

# Tahoe Central Sierra Cal FRAME Project

## Community Collaboration Report

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Note: Placer County Water Agency and the Cal FRAME Study Team have made a good faith effort to assure the accuracy and completeness of the information contained within this report. However, the contents of this document are subject to omissions, errors, and professional judgment, and PCWA and its Study Team do not accept responsibility for any inaccuracies or misrepresentations that may occur.

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**ACRONYMS AND ABBREVIATIONS**

BCAP	Biomass Crop Assistance Program
BDT	Bone dry ton(s)
BTIP	Biomass Transportation Incentive Pilot
BioMAT	Bioenergy Market Adjusting Tariff
BioRAM	Bioenergy Renewable Auction Mechanism
BLM	Bureau of Land Management; United States Department of Interior Bureau of Land Management
BOR	Bureau of Reclamation
CAL FIRE	California Department of Forestry and Fire Protection
Cal FRAME	California Forest Residual Aggregation Market Enhancement
CPUC	California Public Utilities Commission
CTC	California Tahoe Conservancy
FEMA	Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission
FSC	Fire Safe Council
FSC	Forest Stewardship Council
GHG	Greenhouse gas
JPA	Joint Powers Authority
MFP	Middle Fork American River Project
MSA	Master Stewardship Agreement
MSW	My Sierra Woods Forest Biomass Transportation Incentive
MW	Megawatt
NCSD	Northstar Community Services District
NTPUD	North Tahoe Public Utility District
OPR	Governor's Office of Planning and Research
PCWA	Placer County Water Agency
RCD	Resource Conservation District
REM	Reduced Emissions from Megafire

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SGMA	Sustainable Groundwater Management Act
SNC	Sierra Nevada Conservancy
SPI	Sierra Pacific Industries
SOFAR	South Fork American River
TCS	Tahoe Central Sierra
TCSI	Tahoe-Central Sierra Initiative
TNC	The Nature Conservancy
USFS	United States Forest Service; United States Department of Agriculture Forest Service
WCB	Wildlife Conservation Board
WIP	Watershed Improvement Program

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# EXECUTIVE SUMMARY

## BACKGROUND

The Governor's Office of Planning and Research (OPR) initiated the California Forest Residual Aggregation Market Enhancement (Cal FRAME) Pilot Project as an implementation measure for the California Wildfire and Forest Resilience Action Plan. Cal FRAME is designed to address a fundamental challenge to statewide wildfire risk reduction efforts: too few economically feasible disposal options for excess woody biomass material. The cost of ecological forest treatments and green waste programs that generate excess biomass material outweigh the price biomass utilizers are willing to pay to purchase the material as feedstock. The Cal FRAME project explores regional biomass aggregation as a potential means to address this challenge by centralizing feedstock collection and having a single entity manage collection, transport, and utilization contracts for material generated by forest health, utility corridor clearing, and community-based wildfire prevention projects.

The Tahoe Central Sierra (TCS) Pilot Project, one of five regional Study Teams sponsored by the Cal FRAME project, is led by the Placer County Water Agency (PCWA) and funded by OPR. The TCS Pilot Project focuses on Placer, Nevada, and El Dorado Counties within the larger Tahoe-Central Sierra Initiative (TCSI) area.

The Community Collaboration Report is one in a series of reports developed by the TCS Study Team that, together, comprise the backbone of the project, including:

1. *Water Agency Role in Forest Health Report* – assessing water agencies' forest health and wildfire prevention initiatives that could contribute to biomass feedstock procurement and utilization;
2. *Legal Tools for Government Entities to Incentivize Utilization of Forest Biomass in California* – evaluating potential institutional arrangements for biomass feedstock aggregation in the region;
3. This *Community Collaboration Report* – identifying activities, challenges, and opportunities to inform biomass aggregation activities; and
4. *Case Study: Biomass Supply Report* – assessing feedstock availability and supply chain economics related to a new biomass facility being proposed by PCWA outside of Auburn, CA.

The *Community Collaboration Report* uses insights drawn from key documents, prior studies, stakeholder engagement, and practitioner interviews to explore various aspects of a potential aggregation hub entity connecting biomass generators with those in need of feedstock material (aka off-takers). Stakeholder feedback strongly supports the idea of a hub entity managing long-term biomass feedstock contracts to create a more stable biomass market and enhance the ability of emerging biomass utilization facilities to meet lender and investor requirements.

## CHALLENGES AND OPPORTUNITIES

The Study Team's research uncovered various challenges affecting biomass utilization in the TCS Region, with 67% of interviewees identifying the lack of local biomass facilities as the main hurdle. The absence of facilities means that excess biomass material remains on the ground, heightening wildfire risk and severity, increasing potential harmful air emissions, and reducing revenue-generating opportunities to help support the work. Respondents also cited lack of vendor availability and inadequate coordination

among project proponents and funders as major operational challenges. In addition, smaller jurisdictions with lower material volume face disposal difficulties, and the lack of incentives for existing biomass facilities to recognize and cover the full cost of biomass removal, including non-market co-benefits of reducing wildfire risk, also hinders progress. Finally, tariffs, lengthy permit processes, high upfront investment needs, unstable material quality/quantity, and negative public perceptions about biomass facilities in general, further exacerbate the situation.

Despite challenges, the TCS Region benefits from substantial forest treatment work. Opportunities exist to align biomass purchase/use with multiple climate goals, localize processing facilities, expand workforce development efforts, and test new technologies. Longer-term funding, confirmed valuation methodologies, revolving loans or lines of credit, and conservation-specific financing – coupled with the services of an aggregation hub – can also contribute to a sustainable and efficient biomass utilization ecosystem, addressing market insufficiencies and cost/financing issues in the forest sector.

### **CONSIDERATIONS FOR FORMATION OF A BIOMASS AGGREGATION HUB**

Stakeholders strongly support establishing a biomass aggregation hub in the TCS Region, leveraging robust human, organizational, and financial capacities unique to the area. The primary function of such a hub entity would likely involve acting as a broker between suppliers and buyers and managing the resulting long-term biomass contracts. The operational entity can rely on third parties for material generation and processing or take ownership of biomass material itself, influencing feedstock source and distribution. Regardless of the model, the hub must provide indemnification insurance to mitigate risks related to biomass price variability and supply changes.

The report acknowledges the biomass market's complexity and proposes support services that go beyond just contracts and indemnification insurance. Services like consolidated environmental review, permitting, grant administration, and green waste management align closely with the hub's objectives and could reasonably be provided by the hub through initial subsidization and/or on a fee-for-service basis. Other services, such as workforce training, operation subsidies, ecosystem services valuation, mapping, public outreach, business support, and improved access to capital, may be better addressed by existing entities. In these cases, the hub can connect stakeholders with available resources.

### **AGGREGATION HUB VALUE PROPOSITION**

Considerations for the TCS Region offer substantial value to OPR, elected officials, stakeholders, and others in addressing biomass complexities. Establishing a public biomass aggregation entity that can act as a feedstock broker and mitigate risks related to long-term supply for both buyers and sellers stands out as a pivotal solution. This approach improves conditions for expanded biomass removal, sustains existing operations, and provides the basis for development of new facilities. The focus on a narrow geographic area, especially at the county level, tailors operations to local governments' capacities and needs and accounts for varying levels of forest management and social and political support.

Recommended support services – from consolidated environmental review to coordinated grant pursuit and green waste management – can enhance operational efficiency and overall supply chain sustainability. Concepts such as risk mitigation through insurance pools, coordinated public outreach to address public perceptions, and enhanced business support and access to capital contribute to a comprehensive solution that fosters a proactive shift in the region's biomass utilization, addressing

immediate challenges while aligning with broader forest health and wildfire resilience goals. The potential benefits extend beyond disposal, encompassing community welfare, environmental conservation, and the economic stability of rural, forested communities.

## 1. INTRODUCTION

### STUDY BACKGROUND

This study is part of the Tahoe Central Sierra (TCS) California Forest Residual Aggregation Market Enhancement (Cal FRAME) Pilot Project (TCS Pilot Project) led by Placer County Water Agency (PCWA) and funded by the Governor’s Office of Planning and Research (OPR). The pilot project was conducted pursuant to actions contained in [California’s Wildfire and Forest Resilience Action Plan](#)<sup>1</sup> (Plan; Forest Management Task Force 2021) to address feedstock barriers to biomass utilization throughout the state, one of which is the lack of facilities available to utilize excess biomass material generated by forest treatment work. One of the key challenges underlying the facility issue is the price differential between the cost of generating biomass feedstock material and the price utilizers are willing to pay to purchase the material as feedstock. This leads to difficulties in attracting investment in new or expanded utilization markets due to unstable guaranteed feedstock supply. Under the TCS Pilot Project, project lead PCWA is tasked with assessing pathways, which may include the creation of a public entity, to reinforce and facilitate feedstock supply chain logistics for woody biomass gathered from public and private forest lands, utility and transportation corridor vegetation management treatments, and forest thinning projects, and to advance utilization of the excess biomass in an environmentally sustainable way that supports a circular forest economy.

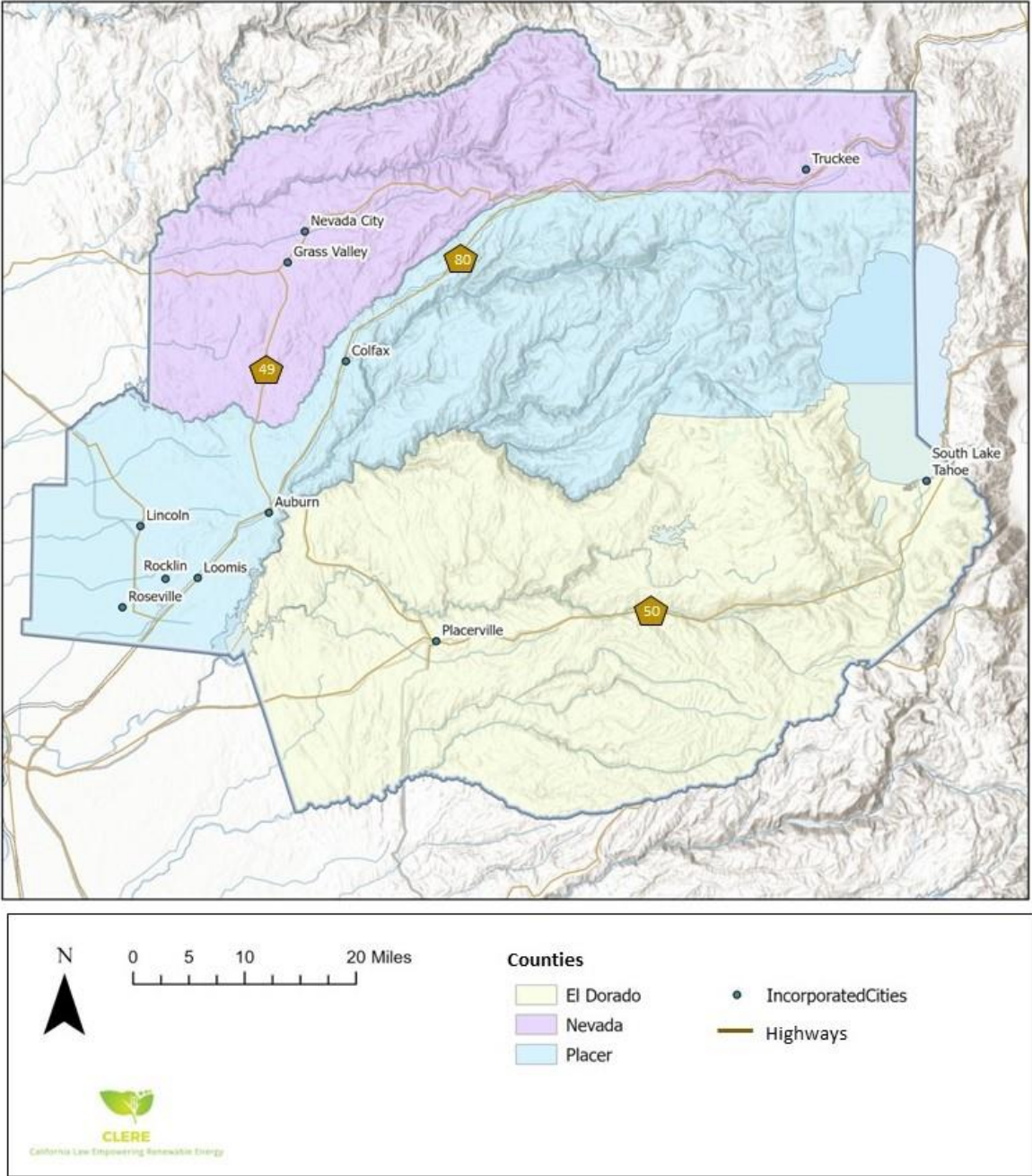
In 2021, project lead PCWA set out to determine the reasons for the statewide challenge of finding utilization pathways for biomass residuals produced from ecological wildfire mitigation and forest health projects, as it relates to protection and management of PCWA’s forest lands and catchment area. In partnership with other local and state agencies, PCWA determined that the biomass feedstock supply chain is volatile, inconsistent, and full of risk. In simple terms, biomass is difficult to remove from forests and transport, especially when there is no available outlet or when those who currently utilize biomass are not selling products that are priced high enough to cover the cost of its harvest and hauling. In 2022, PCWA focused on creating a better understanding from the perspectives of commercial timber, utility and Licensed Timber Operators of the biomass supply chain risks, and how to address them. These earlier efforts helped to lay the foundation for the TCS Pilot Project, which expanded PCWA’s evaluation of biomass supply chain barriers and potential solutions.

The TCS Pilot Project focuses on the TCS Region, which includes Placer, Nevada, and El Dorado Counties, (Figure 1); the pilot includes the entirety of the three-county area, but the specific geography of any ultimate aggregation hub or hub services may shift based on stakeholder interest. This area is a subset of the larger Tahoe-Central Sierra Initiative (TCSI) area encompassing the Lake Tahoe Basin and the American, Bear, Truckee, and Yuba River watersheds. TCSI is a public-private partnership that aims to restore the resilience of 2.4 million acres of Sierra Nevada forests and watersheds through innovative planning, investment, and management to increase pace and scale of forest health and wildfire risk reduction work across the landscape.

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<sup>1</sup> Consistent with the State’s Action Plan, “information and templates will be shared broadly to provide a menu of options for broader adoption” (Action 3.10 Address Feedstock Barriers through Pilot Projects; Forest Management Task Force 2021).

**Figure 1. Tahoe Central Sierra Pilot Project Area Map**



The TCS Pilot Project consists of several tasks conducted in succession so that subsequent efforts can be well informed and consequential research can be conducted. As one of its first tasks, the TCS Cal FRAME Study Team (Study Team) assessed the existing and potential role of regional water agencies (e.g., County Water Agencies, Irrigation Districts, Community Service Districts, Public Utility Districts, and Municipal Utility Districts) in biomass feedstock procurement and utilization. The role of water agencies was of particular interest and is a unique element of this Pilot.

Water agencies in this region and other forested parts of the state have an inherent interest and play a key role in headwaters forest management because of their reliance on the forested upper watersheds to generate, store, and deliver adequate and high-quality water supplies. As a result, these agencies work to protect and maintain both the natural and built infrastructure throughout the state's forested areas. The *Water Agency Role in Forest Health Report* (Landmark Environmental, Inc., 2023), released in March 2023, included research and interviews of key local government and water agencies to describe existing initiatives to remove excess biomass associated with forest health and wildfire reduction activities, and to examine the agencies' existing and anticipated future role in biomass utilization, including biomass conversion.

The Study Team then evaluated potential organizational structures for a public entity, such as a Joint Powers Authority (JPA), that could be formed to aggregate and manage biomass feedstock across jurisdictions in the region with the goal of improving the ability of those who generate biomass and those who utilize the material to satisfy finance requirements and advance their respective abilities to support existing and establish new utilization infrastructure. The *Legal Tools for Government Entities to Incentivize Utilization of Forest Biomass in California* (CLERE Inc., 2024) report built on the information already gathered on water agencies and included legal research of additional local, state, and federal entities regarding JPAs, potential associated barriers including contracting limitations and conflicts of interest, and financing mechanisms. The evaluation also included coordination with key local, state, federal, and non-government entities regarding interest, perception, capacity, potential barriers, and opportunities.

This report, the *Community Collaboration Report* (Placer County/Headwaters Environmental, Inc., 2024), is the third element in the suite of TCS Pilot Project deliverables. It engaged a diverse range of existing and potential partners, forestry, and timber operators, associated businesses, and other stakeholders to help examine the history and status of biomass-related activity in the region. Through interviews and other research, the Study Team evaluated biomass aggregation, procurement, and utilization issues – including challenges and potential future opportunities – that help to inform recommendations for the potential future JPA or other public entity identified in the prior study.

The fourth report, *Case Study: Biomass Supply Report* (CLERE Inc., 2024), more fully explores the economics of feedstock material flow (i.e., the potential financial gap between the high cost of removing excess biomass material for wildfire resilience and the price that utilization facilities can pay to purchase that material) by assessing future feedstock availability and pricing considerations specific to a new biomass facility proposed by PCWA outside of Auburn, CA. The new facility would power PCWA water pumping and treatment activities at one of its primary facility locations and provide excess electricity to the California power grid.

When combined, these reports and studies facilitate evaluation of whether the creation of a public entity is beneficial and useful to ensure sustainable feedstock supply chain logistics necessary for expanding the local wood utilization market to accept the anticipated volume of excess woody material generated by ecological forest health and wildfire risk reduction projects in the TCS Region.

## 2. STUDY METHODS

This study consisted of 1.) reviewing existing documents pertaining to forest health and resilience in the TCS Region; 2.) conducting stakeholder engagement and outreach; 3.) completing interviews with TCSI leadership, various local, state, and federal agencies in the TCS Region, logging and forestry professionals, and others; and 4.) using expert review and professional judgment to explore resulting tools and services identified through the outreach efforts that can reduce contract risk to those in the forest biomass supply chain and help to overcome barriers to increasing the pace and scale of forest restoration and wildfire risk reduction work, including the related disposal of excess biomass material generated by such work. Mitigating contract risk may facilitate biomass generators and end-users' entry into long-term contracts more readily than is currently practiced, enabling emerging facilities to meet lender and investor finance requirements for successful facility development.

### STUDY TEAM

The Study Team consisted of Tony Firenzi of PCWA, Kerri Timmer of Placer County, and Regine Miller of Headwaters Environmental, Inc., who provided oversight and direction; Ms. Timmer and Ms. Miller also conducted background research and interviews, with support from Camille Swezy of CLERE Inc., and Catherine Silvester of Point View Environmental d/b/a; and research was conducted by Christiana Darlington, Esq. Attorney at Law, CLERE Inc.

### PROCESS/APPROACH

#### Review of Key Documents

The Study Team began by reviewing existing relevant documents to gain a better understanding of the region covered in this pilot and the status of efforts related to forest health and biomass utilization within the region, beginning with TCSI. TCSI is a critical public-private partnership established as part of the [Sierra Nevada Conservancy's \(SNC's\) Watershed Improvement Program \(WIP\)](#) to improve forest and social resilience to climate change and other stressors across a 2.4-million-acre landscape that includes the TCS Pilot Project region. The TCSI partnership established a multi-part *Roadmap to Resilience* as a foundation for achieving resilience in its area of interest. The *Roadmap* consists of three primary documents that define resilience based on the social and ecological values making up the landscape (aka "Pillars"), assess key aspects of forest and landscape conditions across those Pillars, and provide a set of strategy maps identifying opportunities for achieving target conditions for the 10 Pillars.

The Study Team also reviewed additional studies and reports by others to identify any findings that could expand the Team's understanding of biomass utilization and needs within the TCSI area and the TCS Region. These reports included evaluations of forest restoration economy expansion, wood supply feasibility, wildfire resilience insurance, biomass transportation subsidies, and other topics related to biomass procurement and utilization.

## Stakeholder Engagement

Since project inception, the Study Team has conducted ongoing outreach and collaborative engagement with PCWA's existing and new stakeholders. This has consisted of conducting more than 40 introductory phone calls/meetings and 28 interviews with stakeholders throughout the TCS Region, as well as making several presentations to groups within the TCS Region and holding public stakeholder meetings.

The purpose of this outreach is to engage stakeholders, educate them about the TCS Pilot Project, assess the status of previous work in the region related to biomass, and identify the anticipated future challenges and opportunities related to biomass removal and utilization as background to inform team recommendations regarding a potential biomass aggregation hub concept and/or operational entity.

## Stakeholder Interviews

The Study Team also interviewed a variety of stakeholders who generate or receive biomass from within the TCS Region. These entities and their headquarters locations are listed in Table 1, shown in Figure 2, and briefly described in Appendix A. In addition, the Study Team met separately with Pioneer Community Energy to discuss its interests related to biomass removal and utilization as it pertains to renewable energy procurement, as well as Placer Resource Conservation District regarding issues it faces around fuel reduction work and material disposal from multiple forest health and wildfire risk reduction projects on private non-industrial timber lands in the TCS Region.

The entities selected for interviews were intended to represent a diverse range of perspectives throughout the TCS Region. They included those who generate forest biomass from forest management activities, those who utilize biomass for various purposes, and those who plan, regulate, fund, and/or coordinate such work.

