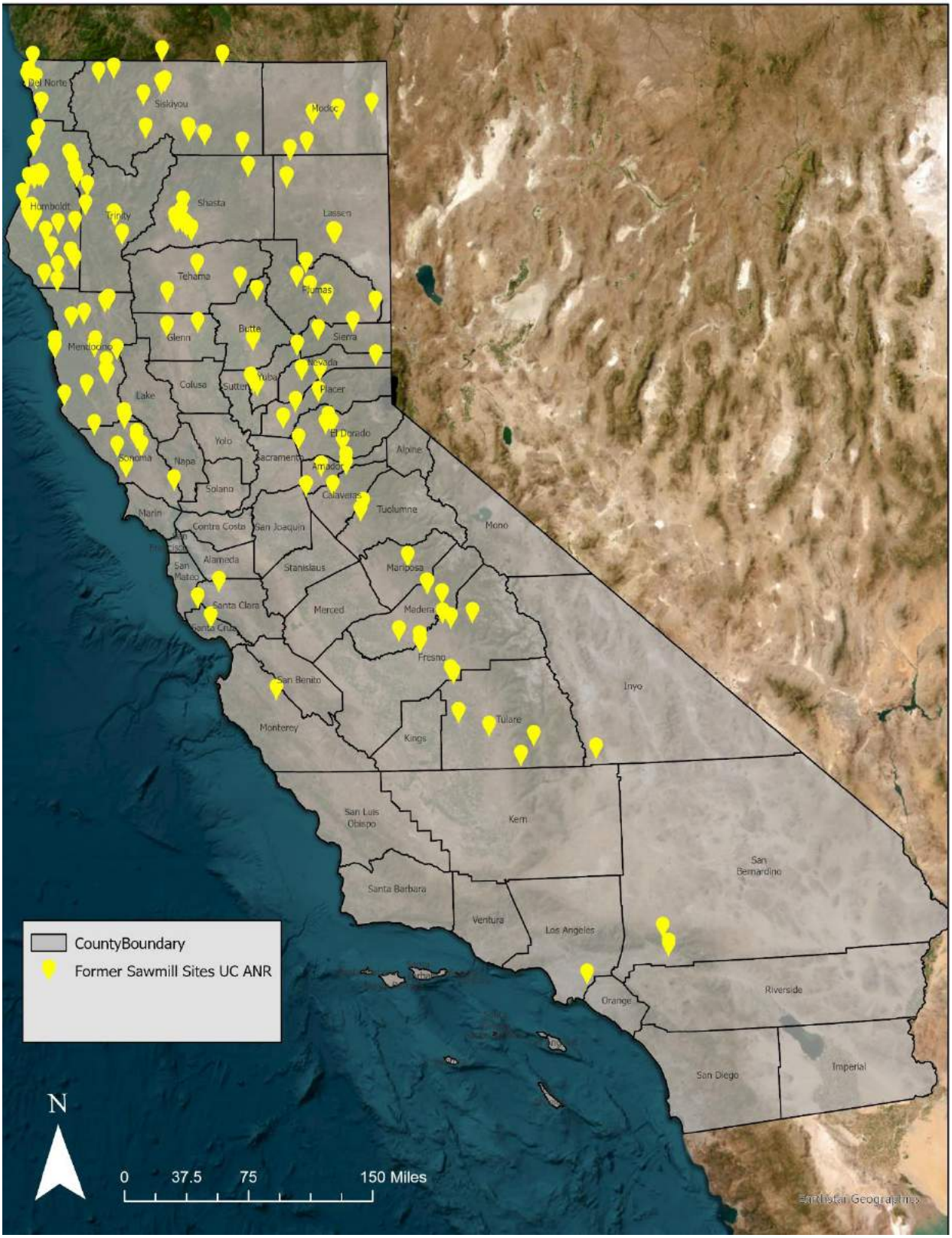
- Compared to large, corporate operators, community-scale facilities can scale their operations to available feedstock types and amounts, rather than require certain types and amounts of feedstock to fulfill operational needs. This allows them to provide more reliable benefits to communities.
- Example of a community-scale, sustainable business model: Heartwood Biomass
- Results, Challenges, and Lessons Learned from Community-Scale Biomass Facility Operations in Plumas County