Interviews were conducted by two team members using a structured list of questions. One team member read the interview questions and engaged the respondent, while the second team member recorded responses and comments. Responses were entered into and compiled within SurveyMonkey®, then later analyzed. Interviews were recorded to allow the team to revisit responses, as needed.

Responses from the conversations with Pioneer Community Energy and Placer Resource Conservation District did not conform to the structured list of questions and therefore were not entered into SurveyMonkey® but were noted as separate input to inform certain portions of the discussion.

Specific information gathered included stakeholder name and entity type; if the respondent was party to projects which generate or utilize residual forest biomass; respondent's most pressing challenges related to disposal of excess biomass; examples of biomass disposal working well; potential options to increase removal of excess biomass; respondent's coordination with utilities (or utilities' vegetation management contractors); the preferred type of biomass aggregation hub models; respondent's interest in helping to create a biomass aggregation hub; potential services or products that could help to overcome biomass removal and utilization challenges; likelihood to contract with a biomass aggregation hub; and, potential benefits of contracting support. Refer to Appendix A for the list of individuals interviewed and their affiliations and Appendix B for the list of questions used during the interview.

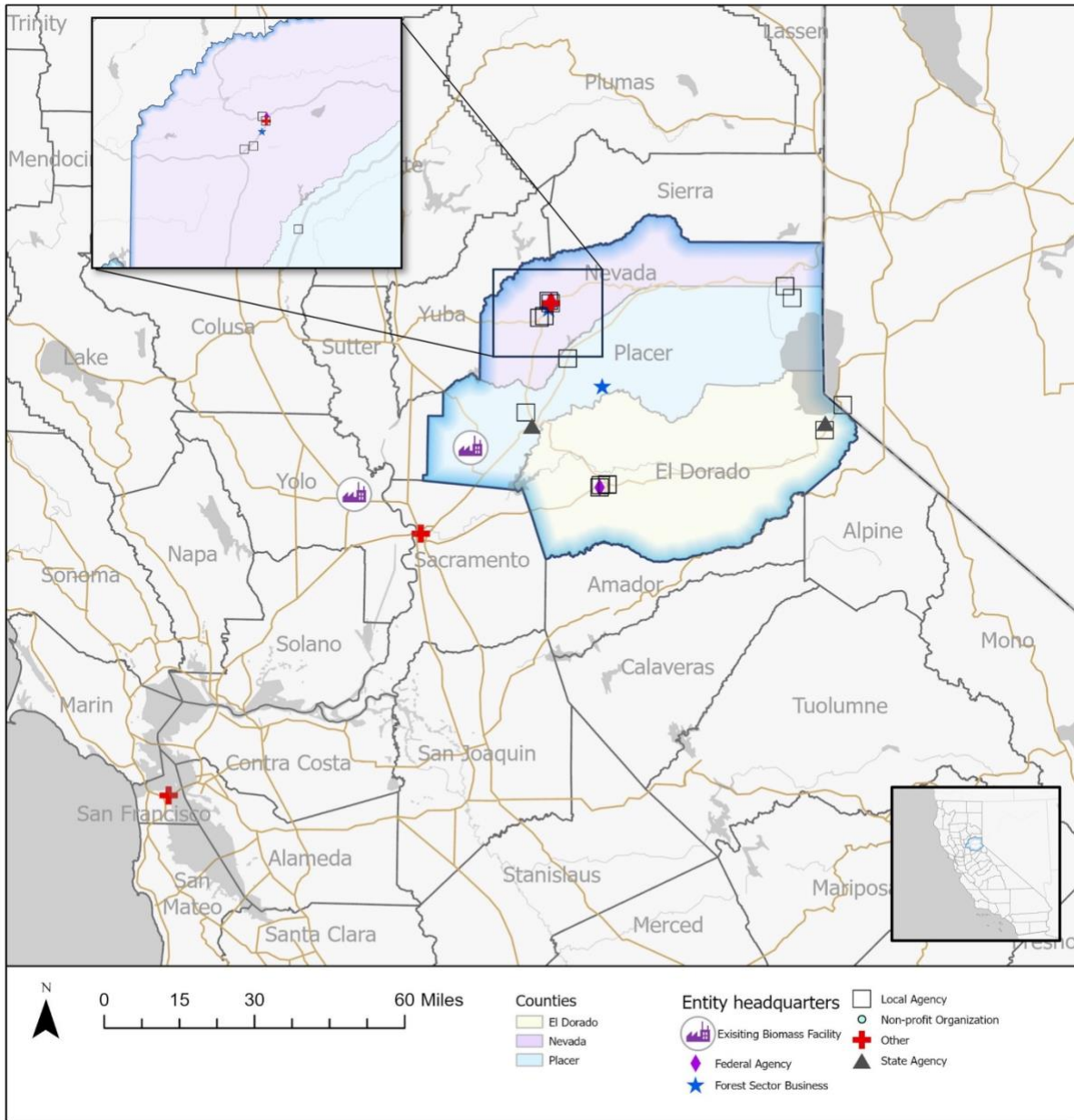
**Table 1. List of Participating Interviewee Entities**

<b>Entity Name</b>	<b>Entity Type</b>	<b>Headquarters Location</b>
California Tahoe Conservancy	State Agency	South Lake Tahoe, CA
City of Colfax	Local Agency	Colfax, CA
City of Grass Valley	Local Agency	Grass Valley, CA
City of Nevada City	Local Agency	Nevada City, CA
City of Placerville	Local Agency	Placerville, CA
City of South Lake Tahoe	Local Agency	South Lake Tahoe, CA
El Dorado and Georgetown Divide Resource Conservation Districts	Local Agency	Placerville, CA
El Dorado County	Local Agency	Placerville, CA
Eldorado National Forest	Federal Agency	Placerville, CA
National Forest Foundation	Non-profit Organization	Missoula, MT
Nevada City Rancheria Nisenan Tribe and California Heritage Indigenous Research Project	Other	Nevada City, CA
Nevada County	Local Agency	Nevada City, CA
Nevada County Fire Safe Council	Non-profit Organization	Grass Valley, CA
Northstar Community Services District	Local Agency	Truckee, CA
Pacific Gas & Electric	Other	San Francisco, CA
Placer County Office of Emergency Services	Local Agency	Auburn, CA
Rio Bravo	Existing Biomass Facility	Lincoln, CA
Robinson Enterprises	Forest Sector Business	Nevada City, CA
Rural County Representatives of California/Golden State Natural Resources	Other	Sacramento, CA
Sierra Nevada Conservancy	State Agency	Auburn, CA
Tahoe National Forest	Federal Agency	Nevada City, CA
Tahoe Regional Planning Agency	Local Agency	Stateline, NV
Town of Truckee	Local Agency	Truckee, CA
Tree MD	Forest Sector Business	Foresthill, CA
Woodland Biomass Power	Existing Biomass Facility	Woodland, CA

Expert Review/Professional Judgment

Data was entered into and compiled within SurveyMonkey® following each interview, then analyzed following the final interview. Stakeholder outreach Team members provided expert review of the findings by applying their extensive backgrounds in forest health and wood and biomass utilization and exercised professional judgment when interpreting the data. Preliminary synthesis of the data was vetted with the full Study Team.

**Figure 2. Participating Interviewee Entity Locations**



### 3. RESEARCH

#### REGIONAL CONTEXT

The TCS Region is comprised of Placer, Nevada, and El Dorado Counties, including portions of the Lake Tahoe Basin and the headwaters areas of the Truckee, South and Middle Yuba, Bear, American, and Cosumnes Rivers. These counties extend from the margins of the Sacramento Valley, east through the

foothills to the steep mountains and deep valleys of the mid- to high-elevation Sierra Nevada (see Figures 1 & 2).

The watersheds of the TCS Region are crucial for downstream communities, agricultural interests, recreationalists, and the environment. These forested watersheds, which supply water purveyors in the region from remote rivers, reservoirs, and distribution infrastructure, provide 24% of the total Sacramento River flow, while the Cosumnes River provides flows into the Mokelumne River which then drains directly into the San Francisco Bay Delta (CABY IRWM Group, 2014). Combined, these watersheds generate water supplies for the Greater Sacramento Region – the Sacramento-Roseville-Folsom Metropolitan area had a population of over 2 million at the 2020 census (United States Census Bureau, 2021) – and greatly contribute to water flowing through the Bay Delta. They also contain large levels of carbon, produce substantial amounts of wood products and clean energy, provide significant fish and wildlife habitat, and are a recreational playground for millions of visitors year-round. Billions of dollars of goods are transported through this area each year as well, contributing to the region’s and California’s economy.

A combination of drought, beetle infestation-caused tree mortality, and catastrophic wildfire have exacerbated high fuel load conditions of historically overstocked forests, resulting in an ever-increasing risk of negative wildfire impacts. The area burned by severe wildfire is increasing each year. To improve conditions in California’s forested watersheds, state and federal agencies have set targets for increasing the pace and scale of forest restoration and wildfire risk reduction activities throughout California. TCSI and other partners in the region are working to scale up forest management by increasing capacity and developing more flexible funding and new or expanded markets for the excess biomass and other woody material generated from this work.

One of those critical areas in need of expansion is local biomass disposal opportunities. Currently, there are two operational biomass-to-electricity facilities accessible to biomass-producing projects in the TCS Region; however, both are located outside of the TCS Region boundary. There are three biomass-to-electricity projects currently under active development, one in the process of restarting, and 10 mixed product end-use projects currently being proposed. Refer to Table 2 for operational, developing, and proposed biomass outlets in the region, and to Figure 3 for their locations.

## **HISTORICAL CONTEXT**

In the late 1970s and ‘80s, the biomass industry was supported in several ways – including by state subsidies under SB 771, the state Agricultural and Forestry Residue Utilization Act of 1979, as well as federal subsidies and mandated procurement under PURPA, the Public Utilities Regulatory Policy Act. The industry was publicly subsidized largely in recognition of the many non-market values or co-benefits of biomass and other renewable energy sources. In the case of biomass, such non-energy co-benefits included (and still include) waste reduction, waste diversion from landfill, air quality improvements from controlled combustion vs. open pile burning or wildfire, related public health benefits from net emission reductions, general forest and watershed health, and energy resource diversity. The biomass industry peaked in the period between 1990 and 1993, according to the California Energy Commission, with a maximum generating capacity at that time of more than 800 MW from 66 direct-combustion facilities around the state.

All that changed with deregulation of the energy market under the Electric Utility Industry Restructuring Act (AB 1890) in the mid-1990s, which returned energy procurement to a least-cost basis, without consideration of non-market values.

Although the deregulation legislation included funding to support alternative energy research throughout a four-year transition period from 1998 to 2001, with the intent of spurring long-term policy development to support alternative energy through continued valuation of non-market benefits, that goal simply did not materialize. Biomass energy became more costly, and utilities stopped procuring it once the mandate was lifted.

As a result, the industry declined, many previously functioning biomass facilities were closed, and statewide capacity to process excess biomass material and generate electricity from it plummeted. The biomass industry has continued to diminish both locally and statewide, leaving fewer and fewer operational facilities. The reduction in facilities continues despite various federal and state efforts to bolster policy and support increased capacity, including President George W. Bush's *Biofuels Initiative* in 2006-07 and California Governor Arnold Schwarzenegger's *Bioenergy Action Plan* at roughly the same time, as well as local efforts including Placer County's adoption of a *Wildfire Protection and Biomass Utilization Strategic Plan* in October 2007 (updated in 2014) and Placer County's ongoing efforts to site a biomass facility at Cabin Creek.

## LITERATURE REVIEW

With this regional and historical context in mind, the Study Team reviewed a series of documents produced by both TCSI and others, as a bridge from what *was* to what *could be* – to identify any findings that might expand the Study Team's understanding of current biomass utilization and needs within the TCS Region.

### Tahoe-Central Sierra Initiative Documents

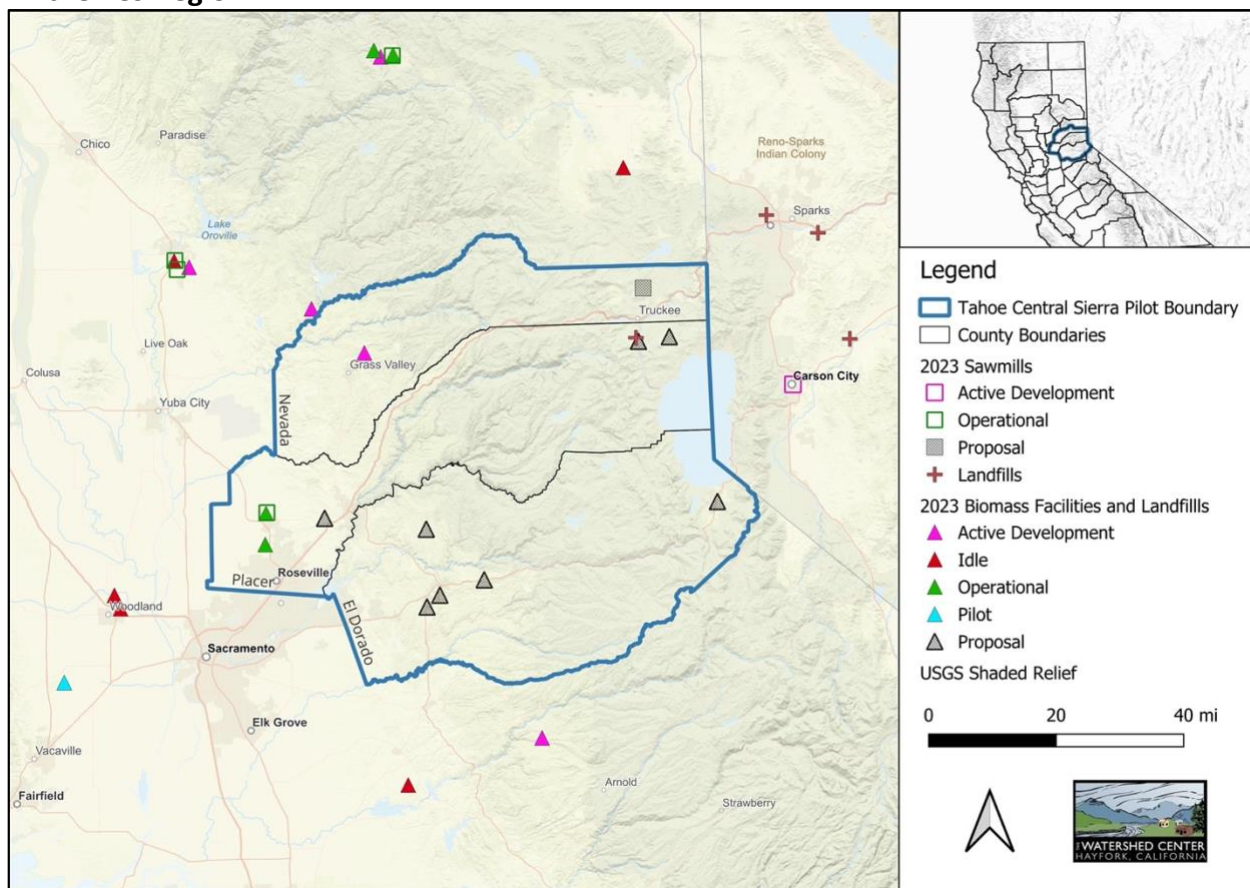
TCSI's multi-part *Roadmap to Resilience* is a series of scientific documents and assessments designed to help the TCSI area achieve resilience in the face of climate change and other impacts. The *Roadmap* consists of three primary documents: 1.) [Framework for Resilience](#), 2.) [Assessment of Current Landscape Conditions](#), and 3.) [Blueprint for Resilience](#), discussed in more detail below. The Study Team's review of these documents focused on findings related to current biomass utilization in the TCS Region and opportunities for future expansion.

**1.) Framework for Resilience** (Manley et al., 2020), which serves as the underpinning for the TCSI efforts (and, incidentally, was adopted by the state's Wildfire and Forest Health Task Force as the basis of recently developed Regional Resource Kits and a mapping tool called Planscape), is the first of the multi-part *Roadmap to Resilience* documents developed by TCSI to support improved forest health and social resilience. The *Framework* defines what a resilient landscape looks like, including the social and ecological values that make up the landscape. Those values are described by 10 "Pillars" that represent the desired outcomes of restoring landscape resilience, including: 1.) air quality, 2.) water security, 3.) wetland integrity, 4.) biodiversity conservation, 5.) forest resilience, 6.) carbon sequestration, 7.) fire dynamics, 8.) fire adapted communities, 9.) economic diversity, and 10.) social and cultural well-being. Each Pillar has associated descriptive elements and metrics that provide a common understanding and a

**Table 2. List of Operational, Actively Developing, and Proposed Biomass Outlets in the TCS Region**

Name	Status	MW Nameplate	Owner	Facility Type	County
<b>Biomass Power Plant Co-located with Sawmill</b>					
Sierra Pacific Lincoln Biomass Power	Operational	19.2	Sierra Pacific	Medium	Placer
Sierra Pacific Camino	Proposal	--	Sierra Pacific	Medium to large	El Dorado
Black Oak Mine Unified School District, Golden Sierra High School	Proposal	--	Black Oak Mine Unified School District	Small	El Dorado
<b>Biomass Power Only</b>					
Rio Bravo Rocklin Biomass Power	Operational	27.3	IHI Power 50% North American Power Group 50%	Bioenergy	Placer
Honey Lake Power	Operational	32	Greenleaf Power Inc	Bioenergy	Lassen
Sierra Valley Enterprises, LLC	Re-start	20	Sierra Valley Enterprises, LLC	Bioenergy	Sierra
Blue Mountain Electric Company	Active Development	3	Calaveras Healthy Impacts Products Solutions	Bioenergy	Calaveras
Nevada County BioMAT Project	Active Development	3	Nevada County	Bioenergy	Nevada
Forest Biomass Business Center Bioenergy Facility	Active Development	5	Camptonville Community Partnership	Bioenergy	Yuba
El Dorado Disposal	Proposal	--	El Dorado Disposal	Bioenergy	El Dorado
South Tahoe Refuse	Proposal	--	South Tahoe Refuse	Bioenergy	El Dorado
Black Oak Mine Unified School District, GT Elementary School	Proposal	--	Black Oak Mine Unified School District	Small	El Dorado
Cabin Creek	Proposal	--	--	Bioenergy	Placer
Ophir Biomass Electricity Generation Facility	Proposal	---	---	Bioenergy	Placer
<b>Other</b>					
Golden State Natural Resources	Proposal	--	Rural Counties Representatives for California	Pellets	Tuolumne
Eldorado Northern	Proposal	--	--	Small Sawmill	El Dorado
NCS D Thermal Facility	Proposal	--	Northstar CSD	Thermal	Placer
Caldor Fire mobile biomass conversion systems	Proposal	--	--	Multiple	Varies
Alpenglow Timber sawmill and thermal	Proposal	--	Alpenglow Timber	Small	Nevada
Tahoe Forest Products sawmill	Active Development		Tahoe Forest Products	Modest	Washoe, NV
<b>Landfills/Transfer Stations/Compost</b>					
Eastern Regional Landfill Material Recovery Facility and Transfer Station	Operational	--	Tahoe Truckee Sierra Disposal	Landfill	Placer
Full Circle Compost	Operational	--	Full Circle Soils & Compost	Compost	Douglas, NV
Lockwood Landfill	Operational	--	WM (formerly Waste Management)	Landfill	Washoe, NV
Western Regional Landfill	Operational	--	Western Placer WMA	Landfill	Placer

**Figure 3. Map of Operational, Actively Developing, and Proposed Biomass Outlets in the TCS Region**



mechanism to evaluate and measure current and future conditions to determine progress. The *Framework* and Pillars also offer a unified, collaborative set of goals and strategies for forest restoration.

The overall *Roadmap* has two primary goals: *Goal #1* – restore and maintain social and ecological resilience across the 2.4 million acres making up the TCSI area; and *Goal #2* – build capacity to restore resilience. Each goal has three strategies within it. Goal #2 includes a strategy calling for the region to **expand markets for biomass** and small-diameter wood to support rural economies and reduce treatment costs, which is particularly germane to this project. A biomass aggregation hub could be a useful implementation measure or tactic under this strategy.

Similarly, the Economic Diversity Pillar within the overall *Framework* focuses on increasing business opportunities that provide regional economic vitality and additional benefits to rural and vulnerable populations, including the wood products industry. The description of this Pillar in the *Framework* emphasizes economic development potential (e.g., creating electricity from biomass to develop an industry in rural forested communities). This Study Team, however, views products such as electricity as byproducts and co-benefits of forest health/wildfire risk reduction

activities that are critical to achieving larger goals and outcomes, such as cleaner air, healthier forests, and safer communities. The region needs facilities to take excess biomass material generated by these forest health/wildfire risk reduction projects, otherwise that material stays on the forest floor or in piles that either serve as redistributed fuel themselves or are burned onsite where uncontrolled combustion continues to negatively affect social and ecological resilience.

Increasing the pace and scale of forest health projects is not intended as a means of restoring the historic biomass energy industry, whose goal was to create energy from woody material; instead, the region needs additional biomass utilization capacity to facilitate getting excess forest material out of the woods, both for forest health/community safety reasons and to help reduce the overall cost of forest health projects. Only then can we truly increase the pace and scale of the work.

Creating electricity or other products from the disposal of excess biomass does help to fund the work; but it is not the reason the work is being done. This Study Team does not advocate building a rural economy out of burning wood to create electricity (“logs for lights”); rather, multiple entities across the region are trying to incentivize the necessary forestry work by providing more ways to utilize the excess material and create a sustainable forest stewardship economy, as was done until the electric industry was deregulated in the early ‘90s and biomass subsidies – which were in place in acknowledgement of the expense of biomass but also the multiple co-benefits of removing it from our forests – were discontinued. There was a time when societal benefits of biomass removal were understood and financially supported; we need to get back to that time.

**2.) *Assessment of Current Landscape Conditions*** (Wilson and Manley, 2021) is the second component of the TCSI *Roadmap to Resilience*, and it is geared toward understanding key aspects of current forest and landscape conditions across six of the *Framework’s* 10 Pillars, including: 1.) forest resilience, 2.) fire dynamics, 3.) fire-adapted communities, 4.) biodiversity conservation, 5.) carbon sequestration, and 6.) economic diversity. The economic diversity discussion includes an analysis of current biomass-processing capacity within the TCSI area. The report identifies the high cost of biomass removal as a barrier to increasing the pace and scale of forest treatments. With no active sawmills or biomass facilities currently operating within the TCSI landscape, transportation distances are too great for biomass removal to be economically viable without subsidies or other economic offsets.

To reach its conclusions, the *Assessment* looks at the impact on biomass removal value based on: 1.) four forest management treatment scenarios with varying levels and types of prescriptions, 2.) the biomass and timber anticipated to be generated from each treatment scenario, 3.) an analysis of how much of that material would likely be transported to and accepted by existing facilities, and 4.) the potential effects on stumpage values (the delivered price minus the cost of removal, i.e. logging, chipping, hauling) and amount of work that could be undertaken if three new biomass energy facilities were sited within or adjacent to the TCSI area.

The four scenarios comprise varying levels of treatment and anticipated quantities of biomass to be generated from each. This information is assessed in light of currently available processing

capacity at existing biomass facilities to identify how much additional capacity would be needed to meet the demand illustrated by the four different scenarios. For the more ambitious scenarios, biomass volumes were found to exceed regional processing capacity. Then the study addresses the effects – relative to business-as-usual – that reduced transportation distances might have on the value per bone dry ton (BDT) of material and the potential for increasing the amount of work conducted.

Relative to cost, the report employs a modeling exercise that indicates that the cost to remove biomass by BDT could be reduced from an average of \$15/BDT to \$2.80/BDT if three biomass facilities were added within or adjacent to the TCSI area. Hypothetical locations (no specific research has yet been conducted to choose specific sites) include: 1.) on Hwy 49 near the Middle Yuba River; 2.) on I-80 near Bell Road in Auburn; and 3.) on Hwy 50 in the South Fork American River watershed. Savings would derive from reduced transportation costs (travel/time) by having facilities closer to where the forest health projects are generating the material in need of disposal.

The *Assessment* concludes that lowering transportation costs by having additional offtake facilities closer to where the forest work is happening would likely improve cost issues more than pace and scale of treatment. The report posits that a better way to increase the amount of work would be to open up “operability” by using hand-thinning, cable logging, or other removal techniques that allow for more work to be conducted on otherwise restrictive areas such as steeper slopes and/or in more remote areas that are too difficult for standard mechanical treatments.

**3.) *Blueprint for Resilience*** (Manley et al., 2022), the third component of the overall *Roadmap*, is a set of strategy maps identifying opportunities for forest protection and adaptation across the TCSI area to achieve target conditions for 30 different metrics across five of the 10 Pillars of Resilience, including 1.) forest resilience, 2.) fire-adapted communities, 3.) fire dynamics, 4.) biodiversity conservation, and 5.) carbon sequestration. The *Blueprint* document allows land managers to create strategic, forward-looking actions that respond to projections of climate change impacts. It also helps land managers determine where restoration treatments are likely to improve conditions over time and, conversely, where treatments are less certain to have an impact.

Because the *Blueprint* is focused on actual land management activities, it offers a decision support tool that evaluates spatial data against target conditions. As a result, the report does not directly address removal of excess biomass generated by the land management activities.

### Additional Pertinent Reports

Additional relevant studies and reports pertaining to biomass utilization have been prepared as part of TCSI implementation and in support of other efforts within the region. To add further context for the study at hand, the Study Team reviewed several of these reports and identified repeated themes associated with biomass removal and utilization (refer to Section 7. Resources). As briefly described below, one of the analyses was prepared by SNC, three were prepared for The Nature Conservancy (TNC), and a fifth was prepared by the California Department of Forestry and Fire Protection (CAL FIRE).

Taken together, these studies help to round out the Study Team’s evaluation of potential opportunities to address biomass challenges.

- 1.) **Waypoints on the Road to Resilience** (SNC) is an analysis of the TCSI *Roadmap* to identify practices that could be employed in other regions to help increase pace and scale of socio-ecological resilience region-wide. While the *Waypoints* review was not specific regarding how to address biomass utilization challenges, TCSI’s members are conducting on-the-ground projects, some of which could engage as biomass generators within the aggregation hub. Biomass feedstock potential from these TCSI member projects is addressed in the *Case Study: Biomass Supply Report* (CLERE Inc., 2024), one of the other reports generated as a part of the TCS Pilot Project. Refer to Appendix C for a list of representative TCSI projects within the TCS Cal FRAME study region and additional detail about the feasibility of procuring biomass from these projects. For reference, these TCSI member projects include:
  - + Caples (Eldorado National Forest, El Dorado Irrigation District, SNC) – because this project is focused primarily on prescribed burning and reintroducing a healthy fire regime on 6,800 acres of the Eldorado National Forest, it is not likely to become a major biomass generator.
  - + French Meadows (Tahoe National Forest, Placer County Water Agency, Placer County, TNC, SNC, American River Conservancy, Sierra Nevada Research Institute University of California, Merced) – focused on providing support to the United States Forest Service (USFS) – Tahoe National Forest for increasing fuels reduction/forest health activities across 22,000 acres, with roughly 5,000 acres of thinning work to reduce fire risk/severity and protect critical resources including Middle Fork American River water/hydropower project (the Middle Fork Project).
  - + Lake Tahoe West (California Tahoe Conservancy, Lake Tahoe Basin Management Unit, Department of Parks & Recreation, Tahoe Regional Planning Agency, Tahoe Fire & Fuels Team, National Forest Foundation) – implementing a 10-year strategy to restore forests, watersheds, recreation, and communities on Lake Tahoe’s western shore.
  - + North Yuba Forest Resilience Project/Partnership (Tahoe National Forest, South Yuba River Citizens League, TNC, Yuba Water Agency, Camptonville Community Partnership, The Nisenan Tribe, National Forest Foundation, Sierra County, Blue Forest Conservation) – forest restoration work across 275,000 acres, to be funded in part by private capital from a Forest Resilience Bond managed by Blue Forest Conservation.
  - + South Fork American River (SOFAR) Cohesive Strategy (multiple partners including industry, environmental, Resource Conservation District, fire, and homeowners) – initiate National Cohesive Wildland Management Strategy on 410,000 acres in South Fork American River watershed on the Eldorado National Forest.

In addition, the *Waypoints* document identifies several ideas or opportunities for further exploration. First, the *Framework’s* Pillar 6, Economic Diversity, clearly calls for expansion of the biomass offtaker market. While the *Framework* may describe such expansion primarily in terms of rural economic development, rather than as a necessary element to support increasing the pace and scale of forest health and wildfire risk reduction work, the Pillar sets the stage for pursuit of an aggregation entity and establishment of a suite of services that can support additional biomass facility development and enhance removal of excess biomass material.

The *Waypoints* analysis also points to possible roles for TCSI and/or its member state agencies, SNC and California Tahoe Conservancy, based on their respective activities within the region. Potential TCSI/SNC roles are explored in the *Legal Tools for Government Entities to Incentivize Utilization of Forest Biomass in California* (CLERE Inc., 2024) report that is another element of this TCS Pilot Project; but a high-level overview indicates that a collaborative such as TCSI or a state agency such as SNC, could be a strategic member of – or even the convener/facilitator of – an aggregation hub entity.

TCSI, for example, already represents the entire area of interest in this study; its resilience framework is presently being used and promoted by the state’s Wildfire and Forest Resilience Task Force as the standardized approach for planning forest/wildfire resilience projects; and it already has a goal of developing frameworks and actions to embed socio-ecological resilience and facilitate forest restoration within the region. TCSI is an affiliation of entities who have signed a Memorandum of Understanding; while the entity does not have legal status, it (or even simply its members) does have the potential to play a major role in the creation of an aggregation hub.

Similarly, the SNC, a state conservancy within the California Natural Resources Agency and a member of TCSI, could also serve as a critical member or convener/facilitator of a biomass aggregation hub. SNC covers the full project area of interest (and beyond); it already has the triple-bottom-line mission of enhancing the economic, social, and environmental well-being of the region; and it already plays a role as a collaborative hub for coordination and distribution of resources and services – via convenings, grant programs, and other programmatic activities. Having the SNC serve as the convener/facilitator of an aggregation hub could make sense particularly if the biomass aggregation services could be added to the SNC’s already established role as a regional “sustainability hub.” As an existing regional hub, the SNC provides regional leadership and “provisioning” (i.e., coordination and distribution of resources and services) needed to achieve state socio-ecological resilience goals. Biomass aggregation and related services could be an additional suite of services offered by the SNC, along with its other services such as managing the state agency [pooled funding block grant concept](#) and rollout of the [Regional Resource Kits](#) under the umbrella of the Wildfire and Forest Resilience Task Force.

- 2.) [\*\*\*Accelerating Forest Restoration: Stimulating a Forest Restoration Economy and Rebuilding Resilience in California Fire Adapted Forests\*\*\*](#), a report developed by Bain and Company (2020), examines how wood products manufactured from low-value forest material can accelerate forest health and resilience and mitigate the risk of high-severity wildfire. The report evaluates commodity markets based on three criteria: technical feasibility, environmental impact, and economic viability. The study determines that based on the evaluation of end markets, bioenergy facilities and sawmills offer the most promising means of accelerating forest restoration, in integrated wood products campuses, however, the report noted that growth of these markets will be challenged without significant changes in public policy and administrative processes. Challenges common to sawmills include competition, risk due to small profit margins, and the limited availability of operators with the necessary small mill expertise. Bioenergy presents a different set of unique challenges, namely, the offtake prices are not high enough to capture the cost of the activities that generate the material, bioenergy activities can generate air pollution/emissions, and there is

associated risk due to small margins and uncertain fuel supply prices. Not surprisingly, the study found that integrated wood campuses require greater upfront capital expenditures, and increased complexity in finding an operator, a site location, and, importantly, project finance.

*Accelerating Forest Restoration* offers possible solutions including recommending that low-cost capital for wood processing facilities be provided through a state revolving loan fund, and that upstream subsidies be offered to forest landowners and land stewards to defray the cost of large-scale restoration management actions. Additional solutions discussed include increasing the number of landscape-level projects to inject more material into the wood market, allowing direct funding for restoration projects and wood and biomass utilization infrastructure, and implementing a state directive to accelerate forest restoration and increasing wood processing capacity. Expanding the use of long-term stewardship contracts and revising the current USFS business practices to reclassify small diameter logs as a liability (rather than a commodity) due to the cost of off hauling, can help to overcome some of the current market barriers.

- 3.) [\*\*TCSI: Phase 1 Restoration Wood Supply Assessment\*\*](#), completed by Mason, Bruce & Girard (2020), consists of a 20-year fiber supply study that assesses the regional economics of biomass utilization. The assessment determines that forest biomass prices need to be considerably higher than they are currently if they are to fully account for the cost to generate and transport the material. On average, the authors found that delivered biomass has a negative value of -\$15 per BDT when delivered to the existing Rio Bravo Rocklin bioenergy facility. Haul distances are key to the economics of biomass removal, and facilities sited close to supply of material are likely to be more successful than those located farther away. The assessment also found that increasing the pace and scale of forest restoration in the TCSI area will generate an additional 320,000 BDT per year for 20 years, or the equivalent of an additional 40 MW of biomass to energy. A fleet of small to mid-sized biomass processing centers in the region could offset the average project biomass stumpage deficit from -\$15 per BDT to -\$3.35 per BDT. The economics could further improve with the use of blended treatments – namely, the harvest and sale of sawlogs – to offset the costs to remove and transport excess biomass. In addition, the authors found that the current haul distances for projects within the TCSI area are far too long to support positive biomass stumpage at a delivered price of \$40 per BDT in 2020 dollar-values, which was within the range of current biomass pricing at the time of the study. It is important to note that the rate of inflation has markedly increased since the time of the study, which would likely result in an even greater biomass stumpage deficit. Mitigating transportation costs through, for example, transportation subsidies directed at material sourced from projects distant to facilities, could promote more restoration work.

The *Wood Supply Assessment* found that counties within the TCSI area produce an average of 189,000 million board feet (MMBF) annually, and that dead biomass is prevalent in the TCSI area due to tree mortality (further aggravated by the recent 2022 Mosquito Fire and 2021 Caldor Fire). At the time of the study, the Rio Bravo Rocklin bioenergy facility constituted 100% of the biomass-processing capacity serving the study area. Therefore, any increase in biomass removal exceeded the current facility's capacity.

The TCS Pilot Project’s *Case Study: Biomass Supply Report* (CLERE Inc., 2024) expands on the findings of this 2020 *Wood Supply Assessment* by assessing potentially available biomass coming from licensed timber operators, major entities sponsoring forest restoration work/biomass generation, and nonindustrial forestlands and fire safe projects within reasonable haul distances of a specific biomass utilization facility proposed by PCWA for development outside of Auburn.

- 4.) [\*Wildfire Resilience Insurance: Quantifying the Risk Reduction of Ecological Forestry with Insurance\*](#) report, prepared by Willis Towers Watson (WTW, 2021) in coordination with TNC, determines whether the wildfire risk reduction associated with “ecological forestry” applied at a landscape scale can be accounted for in insurance modeling and structuring, and to quantify the insurance benefits of ecological forestry, including any reduction in expected losses and consequential technical and actual premium savings. The authors use the TCSI-member-led French Meadows Project as an example to evaluate potential economic value to be derived from ecological forestry that reduces severe wildfire risk and how that value could be reflected in both parametric and indemnity insurance modeling.

*Indemnity insurance* is a more traditional insurance product that pays out for the actual value of damages or losses sustained in an event such as fire. For example, PCWA maintains indemnity insurance for its hydro power and water supply facility assets. Each asset is assigned a value, and, in the event of damage to that asset, a payout is made based on an evaluation of the actual damage to the asset from the event. *Parametric insurance*, on the other hand, protects against the *likelihood* of a specific event occurring or threshold (“parameter”) target being reached, such as a specific threshold number of acres burned in a wildfire; and it “...pays out when [that] previously defined ‘parameter’ is met or exceeded” (WTW, 2021). Parametric insurance is often used in industries that are subject to the weather, such as construction or agriculture. Parametric insurance pays out a pre-determined amount if the given parameter or target threshold is met or exceeded, independent of the actual damages or losses incurred.

The *Wildfire Resilience Insurance* study also explores how insurance premium savings resulting from reducing risk through ecological forestry and fuel reduction practices might be used to fund or finance additional investments in ecological forestry on national or other forest lands. Risk is defined as the product of the hazard (a combination of probability of wildfire and its characteristic intensity based on conditions on the ground), exposure (based on where the asset at risk is located and its value), and vulnerability (which is how damaging potential wildfire is to the identified asset at risk). Wildfire hazard is growing quickly, while the ability to increase resilience to the hazard is limited; therefore, insurance is becoming unaffordable and unattainable.

## **Indemnity Insurance**

The report authors analyze a portfolio of 80,000 properties in the North Fork American River watershed, totaling an annual premium of \$51 million. Report authors found substantial savings in aggregate home insurance premiums of 41% (or \$21.1 million), assuming the application of ecological forestry on the entire sub-basin. Under this model, there is a premium savings of 52% for home insurance obtained for a single community of 533 homes when accounting for ecological forestry.

There is not a demonstrable benefit to indemnity insurance pricing for PCWA's water and power facility assets from ecological forestry benefits because those assets (e.g., dams, reservoirs, tunnels, etc.) are not as vulnerable to significant wildfire damage. However, there is a significant reduction in indemnity insurance premium for a subset of PCWA buildings which are vulnerable to damage by wildfire. When analyzed separately, the annual indemnity insurance premium costs for certain PCWA buildings vulnerable to wildfire in the watershed see a reduction of between 10% and up to 84%, with a 44% reduction on average.

## **Parametric Insurance**

Parametric insurance pays out when a previously defined "parameter" is met or exceeded. For example, the risk could pay out when a certain threshold of acres burned is exceeded, as opposed to the insured having to prove that it suffered damage and loss to insured assets from a wildfire (as with traditional indemnity insurance products). Parametric insurance can provide instant access to funds to pay for costs not covered, such as sediment removal and/or erosion and sediment mitigation expenses. PCWA was, again, used as an example for the study.

Parametric insurance premium estimates (based on expected loss) were found to decrease with ecological forestry, with 10% to 80% reductions across all modeled scenarios, and 20% to 40% reductions for case study scenarios consistent with the scale of the French Meadows ecological forestry project. The parametric insurance premiums decrease because ecological forestry management reduces both the expected total burned area and high severity burned area of wildfires, in turn through reducing both frequency and severity of wildfire at any given location. For a given area of forest treated with ecological forestry, parametric premiums reduced by different amounts because of different sizes of insured areas, different insurance structures (reflecting different potential use cases and purchasers), and whether the designed structure takes advantage of the change in loss profile induced by the ecological forestry. While, overall, the reduction of parametric premiums aligned with results of the indemnity modeling, the authors noted that real-world circumstances make the parametric insurance savings more easily materialized.

WTW recommends insurance regulators consider modifying rate approval regulations to allow insurers to account for ecological forestry in rate development. Businesses and agencies with assets or property adjacent to forests should pilot wildfire resilience insurance, such as water and power agencies, private timber companies, or ski resorts.

- 5.) [\*An Evaluation of Forest Biomass Transportation Subsidies\*](#) is a white paper prepared by CAL FIRE's Wood Products and Bioenergy Team (2023) which examines well-established issues with transportation subsidies, reviews key literature (some of which is cited below), and highlights the complexity of subsidies and their potential to affect the wood products market. The paper discusses how the state's biomass market is unstable and subject to inundation resulting from a combination of wildfire recovery efforts and the lack of available outlets, due, in part, to the tendency for the owners of the remaining sawmills and co-located biomass utilization facilities to source material primarily from private industrial forest lands rather than public and private non-industrial forest landowners. This leaves fewer options for material disposal from federal land projects or those conducted on smaller private landholdings. Facility biomass purchase pricing has decreased due to an oversupply of biomass residual material, which creates an economic gap between the actual costs to remove and transport excess biomass material and the income received from material sales.

As part of its transportation subsidy white paper, CAL FIRE summarizes another older paper, authored by Becker et al. (2009), which identifies shorter travel distance as the principal factor to being able to reduce harvest costs in the modeling scenarios, for example by establishing biomass conversion facilities closer to the source of material. The CAL FIRE paper points to findings from Becker et al. that per-acre cost-shares and certification premiums are additional important factors when trying to offset forest management costs. Citing a different study, Mason et al. (2006), CAL FIRE also identifies the considerable non-market benefits of fuel reduction and biomass removal from forests. Additional studies that CAL FIRE examines highlight the need for a cost-share to reflect the multiple goals of entities operating within the biomass supply chain (Wang et al., 2021), and the need to improve interagency coordination, to better recognize and consider material suppliers, and to establish a feedback loop with conversion facilities so shifts in subsidy policy can be made as needed (Zhu et al., 2022).

The CAL FIRE white paper also briefly describes the Biomass Crop Assistance Program (BCAP), the My Sierra Woods Forest Biomass Transportation Incentive (MSW), and the Sierra Forest Products Facility-Specific Subsidy. The CAL FIRE paper finds that incentive programs can be underutilized including when the subsidy pricing is too low to account for harvest and transportation costs, as was the case with MSW when it was initially rolled out. The CAL FIRE paper also finds that subsidies can be abused when "eligible" material is not clearly defined, and that markets can be disrupted by a decrease in other wood or biomass manufacturing facilities' fuel purchasing power. Lastly, the number of acres that can be treated when using subsidies can be influenced by the potential for outlets to become inundated with fire salvage material and decreased price paid for biomass, thereby making the incentive payments less effective at offsetting actual forest management costs.

The CAL FIRE white paper's recommendations include the need to create and monitor a pilot transportation subsidy program to evaluate the program effectiveness before considering possible program expansion and broader adoption. After releasing its 2023 white paper, CAL FIRE awarded Business and Workforce Development Program Biomass Transportation Subsidy funding to Community Renewable Energy Services, Inc., for the Dinuba Energy Biomass Power Plant Restart project and to Lignum Support Services LLC for

the Lignum Support California Biomass Transportation Subsidy. These two grantees are presently piloting subsidy programs which may provide opportunities for learning and future implementation across a larger area.