17. Consider opportunities for co-located wood processing businesses.

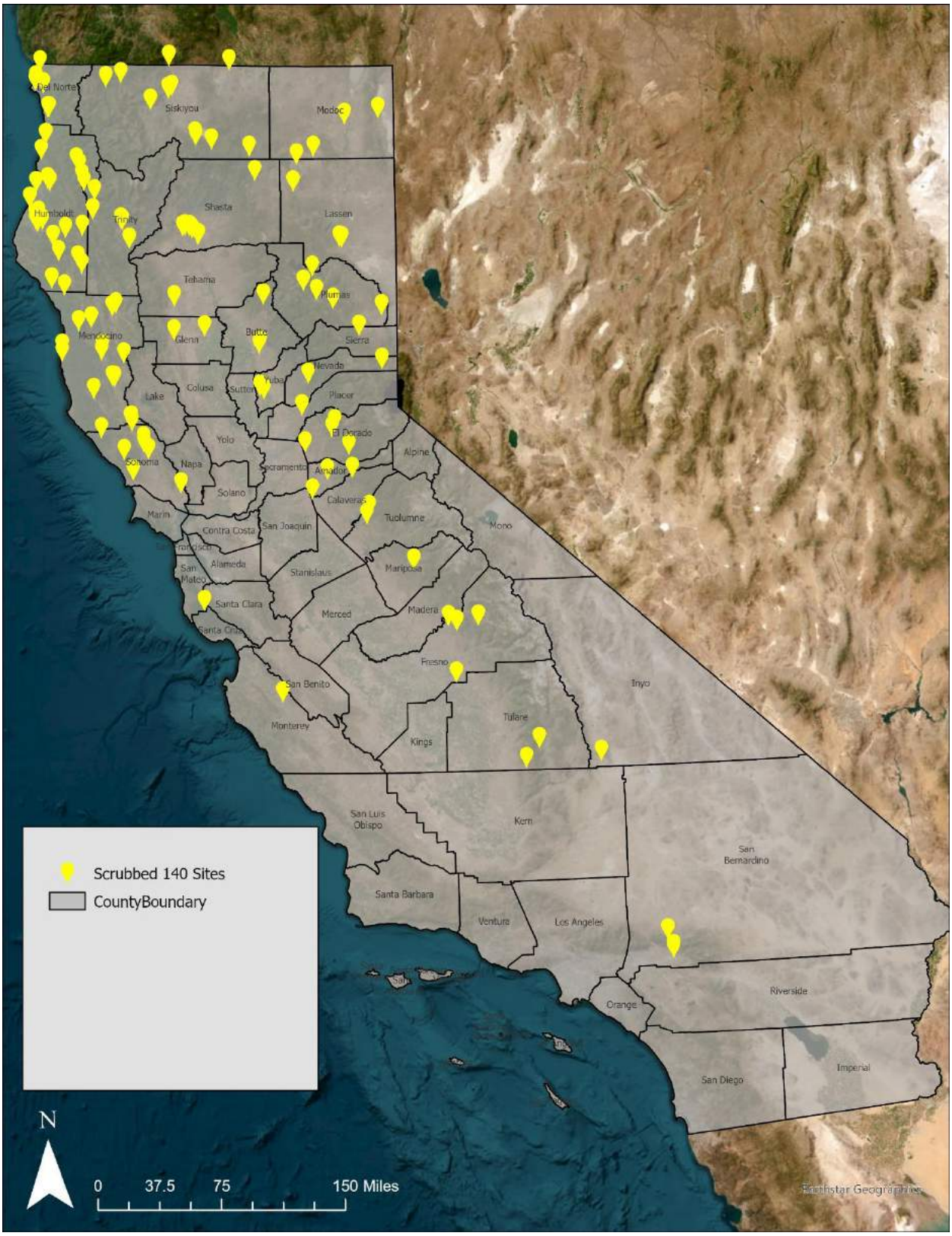
- Co-locating complementary business and operations (e.g., landscaping services, greenhouse, or bioenergy facility) at a site can increase the economic viability of biomass projects.
- Paying For Forest Health: Improving the Economics of Forest Restoration and Biomass Power in California: Co-Product Development and Integrated Product Yards on Page 15
- Example of co-locating wood processing businesses: Indian Valley Wood Utilization Campus

Appendix 5- Maps

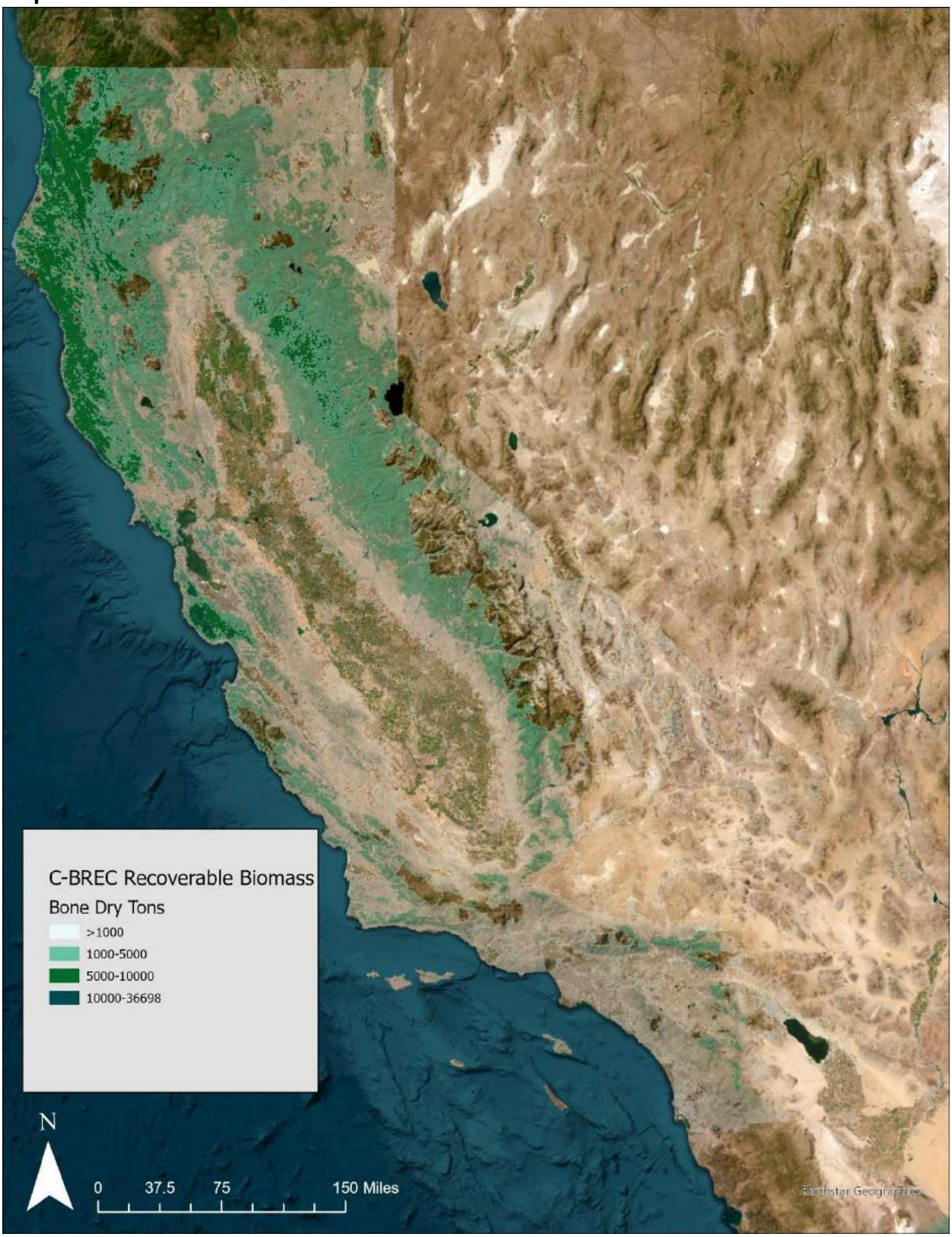
Map 1. 208 Former Mill Sites- UC ANR/USFS Database



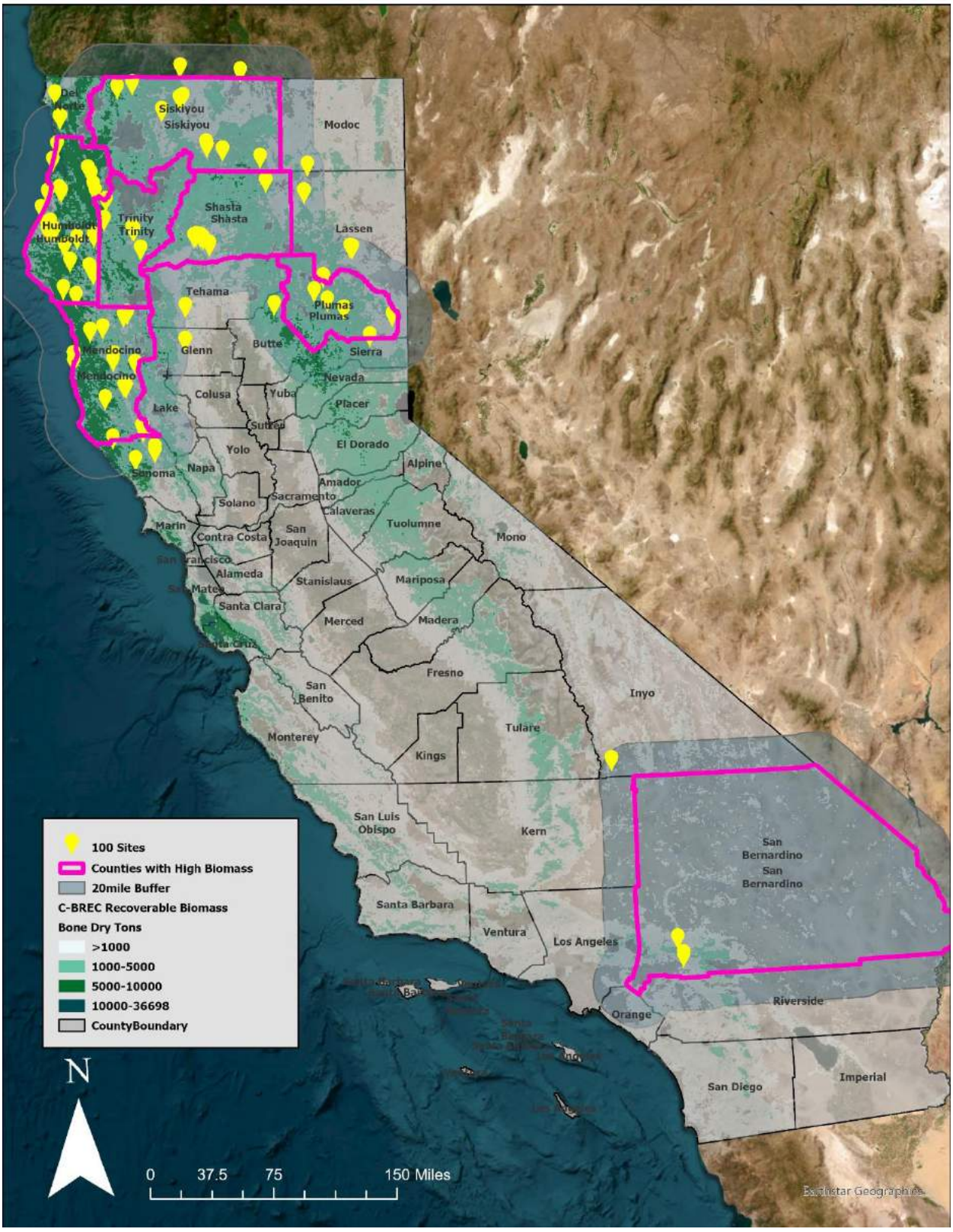
Map 2. Scrubbed database containing 140 sites