## Summary

The reports described above, and others reviewed by the Study Team but not detailed herein, provide insight into the main reasons that a sustainable biomass market continues to be out of reach. The principal common barriers identified include:

- + Material ownership: the establishment of new biomass-to-energy and sawmill markets will continue to be challenging barring significant changes in public policy and administrative processes related to biomass material ownership.
- + Haul distances: hauling distance to transport material from the TCS Region to existing biomass utilization facilities is too far to support positive biomass stumpage at a delivered price of \$40 per BDT in 2020 dollar-values.
- + Competition for limited processing capacity: dead biomass is prevalent in the region due to excessive tree mortality and recent large fires, including the 2022 Mosquito Fire (77,000 acres) and 2021 Caldor Fire (221,835 acres). Tree mortality, alone, has been pushing facilities to capacity. Adding fire-killed trees makes it extremely difficult to then accommodate byproducts of green forest restoration/mitigation activities.
- + Insurance: homeowner's insurance and other insurance products for those with assets in and adjacent to forests is becoming unaffordable and unattainable, due to growing wildfire hazard outpacing the ability to mitigate the hazard.

The reports reviewed offer possible approaches to help overcome the lack of available infrastructure and the high cost of biomass removal, including:

- + Improving access to low-cost capital for wood processing facilities and the use of upstream subsidies to landowners and land stewards to better support the establishment of new infrastructure and recoup the necessary cost of forest management activities.
- + Expanding the use of long-term stewardship contracts and revamping USFS business practices so that a.) small-diameter logs are considered a liability due to the cost of removal rather than a commodity with value, b.) log accountability tracking is streamlined, and c.) the USFS' current cost share ("match") requirements are reduced.
- + Expanding biomass infrastructure to catalyze forest restoration on more than 600,000 acres in the TCSI region that would otherwise be at high risk from wildfire, drought, and disease.
- + Mitigating transportation costs to promote more restoration work and protection of communities and natural resources. Reducing haul distances to help improve the economics of biomass removal, for example if there were facilities located closer to the material supply, which tend to be more successful than those located farther away. Creating a fleet of small- to mid-sized biomass processing centers across the region to decrease the average project biomass stumpage deficit.
- + Leveraging insurance savings from the suggested insurance cost reduction approach to fund or finance ecological forest treatment on National Forest System or other forest lands through bonds, with the insurance savings applied to pay the debt service on the bonds over time. The proceeds from the bond issuance could be used for upfront funding of forest restoration activities.

## 4. FINDINGS

The following section outlines: 1.) issues, challenges, and opportunities identified through the Study Team’s research, literature review, and practitioner interviews related to removing excess biomass in the Tahoe Central Sierra region as a vehicle for helping to improve forest health and reduce severe wildfire impacts, and 2.) community input on the aggregation hub concept.

### ISSUES/CHALLENGES/OPPORTUNITIES

Issues, challenges, and opportunities highlighted by the Study Team’s research fall into three main categories: insufficiencies, cost/financing, and perceptions.

#### Insufficiencies

##### **Lack of Local Biomass Facilities**

Fully 67% of practitioners interviewed identified the lack of local biomass facilities as the top obstacle to disposal of excess biomass material from forest and community resilience work in the TCS Region. The region is something of an infrastructure desert. As illustrated in Figure 3, the large area surrounding Lake Tahoe has no operational biomass utilization facilities. The need for biomass outlets continues to outpace existing infrastructure. Without local biomass facilities, excess material that should be removed to improve forest resilience is often piled to burn in place. Unfortunately, lack of prescribed fire personnel and severely limited burn windows means that material is left on the ground where it can fuel higher severity wildfires or decompose and contribute methane emissions, a powerful greenhouse gas. In all cases, the emissions are uncontrolled and can, therefore, exacerbate air quality, public health, and other concerns; and projects lose out on potential revenue from biomass supply sales that could help defray the growing cost of conducting this critical work in the field. In addition, developers trying to launch new facilities have no local template to test assumptions around financing, pricing, potential community responses, appropriate technologies, and expected co-benefits. Volatility of non-local cogeneration facilities/markets drives decision-making, making it difficult to define long-term costs for local facilities. Furthermore, as it relates to bringing mobile technologies to where the material is generated, upfront cost and permitting for new or unproven technology can be prohibitive, reducing opportunities for “proof of concept” in the field.

While agencies and decision-makers have shown good intentions around biomass facility expansion, as illustrated by various biomass-related policies and legislation, follow-through is spotty. As an example, [SB 1122 \(Rubio, 2012\)](#), which incentivizes development of new, smaller biomass facilities near forested communities with high fire hazard, has resulted in only one new operational facility (Collins Pine, which consumes both forest biomass and less expensive sawmill residues and produces power and steam for export and for the adjacent sawmill and dry kiln), in part due to lack of agreement within the California Public Utilities Commission (CPUC) on biomass pricing and transportation subsidies that had been available for utility-grade biomass facilities in the 1990s. The failure of developing facilities to secure long-term fuel supply contracts has constrained their abilities to meet lender and investor requirements and to complete project finance and, ultimately, prevented broader program adoption and facility installation. Additional regulatory and operational constraints, such as securing power purchase

agreements or overcoming high cost to tie-in to the local utility grid, continue to limit new facility development, especially in California.

Some point out that the smaller facilities contemplated under SB 1122 are not sufficient to accommodate the current and anticipated disposal needs. Smaller facilities take just as much upfront effort to develop as larger ones, but they don't provide adequate capacity to address the quantity of material expected to be generated from forest health and wildfire risk reduction work in the region, leaving the region with nothing working well at scale. Several projects across the region are testing promising new technologies, some of which take an integrated wood product manufacturing approach with commodities whose pricing is expected to exceed that of currently available electricity offtake; but the Tahoe Central Sierra region has no facilities ready to accept or utilize material right now.

*Opportunities:*

New facility and technology developers face many challenges; but momentum is growing around forest biomass removal and utilization. Additional ideas to help support facility development include:

- + Promote the purchase and use of forest biomass to help local jurisdictions comply with [SB 1383 \(Lara, 2016\)](#) (diversion of organic waste from landfill) and other climate-related efforts or regulations. For example, Town of Truckee is exploring development of a biomass utilization facility in part to reduce the Town's carbon footprint and environmental impact of operations.
- + Locate processing facilities as close as possible to where biomass material is generated, e.g., create places to sort and process material in the field, intermediary sites for log decking, smaller-scale localized processing, etc. County-owned lands in proximity to National Forest System lands are an example location and could potentially also host a stationary or mobile biomass conversion technology.
- + Create a pilot program to leverage existing projects and public-private partnerships to test new/mobile technology on public lands where there is no available access to nearby infrastructure. For example, the Eldorado National Forest and Great Basin Institute are partnering with mobile technology producer Stonebridge Sustainability Solutions to position up to five mobile air curtain burner units in the field to speed Caldor Fire restoration. Mobile technologies could also be sited on County-owned lands where there is existing infrastructure in place for wood waste storage and disposal. Regulatory permitting issues for mobile technologies are not yet fully addressed but as they are, deploying mobile or semi-mobile conversion technologies closer to the source of material will become easier and potentially allow for the production of a range of commodities.
- + Use the siting of Northstar Community Service District's biomass thermal energy facility near Truckee, which will provide a disposal outlet for the District's biomass residuals generated as a result of fire risk reduction activities, or the Tahoe Forest Products sawmill in Carson City, Nevada, the closest recently opened mill facility to the TCS Region, as models to test the ability to create a

- “closed circle” community-scale solution, with small to modest-scale biomass, milling, and other wood utilization using locally generated material.
- + Advocate to the CPUC to expedite implementation of SB 1122 to get smaller facilities moving into the region.

### **Lack of Vendor Capacity**

Survey participants identified lack of available vendors or vendor capacity to do the work as one of the top three primary challenges – behind lack of facilities and cost of material disposal – to scaling up from current wildfire and forest resilience efforts to protect communities and resources and meet fuels treatment and forest management goals.

Higher elevation and more remote projects feel this challenge acutely. Unanticipated wildfire suppression activities and post-fire recovery efforts on recent major fires, such as Caldor, Dixie, and Mosquito, have exhausted much of the available vendor capacity in this region. Much of the recovery work is at lower elevations, so vendors can start earlier and stay on site later than they can on higher elevation or more remote projects. As a result, even if a vendor has a contract for high elevation work, that vendor is more likely to mobilize personnel and equipment on the earlier-starting projects, which means there may not be capacity to get to the high elevation work in a given work season.

The high cost of liability insurance for those driving/hauling material represents a significant impediment to vendors’ abilities to fulfill their companies’ staffing needs or meet client insurance requirements, effectively reducing their capacity to perform field operations and meet existing contract obligations, let alone expand operations to accommodate an increase in pace and scale. Other operational issues such as the dearth of amenities and services and affordable housing, to support and attract the forestry- and biomass-related workforce to this region can also be a detriment to vendor capacity and availability.

#### *Opportunities:*

Certain challenges in this category can also be potential opportunities. For example:

- + The passage of [AB 338 \(Aguiar-Curry, 2023\)](#) requires forest health/fuel reduction projects to pay prevailing wage for labor, which could provide more incentive for workers to engage in this field. The difficulty is that such a requirement is likely to double or triple the cost of projects going forward, which might have a chilling effect on scaling up existing work.
- + The amount of current fire salvage work available can attract workers who may stay on with local companies to do mitigation work, as well.
- + Existing and emerging workforce development programs can increase the capacity of vendors and potentially expand the pool of available vendors to include others that may not have a large presence currently in the supply chain such as Tribal entities or to include others that have transferrable skills, for example, landscape contractors. Existing programs include Shasta College’s Heavy Equipment Logging Operations and Maintenance certification, Columbia College’s Forestry and Conservation On-the-Job Training, the Sierra Institute for Community & Environment’s Plumas Conservation and Restoration in

Watersheds (P-CREW) program, and the Inter-Tribal Council of California's Intertribal Stewardship Workforce Initiative (ISWI).

### **Work Restrictions/Delays**

Dangerous weather and/or high fire risk conditions can limit the type and amount of work that can be safely conducted on a given day or time period (i.e., "red flag" days). This can be especially impactful to projects conducted on federal lands, where land managing agencies use ignition avoidance protocols such as Project Activity Levels, or PAL, to determine whether work is allowed and, if so, what kind of work can be conducted on any given day. Work restrictions create financial hardship for vendors, who either pay workers for days they can't work or remove crews and equipment altogether, creating further project delays along with the potential for tens of thousands of dollars of additional project expense for having to remobilize crews and equipment. As a result of these and other difficulties, some forestry vendors have either left the state or are choosing only to bid on work in less extreme, usually lower-elevation project areas, leaving landscape-scale headwaters projects short of vendors to do the necessary work.

#### *Opportunities:*

Agencies and forestry vendors are working together to identify potential mitigations that could reduce the number of restricted work days in a season. In addition, as current forestry vendors in the region complete the fire salvage work from recent megafires (Dixie, Caldor, Mosquito), and new forestry and fire personnel come onboard, there will be more opportunity to mitigate risk to allow this critical work to go forward.

- + Work with landowners, project proponents, and funding agencies to fund standby fire crews, dedicated firefighting equipment, better remote communications systems, and other project- and location-specific mitigations to decrease the risk of fire ignitions and increase the speed of communications, all of which can help reduce the need for work restrictions.
- + Work with contracted vendors to manage location/timing of activities in the field to leverage fire ignition mitigation strategies, such as scheduling higher-risk activities (mechanical treatments, hot saws, etc.) during times of the season that are less likely to experience red flag conditions, grouping higher-risk activities being conducted by different vendors to enable the sharing of firefighting equipment, etc.
- + Increase the forestry worker pool by supporting more training programs and creating necessary incentives, such as more equitable pay, benefits, and affordable housing in communities near where forest treatment projects occur. An example of this is the co-development of employee housing alongside wood infrastructure at the Alpenglow Timber sawmill under development in eastern Nevada County. The facility's biomass-fired boiler system is planned to supply thermal energy to the dry-kilns as well as to the commercial buildings and on-site employee housing. This innovative approach avoids the use of fossil fuels (in this case, propane) for space heating and is intended to enable the facility owner to address a primary challenge to attracting and retaining workforce –

affordable housing – in a community that is largely dominated by second home ownership and short-term rentals.

- + Create opportunities for year-round work to establish a stable and consistently available workforce. This could include staging on-the-ground work to follow seasonal weather fluctuations, meaning work in lower elevation areas could take place early and then again late in the field season when upper elevation areas are inaccessible due to snow and, conversely, lower elevations are at higher risk of fire ignitions. Non-urgent activities could be reserved for the off-season, including completion of workforce training/professional development or perhaps processing and transporting woody residual material that is stockpiled during the field season. While this would not completely resolve the issue of workforce being redirected toward wildfire suppression and recovery, it would perhaps encourage the development of a larger, more persistent and robust workforce.

### **Inefficient Use of Limited Resources**

Despite challenges, the region is benefitting from a substantial amount of forest treatment work. However, a lack of coordination among landowners/managers and across jurisdictions can lead to missed opportunities for more efficient use of limited resources. For example, utilities maintain vegetation to a limited right-of-way distance around their infrastructure. Additional fire prevention/mitigation benefits could result if utilities and other entities working in the same area could coordinate their efforts, adding larger-scale fuel breaks or other landscape-level treatments to the right-of-way clearing work.

#### *Opportunities:*

Better coordination among vegetation management/forest treatment projects could provide cost/time efficiencies, allowing for more work to get done over time. Ideas include:

- + Better communications and coordination between homeowner groups, utilities, cities and counties, Resource Conservation Districts, Fire Safe Councils, and state/federal land management and fire agencies to reduce redundancies that decrease available resources and, therefore, reduce the amount of material that needs to be removed and can be put to beneficial use.
- + When siting new or expanding existing biomass utilization facilities, work with surrounding communities to address concerns.
- + Support for development of new technologies to make biomass utilization more efficient so it can help to defray the cost of increasing the pace and scale of forest treatment work.
- + Focus on addressing one or two underlying challenges, such as financing or expanding the workforce, that can create a cascade effect in reducing the impact of other challenges.
- + Consider integrated approaches to biomass and wood infrastructure development that can help to overcome obstacles and/or maximize wood utilization. For example, historically speaking, most biomass facilities were profitable when they were attached to a sawmill. The biomass energy powers

the sawmill (as well as potentially supporting local communities in power outages) and provides heat to dry the lumber; then the biomass plant uses the mill's waste material, plus outside material, as feedstock – creating a closed circle. Associating a sawmill with a biomass facility can also help project proponents get through the lengthy Bioenergy Market Adjusting Tariff (BioMAT) process by providing accelerated opportunities to utilize wood. Another opportunity includes siting biomass-to-energy facilities alongside water treatment plants or pumping stations that have high energy demands and can utilize a portion of electricity generated “behind the meter.” This concept is being explored by a number of agencies, including PCWA, as part of the TCS Pilot Project, regarding co-locating a bioenergy facility at the agency's Ophir Road water pumping plant; Burney Bright Bioenergy facility and the Burney Water District in Lassen County, in relation to the District's water treatment plant; and Calaveras County Water District.

- + Leverage forest biomass removal as a means of achieving other costly policy or regulatory mandates, such as compliance with organic waste diversion requirements under [SB 1383](#) (Lara, 2016). SB 1383 reduces short-lived climate pollutants, such as methane, by reducing the amount of organic waste discarded in landfills. The legislation requires jurisdictions to take specific actions to reduce overall emissions, such as diverting landfill disposal of certain materials or procuring specific amounts of recycled organic waste products like mulch or compost. Biomass-derived electricity is another eligible product for procurement under this legislation. [Pioneer Community Energy](#), a community choice aggregator of electricity serving Placer and parts of El Dorado and Nevada counties, is working with smaller cities in the region to buy biomass and make it available to existing biomass energy facilities as a means of meeting SB 1383 procurement requirements.
- + Where appropriate and feasible in terms of conditions for regulatory compliance and community acceptance, support larger biomass facilities rather than multiple 3 MW plants. Larger facilities can accept greater volumes of excess biomass material, supporting more on-the-ground projects and vendors and accelerating the treatments needed to return our forests to a healthy state and protect our communities from the impacts of severe wildfire.
- + Provide opportunities for professional development and training to increase the base-level knowledge of forest management and biomass removal and boost the capacities of and foster consistency within and across local government and resource management agencies.

## Cost/Financing

### **High Cost of Material Disposal**

Transportation expenses are believed to comprise more than half of the total cost to harvest and remove excess forest material (Han et al., 2004). Close to two-thirds of survey participants identified transportation cost to haul excess biomass material to distant facilities as a primary obstacle. High tipping fees at disposal sites, fuel, labor, and other costs contribute to a

significant biomass stumpage deficit and to the difficulty of material disposal/utilization. As one respondent put it, “[w]e’re good at making biomass but not so good at disposing of it.”

More remote landscape-level projects on public land often pose the greatest difficulty because the work is conducted farther from transportation corridors and disposal/utilization facilities and often necessitates moving personnel, equipment, and material on federal or county road systems that are not designed for such loads. Historically, federal roads were maintained as part of timber harvest activity; but with less of that activity, and increasingly severe weather, there are more maintenance needs than financial support to meet them. As an example, Mosquito Ridge Road outside of Foresthill in Placer County was damaged from heavy use during the Mosquito Fire (September 2022). The road – the major ingress and egress route for a 28,000-acre forest health project around French Meadows Reservoir – remained closed for the remainder of the 2022 work season. The heavy winter of 2022-23 exacerbated the damage. The road was still closed a year later and remained so during the entire 2023 work season as well, meaning forest workers and others were forced to use sub-standard roads and/or enter and exit the project area using alternate routes, adding mileage and haul time to an already lengthy trip. Such conditions affected not only project cost but also the willingness of vendors to mobilize for the work season and/or bid on future work on that project.

Making matters worse, funding programs are often either unwilling to fund chipping and hauling or will lower the score on grant applications that include those expenses because the resulting per-acre treatment costs are deemed unreasonable and far beyond the unit costs in other competing applications. To keep total costs down, applicants may reduce the overall number of acres treated, which can also negatively affect grant application scoring.

Transportation subsidies, generally based on a flat rate per tonnage of material, are often touted as a solution to the high cost of hauling and, more important, the greater the distance a source is from a given facility. They can be useful in particularly critical situations, such as post-fire restoration activities, new facility start-ups, or hazard tree removal projects. But because there are so few facilities available to the TCS Region, and the ones that are operational are sometimes at capacity already and subject to inundation from wildfire salvage, it’s difficult to gauge the utility of long-term transportation subsidies [see [CAL FIRE white paper](#) on challenges of haul subsidies and places where it could be helpful if designed well]. Even in places where transportation subsidies are in use, the lack of in-region facilities means that projects are still forced to transport the material outside of their own region (over 100 miles one-way for one respondent), which provides no local utilization benefit.

At the community level, smaller jurisdictions’ biomass volumes and potential for revenue generation aren’t large enough to justify hauling material to more distant facilities. Their options are limited. While they may be successful in securing funding for fuel reduction activities, the material disposal is a real problem because there is too much to chip onsite but not enough to haul to a distant location. Furthermore, taking material to a local landfill isn’t a good use of the material nor of the landfill space.

And finally, biomass utilization facilities, themselves, typically do not engage in the material generation side of the equation, and with as much material as is available, they don’t have a major incentive to pay more in recognition of the additional societal benefits excess biomass

removal and use can generate and are often constrained by the slim margins of their electricity sales pricing. Also, in areas outside of California, delivered biomass is often paid for by the green ton, as opposed to the bone dry ton, which tends to yield prices approaching double that of the California market.

*Opportunities:*

Transportation costs can create a major hurdle for proponents of forest resilience and wildfire risk reduction projects; but survey respondents and others have offered many ideas for how to begin addressing this issue, including:

- + Explore the possibility of public subsidies for biomass removal and transport where an appropriate treatment, recognizing their critical, yet intangible, statewide non-market benefits.
- + Encourage agencies/funders like CAL FIRE and Wildlife Conservation Board (WCB) that do cover chip/haul costs to work with their sister funding agencies to help them recognize that these work items are eligible costs and, while expensive, are necessary to achieve local, state, and federal forest treatment goals.
- + Consider expanding funding opportunities that just cover hauling costs and structuring haul subsidies to be variable-rate based on two-way mileage (or time), not tonnage. This would support remote projects in that they would not be forced to compete on a cost-per-acre basis that is unfairly skewed to projects nearer existing facilities. CAL FIRE solicited competitive grant applications for its Biomass Transportation Subsidy program in 2023, however, this program is highly oversubscribed given the need. In the Q1 2023 round, CAL FIRE awarded only \$5 million despite a total funding request of nearly \$38 million.
- + Aggregate material by geography by creating centralized mid-elevation sort/processing yards or landings closer to remote projects to allow for centralized material delivery from multiple projects in the vicinity – both community and landscape-level – plus offer onsite processing to further densify material (through drying and chipping) so the hauled material weighs less for purposes of transport/sale. Yards would also provide the opportunity to coordinate the transport of processed/dried material to offsite stationary facilities located further from the source of material, which may otherwise not be practical for entities who do not generate large volumes of material (e.g., cities or private non-industrial forest landowners).
- + Consider more distributed biomass utilization sites (microgrid use, etc.) to address transportation and utilization issues. At this time, distributed biomass utilization is more of a concept that needs proving vs. something that is currently working well.
- + Measure biomass utilization costs against the high cost of other disposal methods – such as tipping fees at landfills. For example, funding from the passage of [Measure T](#) in the eastern portions of Nevada and Placer counties, as well as other state and federal funding programs, is supporting removal of more biomass material at the same time as tipping fees for current disposal at landfills are increasing. The Town of Truckee was paying more than \$1 million/year for

green waste disposal. Those costs are infeasible over the long term, so the Town is looking at biomass utilization as an alternative to landfill.

- + Encourage projects closer to towns that have good access to transportation corridors for hauling.
- + Try to incorporate different processing stages together on the same site to reduce hauling. For example, much of the biomass material generated by the Town of Truckee is removed initially to the Eastern Regional Landfill for processing and then chips are hauled to Honey Lake or Rio Bravo biomass facilities for use as feedstock for energy generation.
- + Increase the kinds of activities that are working well, such as Nevada County's Fire Safe Council green waste<sup>2</sup> programs, that focus on helping individual homeowners remove non-commercial biomass, county chipping and green waste programs, and the USFS projects to thin and make forests more resilient. More funding, more programs, more outreach to increase utilization would create more opportunity.
- + Increase use of incentives, especially to induce the removal of material from less accessible areas (poor roads, steep ground) that are typically not cost-competitive in terms of competitive grant funding, resulting in a greater number of acres treated than otherwise possible. This could include subsidies for the use of cables, skylines, landing decks, etc., to accommodate rougher conditions in the higher-elevation, more remote areas.
- + Advocate for the re-establishment of a federal transportation subsidy program or broaden the use of existing programs for fire salvage to include fire mitigation work. From 2008 to 2018, the Biomass Crop Assistance Program (BCAP) directed federal funds to facilities to support utilization of forest residues for bioenergy generation and to assist forest landowners and operators with forest management activities, storage, and transportation of biomass conversion facility-eligible material. According to respondents, BCAP funds often went from facilities to biomass brokers who still purchased and sold the material at its original pricing and retained the difference, resulting in the subsidy not reaching the target entities (haulers and forest businesses). Beginning in 2023, the Biomass Transportation Incentive Pilot (BTIP) began directing federal funds to select facilities as part of a test to explore subsidizing the haul of non-merchantable biomass from National Forest System lands to reduce wildfire risk. Both BCAP and BTIP, as well as Federal Emergency Management Agency (FEMA) wildfire recovery subsidies, have been/are based on the distance traveled per load of material and are intended to target the hauler. While helpful in overcoming cost deficits, transportation subsidies can be difficult to structure and administer and can be abused.
- + Continue prioritizing cultural and controlled burning and reintroducing fire to the landscape where appropriate to reduce the need for hauling. Tribes, Resource Conservation Districts (RCDs), California Deer Association, and the Great Basin Institute have been making progress on this front, often in partnership with state and federal agencies, such as the USFS, BLM, and others.

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<sup>2</sup> For the purpose of this study, there is no single definition of green waste. Depending on the respondent, green waste could include anything from pine needles to submerchantable timber.

- + Continue building a market to remove excess material and create value from it to induce additional direct and indirect social benefits.
- + More actively engage with existing biomass facilities to learn more about their needs as a means of creating more comprehensive solutions.

### **High Cost of Forest Treatment Project Work**

Agencies and entities attempting to remove excess biomass material face additional challenges around project funding. One of the most impactful issues is the lack of valuation of indirect, or co-benefits, of biomass removal as there was historically. Lack of such a policy keeps project proponents from being able to monetize the value of biomass removal on air quality, public health, habitat, recreation, and local economic sustainability, and doesn't allow that additional value stack to be added to generate a higher price at biomass facilities which, in turn, could help to offset the cost of removal and disposal of excess material.

Other elements affect funding for biomass removal projects. As mentioned above, there is an effort at the state level to require mechanical forest health/fuel reduction projects to pay prevailing wage for labor. While increasing pay rates might help to attract workforce, it is likely to double or triple the cost of doing this work going forward, thereby reducing the amount of forest treatment that can occur with currently available funding. There is already substantial competition from lower-cost out-of-state wood products for certain uses, which negatively affects local projects designed to improve forest and community sustainability. In addition, complicated and time-consuming grant application, reporting, procurement, contracting, invoicing, and other processes can take valuable time away from on-the-ground project management, especially in situations where the same person handles all of those tasks, as is often the case.

#### *Opportunities:*

The funding challenges can seem daunting; however, there is growing interest in and momentum toward addressing biomass removal and utilization funding and other issues. For example, state and federal government agencies are aware of the biomass utilization issue and are putting resources into local governments, communities, and groups to accelerate market development. Both theoretical and practical ideas include:

- + Build better relationships with Tribes to include more Tribal engagement in project design and implementation, including contracting directly with Tribal entities to provide traditional ecological knowledge consulting and/or manage cultural burning on their own lands and with other land ownerships.
- + Adapt funding guidelines to allow longer-term funding agreements and vendor contracts to ensure project work can be completed in the face of extreme weather, high fire risk conditions, and vendor issues that can cause work delays.
- + Promulgate methodologies — such as, for example, the Reduced Emissions from Megafire (REM) protocol, a benefit valuation methodology approved by the Climate Action Reserve to quantify certain carbon and greenhouse gas (GHG) reduction benefits associated with forest fuel reduction treatments — to value the co-benefits/public good related to forest treatment and severe wildfire risk reduction work.

- + Consider a Forest Stewardship Council (FSC) certification process for woody material generated from local fire restoration or overstocked forests to show that purchasing the local product supports larger forest health goals, which, in turn, could create more of a “premium” market for the material.
- + Acknowledge that relying strictly on bottom-line economic rules to solve this problem will not work; economic-only price points do not account for the full range of benefits derived from improved forest health and fire risk reduction.
- + Increase technical support for smaller communities and organizations to help them apply for funding, seek business support, connect to collaborative partnerships in their area, and pool project work with larger entities within their regions.
- + Consider adapting funding programs to include low-interest loans for smaller jurisdictions, vendors, Tribes, and others looking to start forest treatment work.
- + Expand the authority for funding agencies to provide advance funds or lines of credit upfront to help get projects started, rather than making grantees carry the cost and get paid in arrears.
- + Work with government agencies that have a responsibility for public safety to help establish the framework and infrastructure needed to support forest health, improve wildfire safety, and break down the silos that isolate different parts of the supply chain.
- + Look to the [Sustainable Groundwater Management Act \(SGMA\)](#) as a model for how government intervention can bring key stakeholders to the table to alleviate certain challenges.

### **Unstable Material Quality/Quantity**

Biomass infrastructure of any sort requires heavy upfront investment, which is partially offset by the ability to create value-added products. Investment is driven by stability of feedstock supply at a steady price, so facility developers need to know they have a source(s) of appropriate-quality material coming from a predictable pipeline of ongoing forest health projects; they need to know there is a baseline amount of material stockpiled and available to balance out fluctuations caused by weather, fire, or other impacts; and they need to know the local, state, and federal agency plans for forest management and be assured of ongoing funding programs to support the work over time. Otherwise, project developers are asking investors to capitalize an activity they can't guarantee will continue.

#### *Opportunities:*

This is a case where all the tools in the toolbox are necessary. Part of the solution may be to focus more attention on processing excess biomass material onsite, rather than trying to move it elsewhere, such as by facilitating increased use of cultural and prescribed burning or mobile biomass utilization/onsite conversion technologies. In general, though, biomass energy processes the highest volume of excess material compared to other products. In terms of actual biomass markets and stationary facilities, opportunities could include:

- + More detailed regional assessments of forest health needs, forest treatment types, and usable feedstock that could be generated from such projects. For example, the OPR is working in partnership with Cal Poly San Luis Obispo and others to develop an integrated digital marketplace tool that assesses carbon intensity of feedstock mobilization, models the economics of biomass harvest and transportation, and helps to connect biomass generators' and buyers' private and non-commercial lands.
- + More research to identify what species of vegetation grows where, and what local products or utilization markets need or could be created based on the type of material adjacent to each community.
- + More detailed assessments of forest health funding programs and estimated volume of excess material likely to be generated from projects funded by those programs, and increased advocacy for program stability and longevity to allow for more accurate estimations of future feedstock availability.
- + Longer-term contracts for greater stability. Private sector entities suggest minimum 5- to 10-year contracts are needed to attract front-end investment. Biomass generators suggest price certainty could help them to improve project plannings.
- + Lower-elevation material aggregation/staging sites where material can be delivered and stored for future distribution to contracted off-taker facilities as needed.

### **Costly Infrastructure Facility Financing**

Whether large and stationary or compact and mobile, biomass processing equipment and facilities are costly. A 1–2 MW biomass energy facility in the planning stages in eastern Placer County, for example, is estimated to cost \$20–25 million to construct, plus operating expenses over time; a mobile air curtain burner unit can cost upwards of \$30 million, depending on technology, for manufacturing, transportation, and onsite operational costs. Project proponents have identified the lack of access to capital and upfront funding to help with the initial capital outlay, as well as the inability to spread initial operational costs over time, as serious obstacles to moving projects forward. The inability of project proponents to secure the debt and/or equity investment necessary for facility finance due to the lack of sufficient feedstock supply contracts has been documented by the Joint Institute for Wood Products Innovation in the [Advancing Collaborative Actions on Forest Biofuels in California](#) report (Sanchez and Gilani, 2022).

Additional tariff issues make the use of biomass for electricity generation more costly than other sources of energy and, therefore, less appealing to utilities for purposes of power purchase agreements to buy the energy. Landowner procurement/contracting policies — such as year-to-year contracts between counties and waste disposal providers — that discourage long-term operational contracting make it difficult for facilities to provide the certainty needed to start up or expand. Furthermore, the number of factors outside the control of facility operators, particularly around feedstock supply volume certainty and pricing, make it hard to attract early investment needed to launch or expand a facility.

*Opportunities:*

Luckily, there is still great interest in biomass utilization — of all types — as a means of supporting increased pace and scale of forest treatment. There are many pilots and ideas under evaluation in the TCS Region; it is promising, and, as a result, the region is attracting people with ideas, such as Blue Forest and the concept of forest resilience bonds and other conservation finance tools to assess benefit and generate private investment to support biomass utilization and other mitigation projects and facilities. It should be noted that innovative conservation finance tools do not, however, negate the lender/investor requirements for long-term biomass supply contracts.

- + The part of the supply chain that generates biomass seems to be working in terms of increased activity resulting in excess material (both large-scale forestry and smaller-scale land management activity).
- + Consider the establishment of a low-cost regional revolving loan fund to provide support for facility finance or heavy equipment. The Rural County Representatives of California’s Biomass Utilization Fund (BUF) is one such fund which has been successfully deployed in Tuolumne County to support development of biomass infrastructure. Similarly, the California Infrastructure Bank Climate Catalyst Fund (CCF) was launched in early 2022 and is now preparing to issue its first loans.

Perceptions

**Negative Public Perception of Biomass**

Although biomass is a carbon-neutral source of energy, it has its detractors. Due to a lack of education and outreach to provide information on the true benefits/impacts of newer facilities, it is easy for people to be concerned about an industrial facility in their midst. Others worry that having a new facility will lead to cutting trees simply to “feed the beast,” rather than understanding that biomass utilization provides an outlet for material that would still be removed for forest health purposes, even if there is no outlet for using that material. Public perception of biomass facilities can also be based on the historic siting of large biomass energy facilities, some of which experienced repeated regulatory compliance issues, in disadvantaged and under-resourced communities in California’s Central Valley. Or, people may be generally supportive of work that reduces fire risk, but they are unfamiliar with what it takes to remove material to reduce fuel loading.

*Opportunities:*

Without nearby, contemporary “right-sized” facilities to illustrate the true costs and benefits, it can be difficult for facility developers to overcome initial opposition. But a growing number of forested communities in the region have interest, material, and community/political will to leverage biomass utilization as a means of increasing pace and scale of forest treatment. Ideas that could help achieve biomass utilization goals include:

- + Work to site pilot projects in communities with the interest and community/political will.

- + Continue researching and piloting ways to safely use excess biomass material that don't require large, stationary facilities, for example, a company in Sonoma that uses woodchips inoculated with mushrooms as mulch because the mushrooms reduce fire risk.
- + Consult with [Utility Arborist Association \(UAA\)](#) on messaging and effective outreach tools; UAA is the primary industry association for collaboration, benchmarking, and information-sharing between utilities and others interested in forest health and vegetation management around the US and Canada.
- + Work with elected officials, agencies, and entities to mount a public education campaign that puts biomass utilization in the context of larger forest health and wildfire risk reduction goals and illustrates the benefits of safe disposal of local material. See, for example, the California Milk Advisory Board's "Great cheese comes from happy cows, happy cows come from California; Real California Cheese" campaign. Such a buy-local campaign can highlight the important long-term benefits of choosing a locally made product over a non-local product and encourage hazard fuel reduction including homeowner defensible space.
- + Work with agency personnel responsible for fuel reduction activities to ensure common understanding and consistency in communications around removal and utilization of excess biomass.
- + Educate people about the benefits of advanced air emissions control technologies like ceramic filtration that significantly reduce particulate matter (PM) and nitrogen oxide (NO<sub>x</sub>) emissions.
- + Continue educating decision-makers on the non-market benefits of biomass utilization as a tool to help meet commitments for increasing pace and scale of forest treatment.
- + Use the development of the PCWA facility to test different community engagement strategies and address community acceptance issues in the PCWA facility case study.

## **BIOMASS AGGREGATION HUB CONSIDERATIONS**

In addition to overall biomass utilization challenges and opportunities, the Study Team sought input on different aspects of a potential aggregation hub entity that could connect biomass generators with those who need such material as feedstock, help support and manage long-term contracting for material, and possibly provide other services. The following section provides background on the most common entity type, JPAs, which are being studied in more detail in a separate evaluation of possible models, titled *Legal Tools for Government Entities to Incentivize Utilization of Forest Biomass in California* (CLERE Inc., 2024). The study offers input that could inform development of a hub and the suite of services it could provide to help overcome issues and challenges identified above.

### Review of Joint Powers Authorities

The TCS Pilot Project is charged with evaluating institutional arrangements (aka public entities) that have the legal and financial capacities on a local level to aggregate woody biomass across private and public lands, and that can act as a broker for long-term feedstock contracts. This research is compiled in the more detailed companion report, *Legal Tools for Government Entities to Incentivize Utilization of Forest Biomass in California*. In addition, Landmark Environmental, Inc. assessed the potential role of water

agencies within the region as it relates to forest health and feedstock availability in another companion report titled, *Water Agency Role in Forest Health Report* (Landmark Environmental, Inc., 2023). The study found that water agencies play a key role and have demonstrated justification in initiating, implementing, and maintaining forest health and wildfire resiliency of their jurisdictions and associated watersheds. It was determined that the agencies maintain broad implied authorities and contracting powers, meaning they can fund fuel reduction activities on private and public lands, direct biomass disposal, and support biomass utilization projects, although the direct sale of electricity is limited for some agencies. All the agencies contacted as part of the study make funds available annually to sustain a base level of forest health and fuels reduction work, resulting in the reliable generation of excess biomass material. Biomass removal to improve resilience against wildfire is the preferred method of disposal for all the agencies, with over half of them actively investigating or playing a role in developing biomass utilization projects. Finally, the study found that all agencies would be willing to participate in a long-term biomass contract, although some acknowledged planning for an increase in pace and scale requires the resolution of additional challenges associated with biomass.

CLERE Inc., who serves as a consultant on the Study Team, has taken the other companion reports into consideration in its evaluation of possible model entities that could manage and administer biomass feedstock contracts between those who generate biomass (sellers) and those who utilize it (buyers). The model entity ultimately supported by the TCS Region's stakeholders may or may not include one or more water agencies. CLERE Inc.'s report investigates the potential exercising of a Joint Powers Authority (JPA) or a Joint Powers Agreement, both of which are voluntary collaborations between public agencies that define mutually held powers to handle a common or complex issue, for example groundwater management or transportation planning. JPAs are being considered for the TCS Pilot Project because they help to disseminate business risk from the participating local government agencies to an independent entity. JPAs are quite flexible; they can allow for agencies to work in one another's jurisdictions and share resources and can also provide services or manage energy procurement. JPAs are limited by the authority of their least powerful member.

CLERE Inc.'s paper considers the utility of a JPA arrangement, examines relevant JPA examples, and discusses how such a public entity could aggregate multiple biomass supply feedstock contracts of varying volumes and terms which would position it to offer 10-year sales contracts to end-users, or supply contract indemnification insurance products that could protect parties from price variability. Long-term contracts would, thereby, improve both biomass sellers' and buyers' respective abilities to overcome one of the most significant biomass infrastructure developmental hurdles, namely meeting lender and investor requirements to secure project finance including that for infrastructure projects. Unknown to some, there is a continued disconnect between lender and investor fuel supply contract requirements and what is possible to achieve in the current market. The report also briefly discusses other types of services or tools that the biomass aggregation hub could provide to its members, such as environmental review for National Environmental Policy Act (NEPA) and/or California Environmental Quality Act (CEQA) compliance, business support services (e.g., development of business or marketing plans, legal counsel, financial services, software support), equipment leasing, and owning of infrastructure (e.g., biomass conversion infrastructure, sort or processing yards), to improve regional capacity for forest restoration and biomass removal and utilization.

The model entity options reviewed in the CLERE Inc. report include:

- + A Watershed Authority JPA comprised of counties, water agencies, and some cities.

- + A JPA comprised of one or more of the following entities: the Coastal Conservancy, SNC and California Tahoe Conservancy, counties, cities, and special districts, or, in the alternative, an amended existing Joint Powers Agreement (no entity creation) between the conservancies to include additional members in order to facilitate biomass aggregation, sale, and utilization.
- + A JPA comprised of cities and counties (no state agency members).
- + A Wildfire Prevention Authority JPA that would include one or more counties and their special districts.

This Community Collaboration Report did not investigate stakeholder input on the specific model entity options listed above because at the time the structured list of interview questions was prepared and individual interviews were initiated, the model options had not yet been fully developed. This said, the Study Team did seek stakeholder input, through the interviews, on the level of interest in participating in the creation of a biomass aggregation hub and in exercising a contract with a hub. The Study Team also sought feedback on the type of biomass aggregation hub that respondents believed could be most beneficial to overcoming stakeholders' current biomass challenges and the types of services that a theoretical biomass aggregation hub could provide to its members and others in the TCS Region, as described below.

#### Regional Support for an Aggregation Hub

Results from the Study Team's interviews confirmed stakeholder enthusiasm and need for a biomass aggregation hub. Across all interviews, the common barriers associated with removing excess biomass from forests and putting it to beneficial use were universally recognized, regardless of the respondent's entity type or where their entity was positioned within the biomass supply chain. Respondents expressed strong interest in participating in some way in the creation of a biomass aggregation hub, with more than half stating they were "extremely interested" in helping to create the hub and another third stating they were "somewhat interested." Only two of the respondents stated they were "not very interested" in participating in the establishment of a body, which is due to their respective entity's legal constraints pertaining to taxation authority, and to a limited focus on providing emergency services, which does not include forest health or hazardous fuels reduction activities.

Multiple state agencies, counties, cities, FSCs, RCDs, and existing facilities, as well as a special district, an investor-owned utility, and a tribe, were among those who responded that they were strongly interested in helping to establish the hub. While respondents were not asked to specify how exactly they would "participate (sic) in some way in the creation" of a hub, it is easy to envision the various means by which an entity could engage, ranging from membership with full voting authorities, to serving as an Ex Officio member with limited (or no) voting rights, to serving in an advisory role with no voting rights.

Along with strong interest in the creation of a hub, a clear sense of urgency was expressed by many. Stakeholders within the TCS Region were pressing hard to address excess fuel loads in forested areas, including both headwaters areas, as well as in and around communities, to mitigate the risk of high severity fire and protect life, property, critical infrastructure, and natural resources of local, regional, and statewide significance. The TCS Region has experienced multiple large-scale wildfires which have left local governments, communities, and others scrambling for predictable and economically feasible pathways to dispose of the material generated by wildfire mitigation and recovery efforts. Such diverse

interest throughout the biomass supply chain and across the geographic expanse of the TCS Region indicates demand for a hub and the promise of benefits it can yield.

Well over half of the respondents affirmed their interested in being open to being party to a long-term biomass contract with a theoretical biomass aggregation, while the remainder stated they would “maybe” be interested, depending on the specifics of the contract and process. While no respondents answered that they would not consider entering into a long-term biomass contract, one respondent did state that their agency is often in a supporting role when it comes to biomass generation and removal, and that other agencies within their county would be better suited to entering into a contract. Several mentioned the need for a feedstock contract to be economically attractive or, at the very least, not a worse offering than the current contract terms they encounter.

Interestingly, both National Forests interviewed for this study stated openness to be party to a long-term supply contract with a biomass aggregation hub, underscoring the need for innovative mechanisms to remove excess forest residuals from federal lands. Typically, it is not possible for the USFS to execute long-term supply contracts due to the inability of federal agencies to act beyond the current budget as approved by Congress; however, there has been at least one instance in the past where the agency did enter long-term contracts which guaranteed volumes of material. The Tongass National Forest entered into 50-year supply agreements for low-cost wood with a series of pulp mills in the early 1950s to help stand the facilities up and spur job creation. These contracts were eventually canceled in part due to the diversion of material to sawmill operations and to aggressive harvesting practices, including that of old-growth timber, associated with the contracts. However, even if the National Forests within the TCS Region could not directly enter into 10-year supply agreements with the biomass aggregation hub, it is conceivable that their partners could by using existing types of agreements, such as the Good Neighbor Authority (GNA), in the case of state and county agencies and Tribes, and through the use of Master Stewardship Agreements (MSAs) and Supplemental Project Agreements (SPAs) for those and other types of partners, that are insured with help from the aggregation hub.