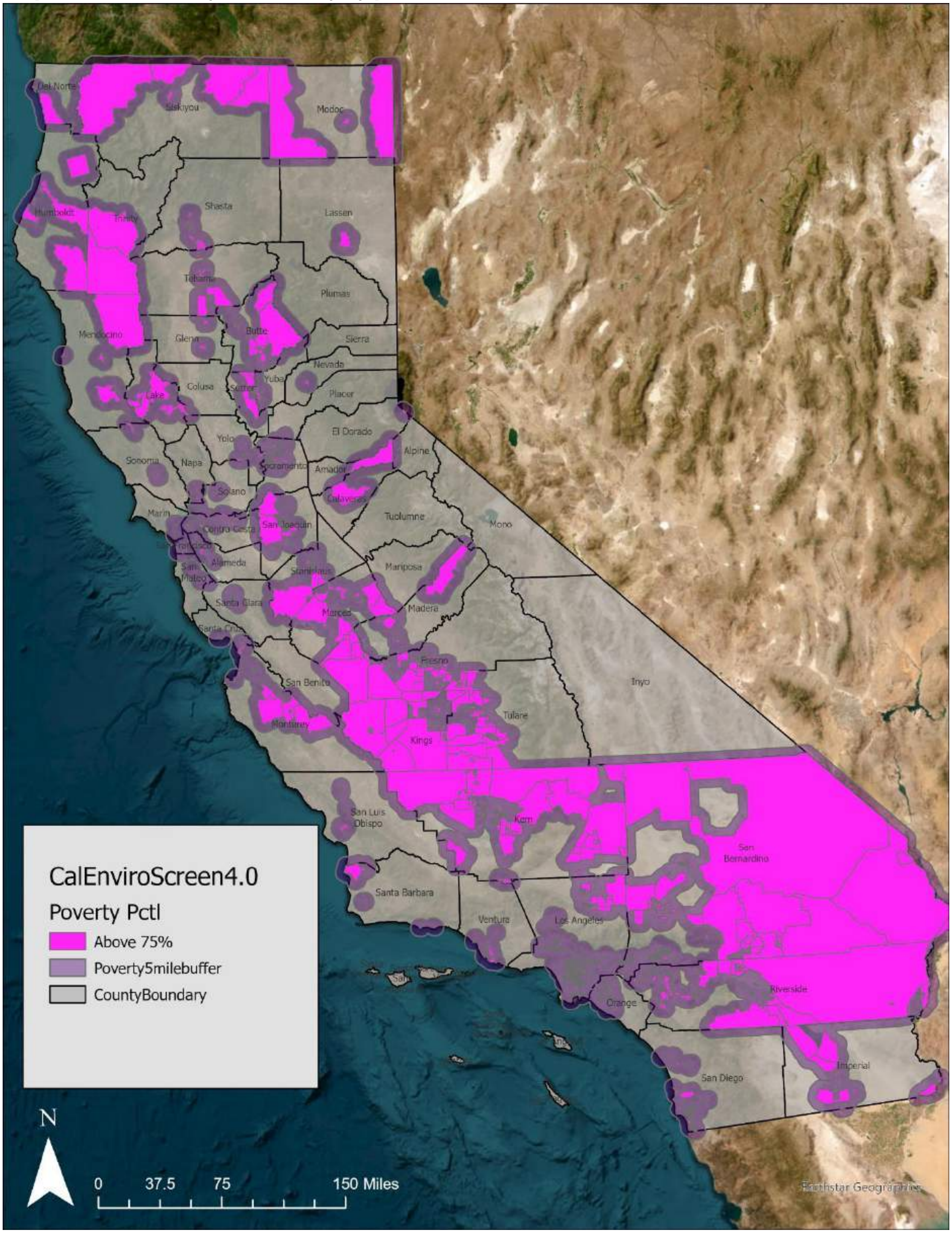
Map 3. C-BREC Recoverable Biomass



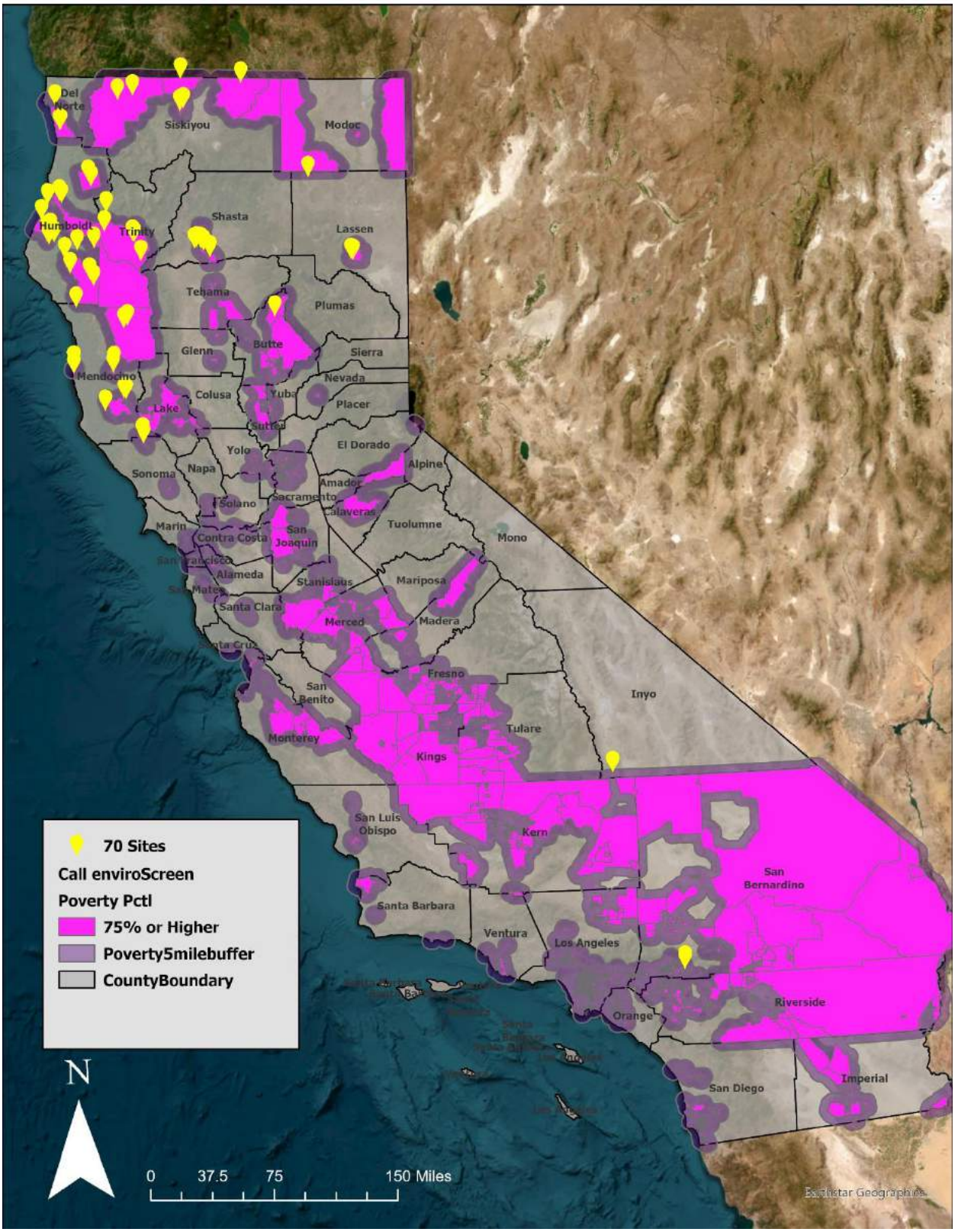
Map 4. Phase 1 Analysis- C-BREC model with High Biomass Counties + San Bernadino + Remaining 100 sites.