The contract risk associated with potentially not being able to supply biomass to a given facility could be backstopped by the aggregation hub through the voluntary use of a transparent indemnification clause that would be associated with an insurance product to mitigate the risk of feedstock fluctuations. This insurance product could also be used to protect against the risk of the receiving facility not accepting the material it is under contract to buy. The aggregation hub could possibly provide this indemnification insurance product itself or connect biomass suppliers and buyers with an entity who could. Regardless of who is providing the insurance product, the aggregation hub could facilitate the guarantee of long-term contracts for the removal and utilization of biomass which, in turn, could reduce current costs associated with contract risk and enhance market stability.

#### Feedback on the Hypothetical Entity Model

Given keen stakeholder interest in participating in the creation of and contracting with a possible biomass aggregation hub, the Study Team, together with stakeholders, could explore the pros and cons of the theoretical model types, collaboratively select one to further research and pursue, including assessing its support services, funding mechanisms, governance structure, insurance and staffing needs, and anticipated budget, and, ultimately, institute the model. As described above, a separate effort is underway by other members of the Study Team to first determine whether a JPA model is conducive to forest feedstock aggregation in this region; second, if a JPA is found to be conducive, to decide what

specific model entity best suits the regional interests, capacities, and needs; and third, evaluate the finances and governance of the preferred JPA model management.

Input from this Community Collaboration Report indicate that:

- + A public or public/private partnership that could fund public infrastructure, such as a biomass utilization campus, sort yard, or biomass conversion or utilization facility, and enter into contracts with feedstock suppliers and end-users using a fixed rate with a collar pricing mechanism was the favored option among respondents.
- + Within this model, the public partner/entity member was viewed as potentially providing transparent decision making; the capacity to easily utilize and responsibly administer public funds (e.g., subsidies or taxation authority) which could help to kickstart entity operations and/or establish wood or biomass infrastructure; important accounting for the non-market benefits provided by biomass removal and utilization; and price stability through the voluntary use of a fixed-rate biomass pricing mechanism. The public partner would not need to generate a profit in the same way that a private entity typically would, thus allowing for the public partner to more easily broker a low-value commodity like biomass. The public partner was viewed as necessary to establishing a hub, then “get (sic) out of the way” of the private partner as one respondent put it.
- + The private partner’s role was perceived as key to leading biomass conversion technology development and deployment, as well as securing secondary wood products potentially to include carbon credits or other commodities that could help to further offset forest management and biomass transportation costs. The private partner was also believed to generally function in a more nimble and responsive manner than a public partner/member could.
- + There was openness to either amending the scope of services an existing entity, such as a state conservancy, standing JPA, or even [Golden State Natural Resources](#) (GSNR; a non-profit, 501(c)3, forest resiliency entity created by rural counties and governed by local elected leaders to reduce excess biomass in California’s forested lands), to take on the functions of the aggregation hub, or creating an entirely new entity. A potential advantage with the former is that the existing entity would be expected to have previously established relationships and trust with both public and private partners that could catalyze biomass contracting. In addition, using an existing entity would minimize the bureaucratic burden of creating another entity. If an existing entity were to take on the function of the aggregation hub, it is possible that it could dedicate staff and resources and, in the case of SNC, that the hub could be integrated into the state’s Regional Resource Hub concept that is intended to help regional partners plan, prioritize, and monitor projects. Regardless of whether a new or existing entity is regionally supported and pursued, innovative legal relationships are likely to be needed to spread the burden of the feedstock contract risk.
- + Some respondents felt it was important for the aggregation hub staff to have in-depth knowledge of how material flows through the biomass supply chain, to be skilled at pursuing opportunities as they become available, and to be able to leverage partnerships. As one respondent put it, the hub is the “glue” that brings together biomass generators and end-users; the staff must be able to connect the dots between the sellers and buyers in the region in order for the aggregation hub to be successful. It is imperative that the hub set well-defined goals and target objectives within a specified time frame and clear reporting requirements, in terms of the annual tons of excess biomass removed and production of biomass-based commodities, among possible other metrics. Reporting is necessary for the members and funders to evaluate if the

model entity is effectively facilitating increased removal of excess biomass residuals and improved development of additional biomass utilization pathways. As part of reporting, the entity could establish a process for adjusting operations to improve its ability to achieve the program goals and objectives.

On the whole, respondents conveyed less concern with the actual type of entity structure and more concern that the entity, regardless of its structure, had the ability to quickly and flexibly incentive forest management and biomass removal and utilization in an economically sustainable manner, that it is able to guarantee fuel contracts (e.g., through indemnification terms and insurance products) supporting the reliable flow of material at a predictable price, and that it can work with the various entities operating in the region.

### Potential Support Services Offered

The biomass aggregation hub's primary focus will be to administer the consistent flow of biomass between suppliers and buyers. In addition to providing this chief contracting function, a hub could offer other support services aimed at addressing additional biomass challenges. Such support services can reduce risk to biomass generators and end-users, and better equip those in the supply chain with the resources they need to be able to offer long-term contracts for utilization outcomes. This is an important ancillary function, since without adequate organizational capacity in the TCS Region to conduct ecological forest health projects, a biomass aggregation hub and its long-term contracts are not particularly helpful.

Most prefer the aggregation hub to be hyper-focused on biomass contracting at the outset and only consider a broader scope of services once the contracting piece is being effectively managed. Biomass contracts will be a considerable amount of work to start-up and maintain over time, and are expected to include contract negotiation, management of a voluntary, semi-public feedstock pricing mechanism available for the seller's and buyer's use, offering of contract indemnification insurance to reduce risk to both parties to the contract, and ongoing management of the seller-buyer relationships.

It is conceivable that the biomass aggregation hub members could expand the scope of services the entity offers over time, as funding and staffing allow and/or the hub could leverage its partnerships with other existing partners/entities in the region to contract out some of the additional services.

A range of possible services are listed below, with the first five listed in order of priority based on survey responses. The remaining potential services were discussed but not frequently cited by most respondents as priorities when it came to the ongoing, day-to-day activities for the hub:

#### Priority Ideas:

1. Green waste management was cited as the highest priority service by respondents, and included the harvesting, sorting, processing, drying/densifying, transporting, and in some cases, redistribution of material. Material flow and quality control can be expensive and complex to manage which pose a challenge for biomass generators and end-users alike. Material management is likely to become increasingly important as more forest health projects and newer facilities with varied technologies, and in some cases, tight fuel specifications come online. The aggregation hub could support green waste management through contracts as well

as through operation of one or more distributed storage yards, that accept material from multiple projects, and sort and process it for on-site conversion and/or offhaul to other end-users. The latter could relieve biomass generators of a significant burden and improve efficiencies in the supply chain while at the same time possibly reducing a project proponent's carbon footprint associated with transportation emissions. This service could also support improved removal and use of materials generated by those who typically produce small volumes that would otherwise not be substantial enough for processing and offhaul (e.g., smaller cities, fire districts, and private, non-industrial landowners).

2. Environmental permitting and review is often a limiting factor for on-the-ground work and can be complex, expensive, and time consuming. The hub could provide environmental planning, namely NEPA and CEQA compliance, for hub members and stakeholders to ease this responsibility. Additional concepts presented by stakeholders include facilitating aggregated environmental review across multiple regulatory agencies to streamline the permitting process for on-the-ground work plus facility development, reducing permitting requirements to more quickly establish wood and biomass utilization infrastructure to create additional available outlets more quickly than otherwise possible, and expanding CEQA Exemptions and providing for legal support if projects are forced into litigation under CEQA.
3. Grant pursuit and administration services could bolster the capacity of smaller communities and the organizations and agencies operating within by alleviating them of this time-consuming and expensive pursuit. The hub could potentially bundle projects together to lessen competition among stakeholders and instead formulate larger-scale restoration projects which may be attractive to funders. The hub could possibly secure grant funding for transportation subsidies or manage cost-share incentives, then administer them to biomass generators as part of biomass contracts to relieve individual project managers of the added complexity.
4. Workforce development and training continue to be an unmet need despite considerable state investment. This is expected to become an even greater issue if forest management activities ramp up as needed to meet local, state, and federal forest treatment goals and commitments. The lack of trained truck drivers, often relating to lack of a living wage and exorbitant insurance costs, and available vendors are persistent and major issues, which have prevented the removal of material from projects where there was funding secured to do so. Identifying the certifying agencies for those conducting prescribed burning continues to be an administrative barrier to the USFS's use of partners to assist with burning.
5. Business support services can help to build the capacity of entities operating in the forest sector and can vary widely depending on the entity seeking assistance. Services mentioned during stakeholder interviews included: 1.) consulting Contracting Officer Representatives (CORs) and grant and agreement specialist support to the USFS to overcome staffing constraints; 2.) real estate/land leasing expertise to facilitate the use of public lands for sorting/processing yards and mobile infrastructure; 3.) infrastructure development assistance for technologies other than bioenergy including siting of facilities, identifying the optimal technologies and scale; and 4.) consulting forestry professionals and contractors to facilitate project planning and implementation.

#### Additional Ideas:

- + Equipment leasing could improve small businesses' market entry to in-woods work, such as for those who may otherwise be unable to purchase heavy equipment that meets air emission regulations. Equipment leasing could also support deployment of specialized pieces of

equipment, for example, tracked dumpsters that enhance the ability of those performing forest work to remove material where it may not otherwise be possible. Material handling capabilities at existing facilities could benefit from the availability of leased equipment, such as a log loader that would allow handling of material that cannot otherwise be chipped in-woods.

- + Insurance products that provide indemnification and limit liability for material generators, haulers, and end-users, and liability insurance for USFS partners facilitating prescribed burning on National Forest System lands are needed to reduce business risk and facilitate in-forest work. Homeowners insurance, especially in those communities with a luxury transient economy (e.g., recreation-based), of which there are several in the TCS Region, was also cited as an important consideration.
- + Mapping/software associated with biomass removal and utilization that optimizes material flow and operational efficiencies across multiple projects/sites and provides a “cradle to grave” cost calculator that forest landowners/businesses can utilize to compare different means of disposal (offhaul to landfill vs. offhaul to biomass conversion facility vs. onsite burning). This mapping/software could utilize remote sensing/LiDAR data to generate estimates of biomass generation, help suppliers to connect with forestry professionals necessary to implement forest management activities, and provide “match making” services between biomass suppliers and buyers.
- + Contracting with Tribes to facilitate sharing of indigenous knowledge of an area and its biology, cultural importance, and history. Contracting with Tribal experts and improving Tribes’ access to project sites could strengthen Tribal engagement and participation for the good of the TCS Region and as prioritized by some state agencies, may help to lay the foundation for more meaningful Tribal relationships over time.
- + Offering improved access to capital through an advance line of credit that can help stakeholders to overcome cash flow issues related to the lag times associated with grant reimbursement and/or through a low interest loan program for those entities who perform work in-woods.

## **5. FINAL CONSIDERATIONS FOR FORMATION OF A BIOMASS AGGREGATION HUB**

The Study Team’s review of the existing documents specific to the TCS Region, stakeholder outreach and engagement, and interview responses suggest that establishment of a biomass aggregation hub is of strong interest and well supported, can help to meet immediate biomass disposal needs, and is worthy of focused exploration.

The TCS Region maintains high human, organizational, and financial capacities compared with other forested regions in the state, with existing entities already undertaking some of the suggested opportunities to increase biomass conversion capacity. Other ideas are still in the concept phase, and are perhaps more or less feasible when compared against each other and in the broader context of the state’s forest management and wood market goals. Below is an attempt to coalesce the mass of data and ideas collected to provide a set of final considerations that relate specifically to the establishment of a new biomass aggregation entity in the TCS Region.

### **CORE WORK**

The Study Team’s principal take-away from this research effort is that an aggregation hub could support both the continued operation of existing facilities and the development of new biomass infrastructure

outlets by focusing on the main function of managing and administering guaranteed long-term biomass contracts.

A hub could function as a biomass broker, negotiating and managing long-term contracts between both suppliers and buyers. In this case, the hub would be entirely reliant upon third parties to perform the work associated with generating, processing, transporting, and utilizing the material and would likely have greater contract insurance needs than if the hub were in full control of the biomass residues. Alternatively, the hub could take actual ownership of biomass material as part of its contract management and administration. This could maximize its control of the material, including where it is sourced from and who it is supplied to, and potentially offer an opportunity for profit-making that would likely be unavailable as broker. Material ownership would be expected to introduce additional risks to the hub related to the cost and liability of securing, storing, and distributing the material.

Whether the hub is biomass broker, owner, or some combination of the two, the entity must also offer the voluntary use of an indemnification insurance product that protects parties from price variability and changes in biomass supply that could affect the contracted volume of material. Without this insurance product, long-term biomass contracts are simply too risky and not viable for biomass generators or end-users. In addition to indemnification insurance, the hub itself could provide (or facilitate connecting forest sector businesses to those who provide) additional types of superior insurance that de-risk the market and ensure feedstock supply chain logistics for locally generated material. This could include: liability insurance for truck drivers or for forest sector contractors who risk accidental fire ignition; loggers broad form insurance to protect forest sector contractors against inadvertent damage to timberlands; business interruption insurance to cover the loss of income during a covered loss that necessitates a temporary business shut down; crop insurance to protect forest landowners against unexpected timberland losses; and/or, homeowners insurance that considers discounts for vegetation management.

## **GEOGRAPHIC FOCUS & MEMBERSHIP**

The Study Team resoundingly heard that the hub should keep a narrow focus at the start, which is reflected in the Core Work described above. Beyond the hub's scope of work, the TCS Pilot Project must review its geographic focus. The TCS Pilot Project geography consists of a three-county area, namely Placer, Nevada, and El Dorado Counties. As the project has progressed, PCWA has maintained that the possible aggregation hub's geographic extent should be considered broadly and could be refined based on stakeholder interests and needs, including that of likely hub members, over the course of the Study Team's research.

CLERE Inc.'s evaluation of potential model hub entities indicates that the exercising of a JPA could help to address the complicated issue of biomass removal and utilization and shift related risk away from the individual participating members to the JPA itself. JPAs are often made up of city and county partners, but can also include specific types of special districts (e.g., fire, water, and resource conservation districts to name a few) and state agencies. With legislative approval, it is also possible for non-profit organizations to serve as members of a JPA (CLERE Inc., 2024).

Government and non-governmental organizations interviewed as part of this report were interested in participating in the creation of an aggregation hub; however, additional outreach is needed to explore hub formation and membership commitments more fully. Given the high capacity at the county and, in

some cases, city levels within the TCS Region, and the fact that many local government entities are already working in the forest health space with a focus on community wildfire protection, the most expedient and practicable path forward is to engage with individual local governments to determine their specific interest and potential role in participating in a hub. Local governments in the TCS Region have varying degrees of forest management activity, biomass disposal needs, financial and staffing capacities, in some cases regulatory constraints, and, perhaps most importantly, levels of political support and social acceptance. As a result, establishing a hub on a more localized basis (e.g., a single county) may be a simpler approach to initial biomass aggregation and provide a higher chance of success than if the hub were to focus on the entire TCS Region from the inception. Caution should be used when contemplating pursuit of such a geographically focused entity, however, since it could produce some drawbacks, particularly when considering the possibility of pooled insurance products offered by the JPA to reduce business risk.

## **SUPPORT SERVICES**

Put plainly: biomass is complex. No single solution, including guaranteed long-term biomass contracts, will solve the numerous challenges faced by those attempting to stand up an expanded, sustainable wood utilization market to support forest health and community wildfire resilience. For this reason, it is important to consider third party services that could benefit those operating in the biomass supply chain. The hub itself could maintain staff to perform these services, and/or it could contract with existing businesses, special districts, or non-profit organizations to fulfill its mission, which may enable the JPA greater operational flexibility. The hub could also function to connect its members and stakeholders with partner entities in the region who are already performing some of the desired support services.

A broad spectrum of third-party services were identified as part of this study. Some appear to have a stronger nexus to an aggregation hub than others. Services that seem reasonable for the hub or its contractors to provide could include:

- + Consolidated environmental review and permitting to increase procurement efficiencies across the hub's geography, potentially helping to complete planning for more large-scale fuel reduction and forest restoration efforts, and possibly also improving permitting efficiencies for emerging wood and biomass infrastructure facilities.
- + Coordinated grant pursuit and administration to increase funding directed to the region, decrease competition among applicants from within the region, make better use of stakeholders' precious financial and human resources, and provide the opportunity to formulate large-scale on-the-ground projects or even closed-loop projects.
- + Green waste management to address unique regulatory requirements, funding mechanisms, and levels of public acceptance depending on the waste stream. The aggregation hub concept evaluated under the TCS Pilot Project focuses exclusively on forest wood waste. While the hub could simply support management of forest material flow through contracts with landowners and with those generating material, it could also establish one or more distributed sorting/processing yards to physically aggregate material. Careful consideration should be given to physical aggregation including the scale of the operation, location/accessibility for supply/offtake, processing equipment needs, end-user specifications, quality control, and staffing, among other factors. It is widely understood that material handling costs increase the more times material is touched or moved; however, these additional costs could perhaps be

mitigated by drying and/or densifying the material prior to offhaul, or by converting the material on-site by means of a mobile technology or a community-scale conversion facility.

Stakeholders mentioned additional activities that may be better addressed by existing efforts or entities, rather than the hub duplicating these support services. The hub could instead leverage partner entities' ongoing work by tracking their efforts, coordinating with them as needed, and connecting stakeholders to them as desired. Possible opportunities for making use of such existing expertise include:

- + Workforce training and development programs that have been instituted and, in several cases, are rapidly expanding at community colleges across the state, as well as within existing Tribal, cultural practitioner, business, and non-profit networks. Other ideas included addressing associated issues related to worker housing and the viability of rural communities. There has also been investigation into the use of the Interpersonnel Act which allows for public entities, like the anticipated hub, to support federal agencies by loaning staff for up to four years (CLERE Inc., 2023). While it is yet to be determined if these collective efforts are sufficient to tackle the immediate and long-term forest health and wildfire resilience workforce needs, there are a range of operating programs that can be tapped to meet stakeholder goals. Program type, content, location, and contact could be tracked by the hub and made available to stakeholders for their use to improve or expand their respective work force capacities and possibly even to provide a means for recruiting forest sector workers including through on-the-job training or the Interpersonnel Act.
- + Haul or treatment subsidy programs being piloted by the state and federal governments. Subsidies may be useful in that they can mitigate the biomass pricing gap associated with existing long-haul distance to available end-use facilities while emerging facilities attain commercial operational status; but it is still unclear if these emerging facilities will achieve success within the timeframe and scale needed to address the immediate biomass disposal need. Subsidies may be necessary as part of a longer-term solution if social values demand that resource management favor the retention of large trees which would otherwise offset forest management costs, including biomass removal; but again, subsidies, while potentially helpful in the short-term, may not be a sustainable climate solution given the contribution to increased transportation emissions. The complexity of funding, administering, and managing subsidies may be best left to those who are presently active in this sector. In this scenario, the hub could support existing facilities and biomass generators in working toward a stable market by offering the use of long-term contracts and a semi-fixed biomass pricing mechanism that potentially accounts for incentives. Alternatively, the hub could pursue competitive grant funds and act as a broker for the incentives in combination with the biomass contract and pricing mechanism to ensure the subsidy is applied at the most appropriate point in the supply chain; but contract administration would increase in complexity, along with risk.
- + Valuation of ecosystem services, most notably voluntary carbon credits, in support of a stacked-benefit conservation finance approach for forest restoration and biomass infrastructure development based on the economic value and willingness of companies to purchase credits tied to forest health/wildfire risk reduction co-benefits. A number of companies and exchange platforms are in operation and others are emerging, as the market quickly expands and credit prices rise to meaningful levels. The hub could provide stakeholders information on and facilitate introductions to entities providing these services.
- + Mapping software that can estimate the volumes of material generated from forest management treatments on private non-industrial lands, as is currently under development by several entities, including Spatial Informatics Group, Vibrant Planet, and a team led by California

Polytechnic San Luis Obispo as part of OPR's work under the Cal FRAME program. This last tool includes other aspects to the application such as treatment cost comparisons, connecting with forestry professionals, and the ability to view locations of other nearby interested landowners to facilitate "bundling" of projects. The hub could direct members and stakeholders to use tools like these as part of the work preceding negotiation and execution of biomass contract services supplied by the hub.