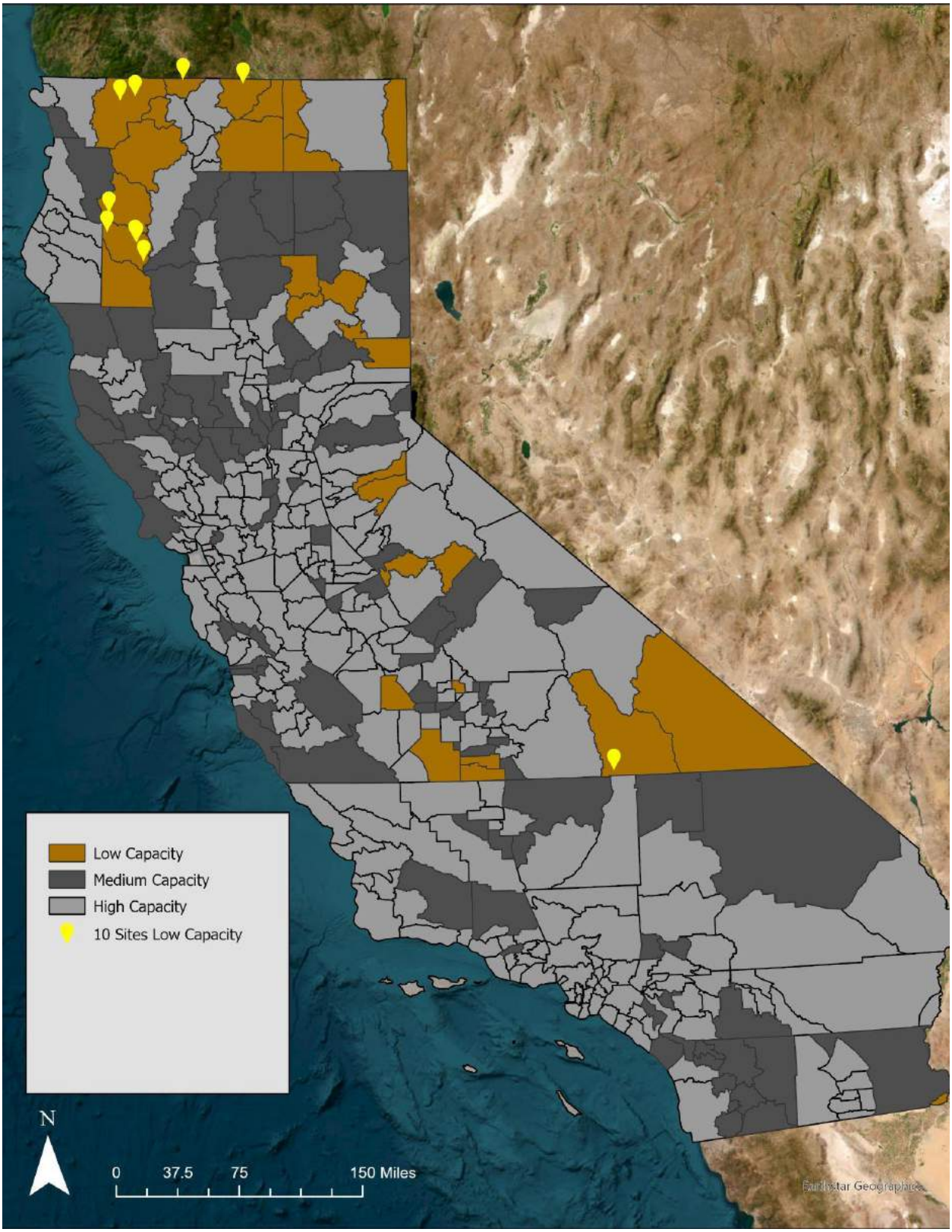
Map 5. Phase 1 Analysis- Poverty by pct above 75%- CalEnviroScreen 4.0



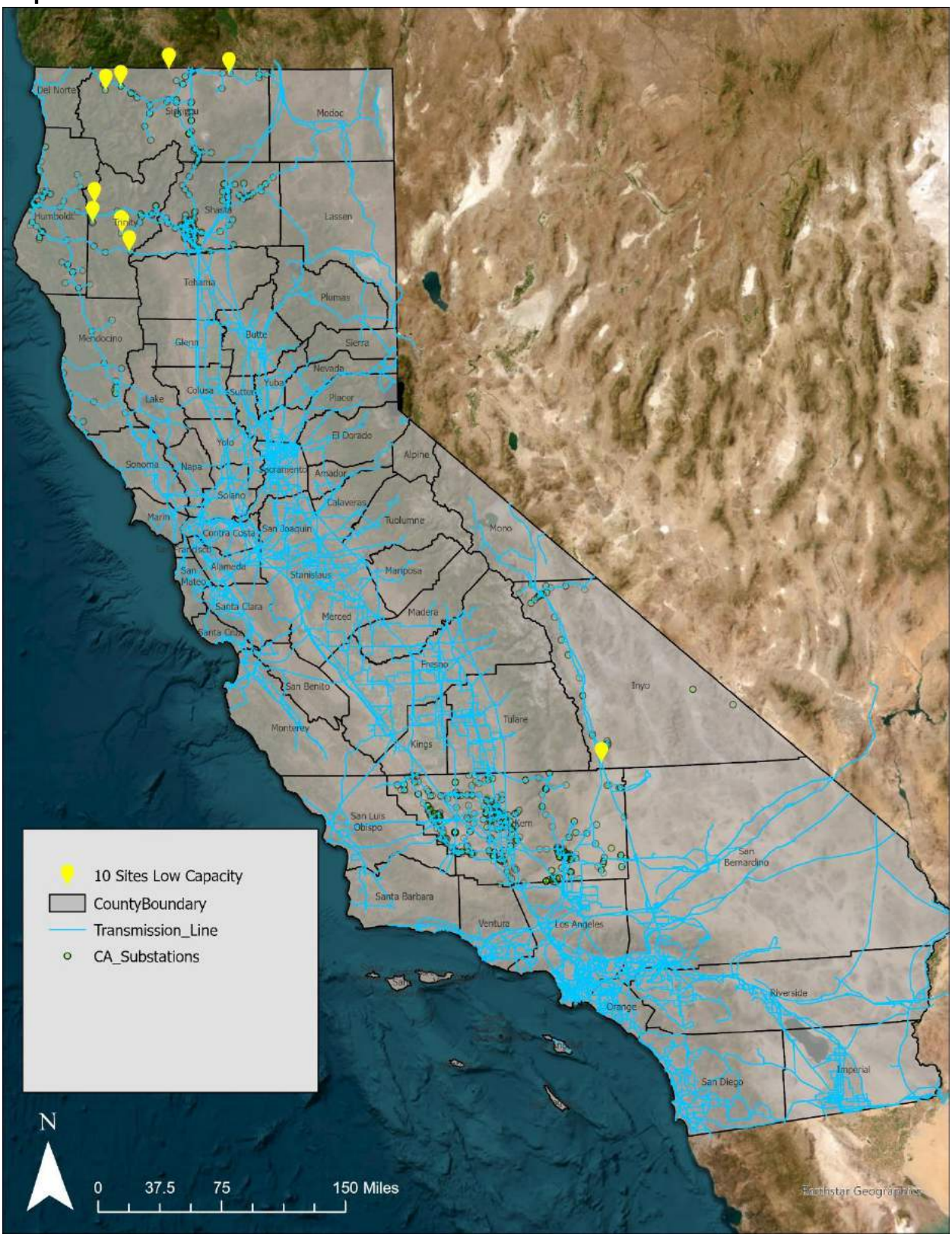