- + Public outreach and education to provide a compelling narrative about the need for biomass utilization and its market and non-market benefits. While the number of operating facilities and net export of biomass-derived electricity has significantly decreased since the height of the market in the 1990s, practitioners are often still contending with the public's negative perception of biomass from that era. The biomass issue is complex and takes skilled messaging to explain and engage meaningfully with the public, especially when people don't naturally make the connection that clean air and water are tied to management of resources located hundreds of miles away. It is possible that an existing entity with experience in outreach and education and with expertise in forest health and associated subject matters, such as TNC, could lead a public education campaign.
- + Facilitating the connection of new and existing forest sector businesses with business support services provided by local, state, and federal entities, such as county Economic Development Corporations, the Governor's Office of Business and Economic Development (Go BIZ), the U.S. Small Business Administration (SBA), the United States Department of Agriculture (USDA) Forest Service's Technical Advisory Team, Small Business Development Centers, and the Employment Training Panel, to name a few.
- + Improved access to capital through a low or no interest business line of credit to connect stakeholders with financial institutions or organizations familiar with the forest sector and the grant reimbursement process, including Blue Forest Conservation and a subset of regional banks and credit unions.

In addition to the support services that the hub could reasonably lead and leverage through its partners, there are additional concepts that were identified but need further definition. Briefly, these include:

- + Enhanced permitting through the use of aggregated environmental review across multiple regulatory agencies and through reduced permitting requirements for emerging wood and biomass utilization infrastructure, which would likely be viewed as controversial and take a significant effort to achieve.
- + Equipment leasing which would require significant upfront and ongoing capital investment as well as continual operating and maintenance funding, in addition to significantly increasing the hub's risk of liability.

## **FUTURE RESEARCH NEEDS**

The primary information gaps related to the hub's core work and potential support services must be addressed before the entity is operationalized. These areas include, but are not limited to:

- + Insurance products. More research is needed to explore contract indemnification insurance as well as other insurance products previously discussed. As part of the Northeastern California Woody Feedstock Aggregation Pilot Project, WTW and TNC are presently investigating where insurance gaps exist within the biomass supply chain and assessing insurers' willingness to fill these gaps, and they anticipate making recommendations for how to address them. The viability and range of costs for the recommended insurance tools are thereafter expected to be explored

using a forthcoming tranche of funding from OPR. While this work is being prepared for a different pilot project, it is expected to inform the TCS Pilot Project's approach to contract insurance, hub insurance, and possibly other types of insurance products as well.

- + Material sorting/processing yards. Establishment of one or more biomass collection and processing yards requires careful consideration in relation to material handling costs, among other factors. The South Central Sierra Woody Feedstock Aggregation Pilot Project is in the process of completing a feasibility study for a wood product campus that will assess industry demand, workforce and training needs, necessary infrastructure, and regional need, as well as develop template documents to secure federal funding and complement state and local investment. The TCS Pilot Project may leverage this study to support further investigations into establishment of sorting/processing yards in the region, evaluating possible locations and their associated infrastructure needs, transportation logistics, opportunities for value-added processing or wood products, costs, and whether and how a FSC chain of custody certification might apply.
- + Hub Financing. Sustainable funding is required to establish a biomass aggregation hub, regardless of the type of entity to be created and independent of focus or services. Potential financing mechanisms will be evaluated in a separate study by Economic & Planning Systems, Inc. (EPS), who is a member of the Study Team. Potential mechanisms likely to be explored include: self-imposed special taxes; fees and assessments; tax increment financing; federal, state and/or local grant funding; fees for services; and/or others yet to be determined.
- + The Impacts of California's Future Electrification Goals. The state has a number of goals related to electrification of transportation and equipment used to remove and process biomass from the forest. This could impact future economics of biomass removal and, therefore, should be addressed in conjunction with the regulating agencies and regulated entities.

## SYSTEMS APPROACH

Recent history and the status of forest management work have shown a high level of federal, state, and private investment in on-the-ground activities, yet complex challenges still affect the biomass supply chain. These challenges continue to prevent the reliable removal and beneficial use of excess woody material, and they are likely to be exacerbated as those active in the forest sector contend with large-scale wildfire impacts and the resulting efforts to increase pace and scale of forest management aimed at achieving the state and federal governments' [One Million Acre Strategy](#) (State of California and the USDA Forest Service Region 5, 2020).

Ensuring a systems approach that recognizes and adds non-market values to the financing equation and builds the business case for biomass utilization based on greater knowledge about when and where future projects will be generating excess material for feedstock is critical. If the TCS Region is to meaningfully help increase pace and scale of forest treatments, it must quickly expand biomass infrastructure. However, the region can't increase infrastructure without some level of public investment; and it can't generate investment without certainty around long-term and economically viable sources of feedstock. A focused biomass aggregation hub may considerably improve the steady flow of residual material through long-term feedstock contracting. Such agreements will better support biomass generators and existing end-users than the status quo. Long-term contracts will also boost emerging biomass conversion facilities' abilities to meet investor and lender requirements, ultimately paving the way for them to secure project finance, realize facility installation and commercial operations, and diversify the number, type, and location of biomass outlets available.

## 6. CONCLUSION

There is no single answer that will solve the complicated problem of how to reduce excess material to make forests and surrounding communities healthier and more resilient to future wildfire. The region needs all the tools in the toolbox to achieve forest health, wildfire risk reduction, and community sustainability goals.

This and the other Study Team reports will be used in future work by members of the Study Team, including PCWA, and by potential future hub members as pathways to facilitating forest biomass supply chain logistics. In addition, the reports will guide further exploration and consideration of critical issues related to establishing a biomass aggregation entity that can advance a financially sustainable wood utilization industry and support ecological forest health and community wildfire resistance in the three-county TCS Region.

This report, in particular, recommends several next steps, additional analyses, and potential future project phases, including:

1. **Establishment and Expansion of Biomass Aggregation Hub and Core Activities:**
  - Further stakeholder engagement, outreach, and commitment to solidify the formation and membership of the aggregation hub.
  - Identification of specific hub services and core work to catalyze forest restoration and mitigate transportation costs, including acting as a biomass feedstock broker and negotiating long-term contracts between suppliers and buyers.
  - Exploration of other potential support services and collaborations, including indemnification insurance products to protect parties from price variability and impacts to biomass supply, workforce education and development, and others.
  - Collaboration with local governments and third-party programs to leverage existing expertise and connect stakeholders to existing support services.
  - Consideration of a series of small- to mid-sized biomass processing centers across the region to reduce transportation challenges, including full emissions profile for removal, transport, and utilization of removed material.
2. **Geographic Focus and Membership:**
  - Confirmation of geographic focus, with stakeholder support for maintaining a narrow focus initially, with the geographic extent subject to review based on future stakeholder interests and capability.
  - Final determination of most appropriate entity type and governance structure, based on conclusions of the Study Team's *Legal Tools for Government Entities to Incentivize Utilization of Forest Biomass in California* (CLERE Inc., 2024).
3. **Pilot Programs:**
  - Exploration of pilot programs to test new and mobile technologies, particularly on public lands where infrastructure access is limited.
  - Streamlining of regulatory permitting issues for mobile technologies for seamless deployment.

4. **Advocacy and Policy Implementation:**

- Acceleration of policy implementation, such as SB 1122, to expedite progress in the region.
- Engagement with regulatory bodies such as the California Public Utilities Commission (CPUC), Air Resources Board (CARB), and Energy Commission (CEC) to address key issues affecting biomass utilization, including full lifecycle analysis and valuation of biomass removal benefits and future issues such as mandated electrification of transportation and equipment used in fuel reduction and biomass utilization work.

5. **Financial Considerations:**

- Exploration of additional funding strategies, including potential grants and partnerships to support successful implementation of the proposed solutions.
- Financial analyses to identify sustainable funding mechanisms for the aggregation hub and related initiatives.

6. **Public Outreach and Education:**

- Development of a compelling public narrative about biomass utilization and its benefits for use in a collaborative outreach program in support of biomass utilization activities.
- Consideration of existing entities with outreach and education experience, such as TNC, to lead a public education campaign.

The Study Team expects to convene a group of key stakeholders who may potentially become hub members (e.g., water agencies, counties, cities, and state agencies). We intend to look to this group to help consider the range of model options and support services and determine if such an entity and services would benefit to the region and, if so, which are preferred. Assuming there is a model entity that is collaboratively supported, members of the TCS Pilot Project's Study Team will conduct more detailed analyses to evaluate the model entity's financing mechanisms and governance in detail.

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**APPENDIX A.**  
**LIST OF ENTITIES INTERVIEWED AND THEIR DESCRIPTIONS**

## **INTERVIEW ENTITY BACKGROUND**

### ***Cities and Towns***

#### **City of Colfax**

The City of Colfax is in western Placer County, at the crossroads of Interstate 80 and State Route 174, approximately 50 miles from the City of Sacramento and is at the extreme northeastern edge of the Sacramento metropolitan area. Colfax is on the western slope of the Sierra Nevada foothills and is bound by the Bear River to the northwest and the North Fork of the American River to the southeast. The City population is 1,995 (U.S. Census Bureau, 2020) and the City limits cover approximately 644 acres, which are primarily developed or are planned for development (Colfax, 2020); however, the City represents a relatively dense, small-town urban core surrounded by primarily undeveloped forested lands. Over the past 25 years, areas surrounding the City have experienced wildfires, including the 2021 River Fire less than one mile from the Colfax City limits (CAL FIRE, 2023). The City has a defensible space project, pending the approval of the State Office of Emergency Services and FEMA, that would support defensible space activities on 137 structures within the City limits.

#### **City of Grass Valley**

The City of Grass Valley is in the heart of western Nevada County, approximately 50 miles from the City of Sacramento on State Route 49. Grass Valley is on the western slope of the Sierra Nevada foothills and is within the Wolf Creek watershed which is a major tributary of the Bear River. The City population is 14,016 (U.S. Census Bureau, 2020) and the City limits cover 2,521 acres (Planning Area includes 9,894 acres plus 209 acres identified to be added to the Planning Area in the 2020 General Plan; Grass Valley, 1999). Grass Valley is the regional economic and cultural center for possibly seven times the City population throughout parts of four Counties (Grass Valley, 1999). Grass Valley is in an area with a myriad of land uses and forest management practices, including timber growth and forest management, water quality and watershed protection, recreation, wildland fire considerations, aesthetics, and wildlife management/protection. Furthermore, the City has a distinct Wildland Urban Interface (WUI) area. As such, the City participates in the Nevada County's Local Hazard Mitigation Plan, and the Fire Safe Council of Nevada County Community Wildfire Protection Plan. Safety Implementation Action and Strategy 18-SI of the City's 2020 General Plan includes continuing to participate in regional efforts with local fire agencies and to implement appropriate strategies to reduce the risk of wildfires. The City generates relatively modest volumes of material through its vegetation management of its properties. While the area has a history of wildfire and multiple relatively small fires have occurred near to and within Grass Valley in the past 10 years, the area in which Grass Valley is located has remained largely untouched by wildfires over the past 20 years (CAL FIRE, 2023). The 2021 Bennett Fire was an approximately 50-acre fire that occurred east of State Route 20 and north of South Fork Wolf Creek in 2021, and the 2020 Jones Fire was an approximately 705-acre fire that occurred approximately 1.5 miles northwest of the City.

#### **City of Nevada City**

The City of Nevada City is in western Nevada County, approximately 60 miles from the City of Sacramento and approximately 10 miles east of the City of Grass Valley on State Route 49. The City is the county seat and headquarters of the Tahoe National Forest (TNF). The City population is 3,152 (U.S. Census Bureau, 2020) and the City limits cover approximately two square miles (1,280 acres; 2022 General Plan Annual Progress Report). The City is in a forested basin on the western slope of the Sierra Nevada foothills. Deer Creek flows from Scotts Flat Reservoir less than five miles east of the City,

through downtown to Lake Wildwood approximately 10 air miles southwest of the city. The creek is a tributary to the Yuba River. The Deer Creek watershed is densely vegetated, and the creek corridor passes through the densely populated City center. With the addition of surrounding forest lands, the City is at high risk for catastrophic wildfire. In March 2023, the City was awarded a planning grant from the Sierra Nevada Conservancy to develop a fuels treatment plan for the WUI. The Deer Creek Hazardous Fuels Treatment Project is being developed using grant funding and to defend 433 acres of public and private lands along Deer Creek. The City also implements their defensible space ordinance, adopted in March 2023. Similar to the City of Grass Valley, the area surrounding the City of Nevada City has remained largely untouched by wildfires over the past 20 years (CAL FIRE, 2023). The 2015 Lowell Fire was an approximately 2,315-acre fire that occurred approximately 7.75 miles southeast of the City, and the 2020 Jones Fire was approximately 4 miles west of the City. The City contracts forest management activities within portions of its small jurisdiction.

### **City of Placerville**

The City of Placerville is in western El Dorado County, approximately 45 miles from the City of Sacramento on Highway 50. The City is the county seat and headquarters of the Eldorado National Forest (ENF). The City population is 10,747 (U.S. Census Bureau, 2020) and the City limits cover approximately 5.8 square miles (U.S. Census Bureau, 2020). The City is the administrative and commercial center of the County and a popular destination for tourists and recreationists (City of Placerville, 1990). The City has implemented the Placerville Fire Safe Council to assist homeowners with emergency planning and preparedness, understanding home hardening, creating defensible space, providing limited free chipping services, and hazard tree removal. The City performs vegetation management of its own lands. The areas surrounding Placerville have a long history of fire, with two catastrophic wildfires occurring in the past 10 years — the 2021 Caldor Fire affecting 221,786 acres southeast of the City and the 2014 King Fire affecting 97,685 acres northwest of the City.

### **City of South Lake Tahoe**

The City of South Lake Tahoe is in eastern El Dorado County, in the Lake Tahoe Basin near the California/Nevada state line. The City population is 21,330 (U.S. Census Bureau, 2020) and the incorporated and unincorporated areas of the City cover approximately 25,383 acres (City of South Lake Tahoe, 2011). The City is a premier destination for visitors from around the world and residents drawn by the resort mountain community and outdoor recreation. The City's 2023–2028 Strategic Plan includes public safety action items to continue to modernize the wildfire preparedness and emergency evacuation plan in coordination with neighboring jurisdictions, and to build out the Fire Prevention Bureau to include defensible space and commercial building inspections. The Basin is geographically set apart and managed by multiple jurisdictions and land managing agencies including the Tahoe Regional Planning Agency. The City participates in community preparedness and protection and wildfire reduction, as well as partnering in regional programs. The Tahoe Fire and Fuels Team consists of representatives of 21 different agencies including Tahoe Basin fire agencies, and the City of South Lake Tahoe, CAL FIRE, and Nevada Division of Forestry. In 2015, the Team developed a Community Wildfire Protection Plan for the Tahoe Basin in partnership with the communities it serves. The Plan is a multi-jurisdictional effort to implement fuels reduction and wildfire prevention across all jurisdictions in the Lake Tahoe Basin. The City has experienced nearby wildfires, including the 2007 Angora Fire which affected 3,070 acres and the 2021 Caldor Fire. The City is exploring the development of community-scale biomass conversion pathways.

### **Town of Truckee**

The Town of Truckee is in the high Sierra Nevada of eastern Nevada County along Interstate 80 approximately 100 miles east of Sacramento and 9 miles west of the California/Nevada state line. The Town encompasses 34 square miles of largely developed land (Town of Truckee Chamber of Commerce 2023), and the population is 16,729 (U.S. Census Bureau, 2020). The Town is situated on the banks of Donner Lake and is surrounded by TNF lands. The Council's Strategic Priorities and Two Year Work Plan for 2023–2025 includes goals and policies related to wildfire preparedness and mitigation, including vegetation removal and chipping along roadways in Town, and updating landscaping and revegetation standards to be fire-adapted. A portion of the material generated has been transported to the Honey Lake Power, roughly 120 miles to the northeast. The Town is exploring the possible siting of a biomass utilization facility.

### **Counties**

#### **County of El Dorado**

El Dorado County is in east-central California, with the western boundary containing part of Folsom Lake, and the eastern boundary being the California/Nevada state line. The County encompasses 1,805 square miles of rolling hills and mountainous terrain — the northeast portion of the County is in the Lake Tahoe Basin while the remainder of the County is in the western slope of the Sierra Nevada. The County is a rural county with a population of 191,185 (U.S. Census Bureau, 2020). The County contains only two incorporated cities — the City of Placerville (county seat, population 10,747), and the City of South Lake Tahoe (population 21,330). Major watersheds in the County include Lake Tahoe Basin and the American River (South Fork American River, Middle Fork American River, and Rubicon River). Like other rural counties of the north-central Sierra Nevada, the County's water resources play a critical role in water supply and power to the region. The ENF comprises a significant portion of the County's land area, while the Lake Tahoe Basin Management Unit manages much of the land east of the crest. The County is also home to the Desolation Wilderness. The County's resources attract tourism, with both residents and tourists enjoying year-round outdoor recreation. The County established the Office of Wildfire Preparedness and Resilience in 2022 to lead the effort of establishing and implementing a strategic wildfire protection strategy across jurisdictions in the County and to incorporate information already available where possible, including the South Fork American River Stewardship Strategy, Community Wildfire Protection Plans, CAL FIRE Unit Fire Plan, County Hazard Mitigation Plan, and the El Dorado County General Plan Safety Element. The Office participates in the Wildfire Preparedness and Resilience Coordination Group which represents agencies and organizations across the county whose missions and/or statutory authorities and funding include wildfire prevention and preparedness (County of El Dorado and County of El Dorado Wildfire Preparedness and Resilience 2022). The County is actively engaged in the development of at least eight wood and biomass infrastructure projects including the possible establishment of an integrated wood campus at the former SPI Camino site. The County is also pursuing the development and possible issuance of a Bioeconomy Development Opportunity (BDO) Zone rating, which could help to attract investment to the area's wood and biomass infrastructure projects and spur economic development. The County has a history of wildfire, with the recent catastrophic 2014 King Fire and 2021 Caldor Fire occurring nearly entirely within the County boundaries. The County is exploring the development of multiple biomass conversion facilities of varying technologies and scale. The County participates in the South Fork of the American River (SOFAR) Cohesive Strategy Biomass Committee.

## **County of Nevada**

Nevada County is in east-central California, with the western boundary defined by several river courses and adjoining county boundaries, and the eastern boundary is the California/Nevada state line. Like El Dorado County, Nevada County also encompasses the rolling hills of the western slope of the Sierra Nevada and the mountainous terrain of the higher elevations in the eastern part of the County. The County encompasses 974 square miles and is drained by the Middle and South Yuba Rivers. The County population is 102,241 (U.S. Census Bureau, 2020), and the incorporated cities and towns are the City of Nevada City (county seat, population 3,152), City of Grass Valley (population 14,016), and the Town of Truckee (population 16,729). A considerable part of the County is National Forest lands which include portions of TNF and Toiyabe National Forest. The County's Office of Emergency Services (OES) leads the County's efforts in wildfire preparedness, response, and recovery (Nevada County Office of Emergency Services, 2023). OES coordinates several local emergency-related task forces that address wildfire issues and has a collaborative relationship with the Fire Safe Council of Nevada County in wildfire prevention and preparedness by handling grants, property pre- and post-inspections, and sends applications to FEMA for review (YubaNet.com, 2023). The County is a major funder of the Nevada County Fire Safe Council and has a Board of Supervisors member on their Board of Directors. Nevada County has experienced relatively few wildfires within the past 10 years, with the 2021 River Fire burning over 2,600 acres in Nevada and Placer Counties.

## **County of Placer Office of Emergency Services**

Placer County OES, in cooperation with local cities, special districts, and fire and law enforcement agencies, provides emergency management services. During an incident, OES secures resources necessary for first responders to protect the community. Placer County OES works closely with the Placer County Fire Safe Alliance to provide community assistance, information, and educational programs in an effort to reduce the risks of wildfire danger to life and property in the County.

## **State Agencies**

### **California Tahoe Conservancy**

The California Tahoe Conservancy (CTC) is a state agency that was established in 1985 to address resource needs in the Lake Tahoe Basin, including protecting and restoring the natural environment, especially water quality; enhancing wildlife habitat; providing public access and recreation opportunities; and managing public land at Lake Tahoe. The Lake Tahoe Basin is located along the California and Nevada state line in El Dorado and Placer Counties and includes local, state, federal, and privately owned and managed land. CTC's jurisdiction spans the entirety of the California side of the Basin, covering 236 square miles. In addition, CTC owns and manages approximately 6,500 acres of land to protect the natural environment, promote public recreation, and access to Lake Tahoe. CTC plays a major role in the restoration of the Basin's most environmentally sensitive areas, reducing wildfire risk, and addressing the threat of climate change. CTC has implemented numerous program areas, including climate change adaptation, forestry, land management, recreation and public access, Tahoe Livable Communities, and water quality and watersheds, and specifically focuses on implementation of the State's Tahoe Basin Environmental Improvement Program to address rapidly declining resource values at Lake Tahoe. As part of its numerous initiatives, CTC provides grants to local governments and nonprofit organizations related to restoration and forest health in the Lake Tahoe watershed; collaboratively leads large-scale watershed and restoration initiatives with over 50 public agencies to

reduce wildfire threat; and enhancing the Basin's resilience and ability to adapt to climate change. In its first 30 years, CTC has funded projects totaling over \$450 million. Furthermore, in support of its Forestry Program, CTC and its partners and adjacent land owners implement large landscape, multi-jurisdictional, multiple-benefit projects. CTC is a partner in the Tahoe-Central Sierra Initiative which is led by state, federal, nonprofit and private partners. The 2021 Caldor Fire threatened the Lake Tahoe Basin, and the 2007 Angora Fire impacted approximately 3,000 acres in the southern portion of the Basin; however, the Basin has otherwise remained primarily untouched by recent and historic fires.