Map 6. Phase 1 Analysis- Poverty by pct above 75%- With remaining 70 sites



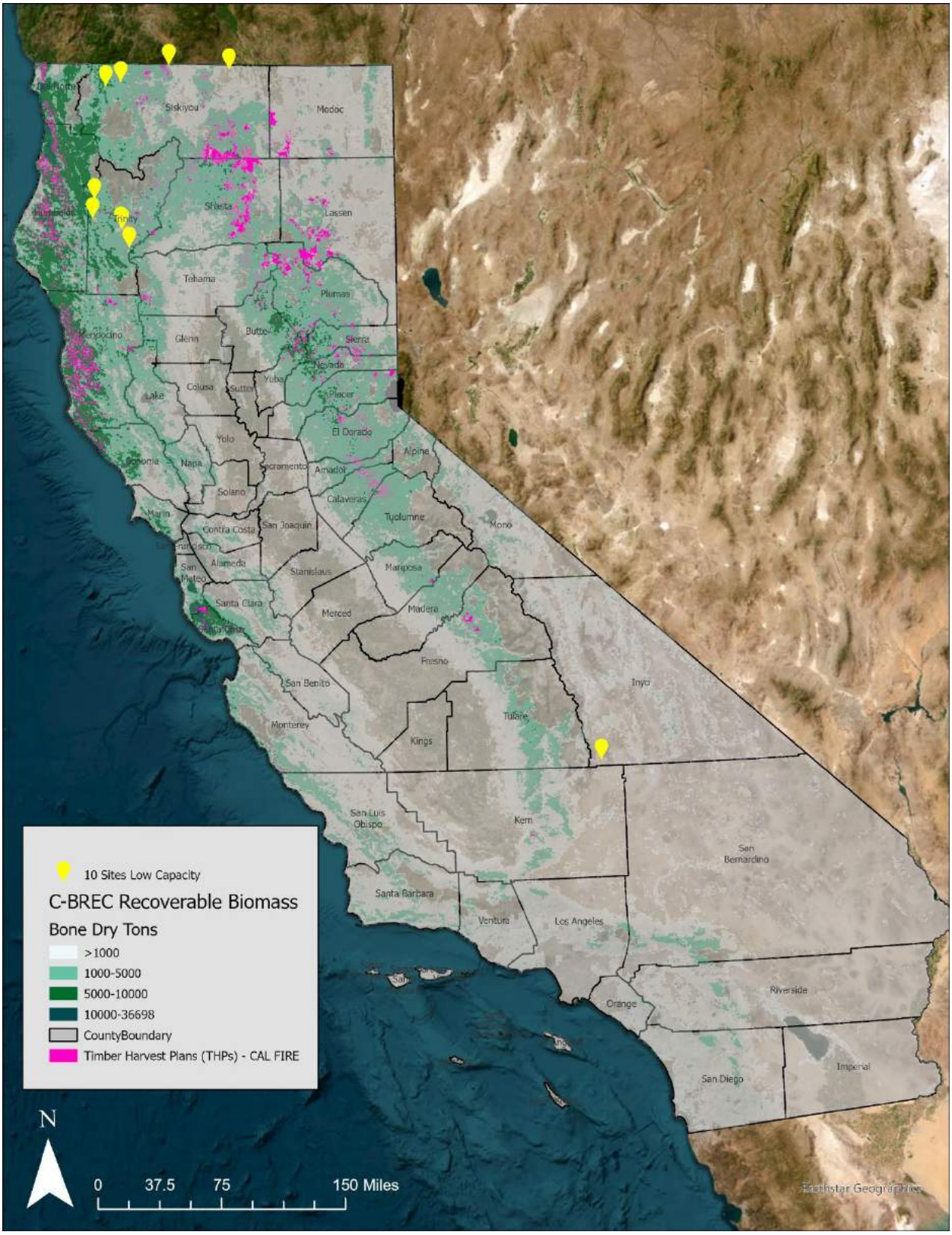
Map 7. Phase 1 Analysis- Rural Capacity Index- Low Capacity Sites Only



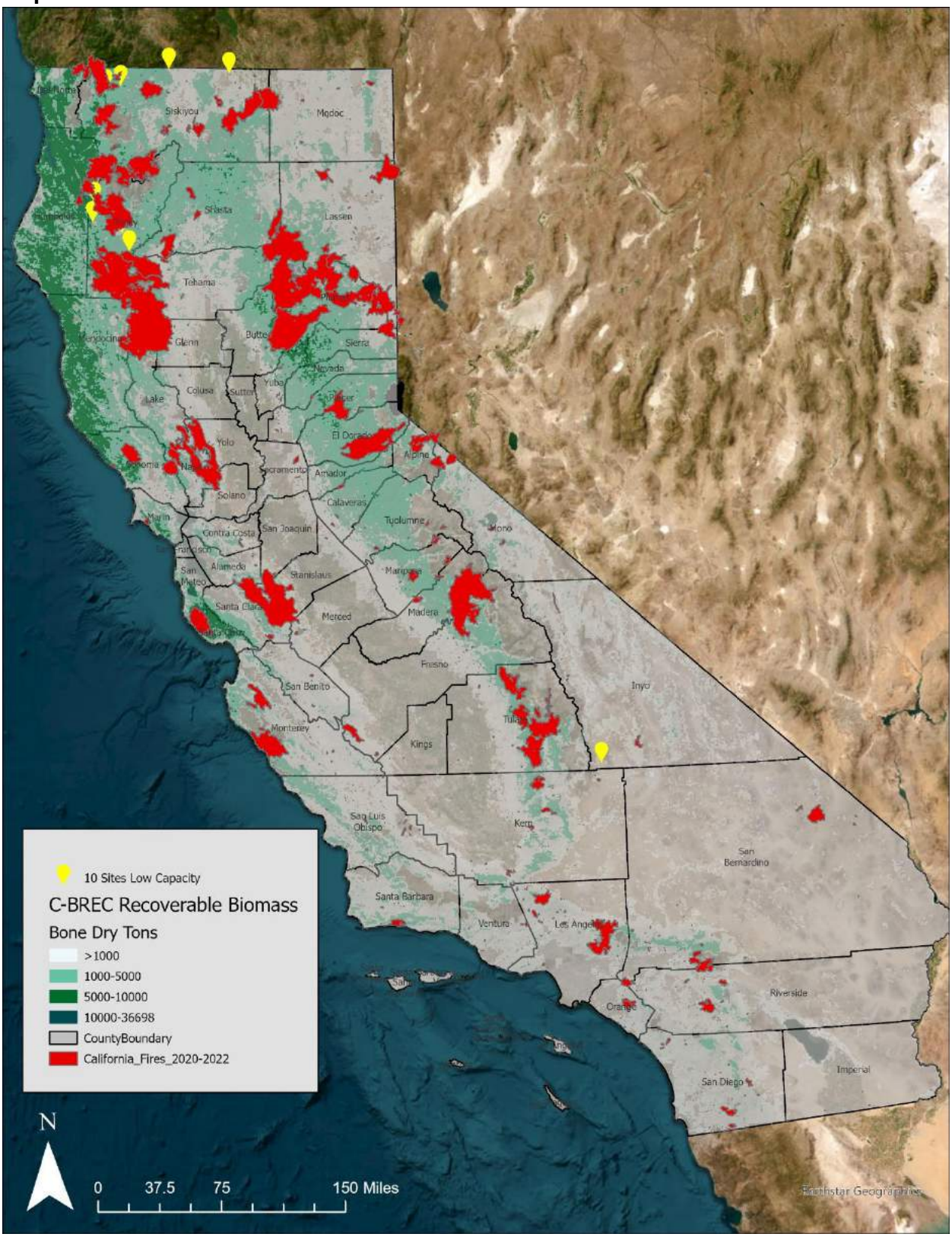
Map 8. Transmission Infrastructure



Map 9. Biomass and Timber Harvest Plans



Map 10. Biomass and Wildfires 2020-2022



Map 11. Air Quality PM 2.5