### **Sierra Nevada Conservancy**

Sierra Nevada Conservancy (SNC) is a state agency that initiates, funds, and supports work that improves the environmental, economic, and social well-being of the Sierra Nevada-Cascade Region. SNC's service area covers the 27 million-acre Sierra Nevada-Cascade region, which includes the mountains and foothills of the Sierra Nevada range, the Mono Basin, Owens Valley, the Modoc Plateau, and parts of the southern Cascade Range and Klamath Mountains. SNC's primary initiative is the Sierra Nevada Watershed Improvement Program (WIP) which focuses on: restoring healthy ecosystems, improving community resilience, promoting sustainable recreation and tourism, and conserving natural and working lands. SNC is a partner in the Tahoe-Central Sierra Initiative.

### **Tahoe Regional Planning Agency**

The Tahoe Regional Planning Agency (TRPA) is a regulatory agency formed in 1969 through a bi-state compact between California and Nevada. TRPA is mandated to manage growth and development in the watershed and to lead a shared, cooperative mission to conserve and restore the lake and its unique environment. TRPA, along with over 80 partners, implement the Lake Tahoe Environmental Improvement Program, in which reducing wildfire risk and improving forest health is a top priority. TRPA works with the public to assist in removing hazardous trees and creating defensible space around homes and structures. TRPA helped form the Tahoe Fire and Fuels Team following the 2007 Angora Fire. The Team is made up of 22 different entities that work together to implement projects that restore forest health and protect Tahoe communities, and which played a critical role in protecting Tahoe communities from the 2021 Caldor Fire due to preparation and coordination by the Tahoe Fire and Fuels Team.

### ***United States Forest Service***

#### **Eldorado National Forest**

The ENF covers approximately 793,652 acres of the central Sierra Nevada (other ownership is 178,615 acres, net acreage is 615,037 acres). Portions of Alpine, Amador, El Dorado and Placer counties lie within the forest boundary. The forest is bordered on the north by the TNF, on the east by the Lake Tahoe Basin Management Unit, on the southeast by the Humboldt-Toiyabe National Forest, and to the south by the Stanislaus National Forest. Water is a major resource of the ENF, with 611 miles of fishable streams, and 297 lakes and reservoirs. The ENF is a partner in the Tahoe-Central Sierra Initiative.

#### **Tahoe National Forest**

The TNF covers approximately 1,208,993 acres of the north central Sierra Nevada (other ownership is 397,253 acres, net acreage is 811,740 acres). Portions of Placer, Nevada, Sierra, and Yuba counties lie within the forest boundary. The lands of TNF are drained by river basins that supply water for millions of people and thousands of acres of farmland. Major rivers include: North Fork American River, Middle

Fork American River, North, Middle and South Forks Yuba River, South Fork Truckee/Feather River, Bear River (Deer Creek). The TNF is a partner in the Tahoe-Central Sierra Initiative.

### ***Other Agencies and Organizations***

#### **El Dorado and Georgetown Divide Resource Conservation Districts**

The El Dorado County Resource Conservation District (RCD) and the Georgetown Divide RCD are local, independent, non-enforcement, non-regulatory, self-governed special districts. Their combined service area covers El Dorado County from near Georgetown in the north, Shingle Springs in the west, Grizzly Flats in the west, and Riverton in the east. The RCDs advise and assist individual landowners and public agencies in planning and implementation of conservation practices for the protection, restoration, or development of land, water, and related natural resources. Through collaborative efforts with Federal, State and local agencies, and private land owners, the RCDs plan, develop, and implement fuels reduction projects, post-fire hazard tree removal and restoration, including several shaded fire breaks and fuels reduction projects; the Fire Adapted 50 Project to establish a post-2014 King Fire more fire resilient wildland-urban interface condition along the Highway 50 corridor in El Dorado County; and the Caldor Fire Forest and Community Restoration Project to implement post-2021 Caldor Fire forest recovery work.

#### **National Forest Foundation**

The National Forest Foundation (NFF) is an organization chartered by Congress to bring people together to restore and enhance the National Forests and Grasslands. NFF provides on-the ground support and funding opportunities for initiatives aligned with the NFF's mission and goals. NFF is a partner in the Lake Tahoe West Restoration Partnership which is an inter-agency effort to restore the resiliency of Lake Tahoe's forests, watersheds, and communities on 59,000 acres of Lake Tahoe's west shore. NFF is acting as an implementation partner, or general contractor, to provide work on the ground for The Yuba Project which is part of a larger effort to treat 275,000 acres in the North Yuba watershed of Tahoe National Forest.

#### **Nevada City Rancheria Nisenan & California Heritage: Indigenous Research Project**

The Nevada City Rancheria was the federally recognized land and name of the Nisenan Native American people in Northern California. The Tribe was illegally terminated in the 1950s and 1960s by the California Rancheria Termination Acts and has not yet been restored (Nevada City Rancheria, 2023). The Nevada City Rancheria was located on Cement Hill in Nevada City, California. The California Heritage: Indigenous Research Project (CHIRP) is a charitable organization originally founded to research, document, and preserve the history and culture of the Nevada City Rancheria Nisenan Tribe. The organization has grown to meet the needs of the Tribe's goals and needs, including programs to support the preservation, protection, and perpetuation of the Nisenan people and their culture while advocating for the restoration of the Tribe's federal recognition.

#### **Nevada County Fire Safe Council**

The Nevada County Fire Safe Council is a non-profit organization dedicated to making Nevada County safer from destructive wildfire through fire safety projects and education. The County leads the collaborative development of the western county wildfire prevention plan. The Fire Safe Council has implemented programs to assist low-income senior residents and disabled residents for defensible space assistance, defensible space consultation, a chipping program, reflective address signs for

emergency, defensible space clearing services, and facilitates creation of Firewise communities and scotch broom removal. The Fire Safe Council partners with Nevada County Fire Districts and numerous government entities to fund and implement its programs. The Fire Safe Council and Nevada County OES are providing defensible space on up to 550 properties using funding provided by FEMA and match provided by the Fire Safe Council and the County. The Fire Safe Council conducts the public outreach, recruits applicants, pre-qualifies them, and provides field crews to do the work. Nevada County OES manages the grants, handles property inspections and sends applications to FEMA for review (YubaNet.com, 2023).

### **Northstar Community Services District**

The Northstar Community Services District (NCSD) serves residential and commercial customers in the communities of Northstar, Lahontan, Martis Camp, Schaffer's Mill, and Hopkin's Village in northeastern Placer County. NCSD's service area includes two water service systems which cover over 9 acres and which serve 2,500 connections. NCSD's services include potable water under both the Northstar and Martis Valley Water Service systems, sewer collection, solid waste management, recycling services, fire protection, fuels management, snow removal, road surface maintenance, and trail construction and maintenance. NCSD's existing water service facilities include 16.2 miles of water line, 10 pressure reducing stations for four pressure zones, two 1-million-gallon water storage tanks, two 275,000-gallon storage tanks, one 280,000 gallon storage tank, one 180-acre-foot reservoir, and the Northstar Treatment Plant. The Martis Valley Water System includes 50.1 miles of water line, two pressure reducing stations, four booster pump stations, two 1,250 gallons per minute wells, one 250 gallons per minute well, one 600,000-gallon water storage tank, one 550,000-gallon water storage tank, one 500,000-gallon storage tank, one 325,000-gallon storage tank, and one 215,000-gallon storage tank. NCSD's facilities are located in the Middle Truckee River watershed which falls within the Tahoe National Forest. The water source is surface water from the Big Springs and Sawmill Flat spring systems, with some from the Martis Valley Groundwater Basin. NCSD is in the process of developing a district heating facility that utilizes forest biomass residuals the District generates.

### **Rural County Representatives of California, Golden State Natural Resources**

The Rural County Representatives of California (RCRC) is a forty-member county-strong services organization that champions policies on behalf of California's rural counties. The member counties cover more than 60% of California's total land mass, amounting to over 155,000 square miles. Many of these rural counties have large forested or wildland areas under state and federal ownership, which are home to many of the state's natural resources, including forested lands, watersheds, lakes and rivers, fish and wildlife, and minerals. The RCRC advocates strongly for increasing the pace and scale of forest management on California's federal public lands. RCRC's involvement in forestry policy has led to state reforms of the Timber Harvest Plan process, advocacy on federal forestry reforms and fire funding, and creation of a Memorandum of Agreement between counties and the U.S. Forest Services and the Bureau of Land Management. The TCSI Region (El Dorado, Nevada, and Placer Counties) are members of RCRC. RCRC and the Golden State Finance Authority (GSFA), which is a Joint Powers Authority whose purpose is to provide affordable housing and contribute to the social and economic well-being of California residents, have jointly created Golden State Natural Resource (GSNR), a non-profit, 501(c)3, forest resiliency company. GSNR holds a 20-year Master Stewardship Agreement with the USFS for all eighteen National Forests within Region 5 and is pursuing development of two pellet manufacturing facilities in Nubieber and Sonora, CA, that will source biomass from forest thinning projects, orchards, and sawmills.

## **Businesses**

### **Pacific Gas & Electric Company**

Pacific Gas & Electric Company (PG&E) was incorporated in 1905 and is one of the largest combined natural gas and electric energy companies in the United States. PG&E's 70,000-square mile service area extends from Eureka in the north to Bakersfield in the south, and from the Pacific Ocean in the west to the Sierra Nevada in the east. PG&E's infrastructure includes 106,681 circuit miles of electric distribution lines and 18,466 circuit miles of interconnected transmission lines; 42,141 miles of natural gas distribution pipelines and 6,438 miles of transmission pipelines. PG&E has approximately 5.5 million electric customer accounts and 4.5 million natural gas customer accounts. PG&E's easements and infrastructure transect numerous jurisdictions throughout its service areas, including forested lands that have been or may be impacted by wildfire. Furthermore, PG&E maintains Power Purchase Agreements with biomass to energy facilities that convert forest fuels to electricity, owns and operates hydroelectric projects, and purchases electricity from hydroelectric facilities in forested areas of the state, including in the TCS Region. PG&E conducts (or contracts) a significant amount of utility line vegetation management within its service area. The utility has provided offtake agreements to some biomass to energy facilities for a portion of this material.

### **Rio Bravo Rocklin**

Rio Bravo Rocklin (RBR) is a 24.4 MW biomass to energy facility located in the City of Lincoln in western Placer County. The plant has been in operation since 1989 and is a joint venture between IHI Power Generation Corporation and North American Power Group. Eight percent of the plant's fuels are High Hazard Zone forest fuels (HHZ; CAL FIRE Fire Hazard Severity Zone mapping) and the output is purchased by Southern California Edison (SCE) pursuant to the Bioenergy Renewable Auction Mechanism (BioRAM) Program.

### **Robinson Enterprises, Inc.**

Robinson Enterprises, Inc. is located in Nevada City and provides general contracting services including timber harvesting, forest management, and wildland fire, and associated trucking services within and beyond the TCS Region.

### **Tree MD**

Tree MD is a timber operator based in Foresthill, CA, that provides vegetation management, hazard tree removal, mechanical fuel reduction, firewood manufacturing, and other services in the TCS Region.

### **Woodland Biomass Power**

Woodland Biomass Power is a 25 MW biomass to energy facility located in the City of Woodland in Yolo County, approximately 14 miles northwest of the City of Sacramento. The plant has been in operation since 1989 and is owned and operated by DTE Vantage. The plant uses wood chips, urban wood waste, logs from forest thinning, tree/orchard trimmings, and agricultural waste. The output is purchased by PG&E, pursuant to a Power Purchase Agreement.

**APPENDIX B.**  
**LIST OF INTERVIEW QUESTIONS**

## INTERVIEW QUESTIONS

### Stakeholder Organizational Information

Stakeholder Name/Organization:

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1. What type of entity best describes your organization [select one]:
  - Local agency
  - State agency
  - Federal agency
  - Non-profit
  - Research institution
  - Professional association
  - Existing facility
  - Emerging facility
  - Forest sector business
  - Other – please specify
  
2. Are you/your organization a party to existing or future projects which generate residual forest biomass:
  - YES
  - NO
  
3. Are you/your organization a party to existing or future projects which utilize residual forest biomass:
  - YES
  - NO

### Biomass Challenges/Opportunities

4. What are the top three most pressing challenges you see or experience related to disposal of excess biomass material generated by forest and community resilience work [select three]:
  - NEPA/CEQA/environmental review and permitting
  - Insurance to do the work
  - Lack of available/capacity of vendors to process and haul
  - Lack of necessary equipment
  - Lack of existing facilities that utilize biomass as feedstock or for manufacturing products
  - Inundation of existing facilities from fire salvage or other sources
  - Lack of trained workforce
  - Lack of consistency within or between agencies
  - Transportation costs to haul material
  - Lack of coordination between utility right-of-way vegetation clearance and other forest health project work
  - Extended utility response time for grid tie-ins for biomass facilities
  - Other – please specify

5. Are you aware of anything that is currently working well in our region related to material disposal:
  - YES
  - NO
6. If you answered Yes to the previous question, please describe what is working well and how we can build upon it in the future [open ended answer].
7. Here are a few options that some have said could potentially increase removal of excess biomass. Please rank the following ideas in order of priority, with 1 being the highest [rank 1-6]:
  - Creating fuel/hauling subsidies
  - Leveraging partnerships more effectively
  - Requiring state-funded projects to remove and utilize the biomass as a condition of funding
  - Streamlining contracting
  - Creating more certainty in material pricing
  - Expanding existing or establishing new biomass utilization infrastructure
8. Do you have any specific thoughts you want to share about any of the proposed options listed in the previous question, or do you have other ideas you believe could help to overcome challenges related to biomass removal and utilization [open-ended]?
9. Do you/your organization interact through contracting, permitting, collaborative planning, or other activity with utilities (or their contractors) who are performing right-of-way vegetation management:
  - YES
  - NO

### **Feedstock Aggregation Hub**

This project is looking at the feasibility of developing a biomass feedstock aggregation hub that could be a stand-alone entity or possibly be established within an existing or future resilience entity. The following questions pertain to the concept of a biomass feedstock aggregation hub.

10. If a biomass feedstock aggregation hub were to be formed, what type of entity would you find most helpful [select one]:
  - Public infrastructure entity or public/private partnership that could fund public infrastructure (e.g., biomass utilization campus, sort yard, or biomass conversion or utilization facilities) and enter into contracts with feedstock providers using a fixed rate with collar (FRWC) pricing mechanism
  - Service provider entity that could provide a menu of community services (e.g., equipment leasing for new businesses or the community) and enter into contracts with feedstock providers using FRWC pricing mechanism
  - Wildfire prevention entity that could fund fuel treatment activities and include a requirement that the excess biomass generated from these projects be utilized, using a feedstock contract template or other agreement
  - A combination of the three types above

- No model entity; instead use existing Joint Powers Authority statutory authorities to create a Joint Powers Agreement to share tasks and responsibilities
  - Resource Conservation Districts play a management role, in any of the above options
  - Form a special district
  - Other - please specify
11. What level of interest would you/your organization have in participating in some way in the creation of a biomass aggregation hub [select one]:
- Extremely interested
  - Somewhat interested
  - Not very interested
  - Definitely not interested
12. Here are some potential additional services or products that a feedstock aggregation hub could provide beyond contract and pricing streamlining to help overcome challenges related to biomass removal and utilization. Please rank the following services/products in order of need or priority, with 1 being highest [rank 1-9]:
- Environmental review and permitting
  - Insurance products for equipment or vehicles
  - Indemnification insurance (for contracts)
  - Equipment leasing
  - Business support (e.g., development of business plans, market analysis, legal or technical assistance)
  - Grant pursuit and administration
  - Workforce development and training
  - Mapping, software, or other computing services associated with biomass feedstock utilization
  - Green waste management
13. Do you have any specific thoughts you want to share about any of the proposed services listed in the previous question, or do you have ideas for other services you believe could help to overcome challenges related to biomass removal and utilization [open-ended]?
14. If you/your organization were offered a 10-year, economically viable contract for supplying forest biomass that took into account market fluctuations and terms, how likely is it that such contracting support would lead you to increase the pace and/or scale of forest management work:
- Very likely
  - Somewhat likely
  - Not very likely
  - Not at all likely
15. If you answered “Very,” “Somewhat,” or “Not very” likely in the previous question, how do you see such contracting support helping your program? Please rank the following potential benefits in order of importance or priority, with 1 being highest [rank 1-6]:
- Generate additional revenue
  - Help to create a financially sustainable forest management program (independent of grants)

- Allow for an expansion of your existing forest health program
- Increase the number of acres you treat
- Increase the amount of biomass material you actually remove vs. leaving it on the ground, chipping, pile burning, etc.
- Lead you to consider leading or participating in the development of new biomass infrastructure given more firm feedstock supply

16. Do you have any specific thoughts you want to share about any of the potential benefits listed in the previous question, or do you have ideas about other benefits that could flow from engaging in the kind of contracts described in the previous question [open-ended]?

17. Would you/your entity, as a project proponent, be open to being party to such a contract?

- YES
- NO
- MAYBE

18. Is there anything else you think we should know that we haven't already talked about [open-ended]?

###

**APPENDIX C.  
LIST OF KEY TCSI PROJECTS WITHIN THE TCS REGION**

**TCSI PROJECTS WITHIN THE TCS REGION**

TCSI Project	Description	Feasibility of biomass procurement from project	Point person contact info
Caples Ecological Restoration Project	<p>Forest restoration on 6,800 acres of the Eldorado National Forest, with 4,400 acres treated using prescribed fire.</p> <p>In partnership with El Dorado Irrigation District, Eldorado NF, and Sierra Nevada Conservancy.</p>	<p>Low — Most of project is focused on prescribed fire and some hand-thinning — thus likely no biomass removal.</p>	<p>Becky Estes USFS Central Sierra Province Ecologist <a href="mailto:becky.estes@usda.gov">becky.estes@usda.gov</a></p>
French Meadows Project	<p>Partnership between Placer County, Placer County Water Agency, The Nature Conservancy, American River Conservancy, and academic researchers.</p> <p>Total project area is 28,000 acres.</p>	<p>Low — current project focus is on hand-thinning and mastication, and primary haul route (Mosquito Ridge Road) washed out in 2023 following the Mosquito Fire. According to one contractor working on French Meadows, hauling biomass to the Rio Bravo facility, for example, with alternate route could take up to 4 hours one-way.</p>	<p>Kerri Timmer Placer County <a href="mailto:ktimmer@placer.ca.gov">ktimmer@placer.ca.gov</a></p>
Lake Tahoe West Restoration Project	<p>Main project is Lake Tahoe West for 59,000-acre area.</p> <p>NEPA is in progress with decision expected in 2024.</p> <p>Implementation in 2025 and 2026.</p> <p>Most of project area is under Lake Tahoe Basin Management Unit, but some falls under California Tahoe</p>	<p>Medium to high — Early estimates for product removal include 17 MMBF sawtimber and 108,000 green tons of biomass.</p> <p>Feasibility of product removal (versus mastication and pile/burn) comes down to project cost and site access.</p>	<p>Brian Garrett Lake Tahoe Basin Management Unit <a href="mailto:brian.garrett@usda.gov">brian.garrett@usda.gov</a></p> <p>Milan Yeates California Tahoe Conservancy <a href="mailto:Milan.yeates@tahoe.ca.gov">Milan.yeates@tahoe.ca.gov</a></p> <p>Rich Adams California State Parks <a href="mailto:Rich.adams@parks.ca.gov">Rich.adams@parks.ca.gov</a></p>

	Conservancy and California State Parks.	The Cabin Creek facility in Truckee could serve as an outlet for material, otherwise it's likely that biomass will be sent to west side of county.	
North Yuba Forest Resilience Project	<p>275,000-acre project area, financed in part by Blue Forest Conservation's Forest Resilience Bond. Current projects are Yuba 1 and Yuba 2.</p> <p>Yuba 1: 14,545 acres on east side of project area, partial completion as of 2023.</p> <p>Yuba 2: 16,800 acres on west side of project area — mostly in planning phase.</p>	<p>Medium to high — project is well-funded, material from Yuba 2 could be transported downhill to the Rio Bravo facility or to the emerging Arbor Facility on Ophir Road.</p> <p>Yuba 1 is likely too distant from biomass facilities on west side of the TCS Pilot area (such as Rio Bravo).</p>	<p>Matthew Millar National Forest Foundation <a href="mailto:mmillar@nationalforests.org">mmillar@nationalforests.org</a></p>
South Fork American River Cohesive Strategy (SOFAR)	<p>The SOFAR Cohesive Strategy project area is approximately 410,000 acres, including approximately 250,000 acres of the Eldorado National Forest. The project area includes the upper 75% of the South Fork of the American River Watershed, 50% of the King Fire burned area, and 49 miles of the Highway 50 corridor.</p>	<p>Medium — there is an active biomass utilization subgroup of SOFAR working to develop local outlets for biomass from SOFAR projects.</p> <p>However it appears that most of SOFAR's planned projects were affected by the Caldor Fire.</p>	<p>Gina Bartlett, SOFAR Facilitator Consensus Building Institute <a href="mailto:gina@cbi.org">gina@cbi.org</a></p> <p>Biomass contact: Greg Stanton <a href="mailto:Greg.stanton@edcgov.us">Greg.stanton@edcgov.us</a></p>