Forest Resilience Authorities ("FRAs"): How regional wood waste management can support forest health, climate mitigation, and economic development goals in California

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Conservation Strategy Group

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Executive Summary

Background

California aims to increase the pace and scale of its forest management, including forest thinning, prescribed fire, and similar fuels reduction treatments, in order to reduce wildfire and improve forest health. In 2018, former Governor Brown issued Executive Order B-52-18, which described how the state's forests are overgrown and deteriorating due to a history of fire suppression. This Executive Order was accompanied by the finalization of California's Forest Carbon Plan (FCP), the product of an extensive multi-agency collaboration, which sets an aspirational goal for the state to treat one million forested acres per year.

FCP implementation presents a number of implications for California. First, it requires a significant increase in the level of forest treatments, which are currently about 250,000 acres per year.[1] Second, it requires a substantial increase in funding for forest treatments. Assuming it costs $2,000 to treat one acre, it would cost the state at least $2 billion per year, for a period of at least 20 years, to implement the FCP. In the 2019-20 budget, California appropriated only $200 million towards forest health projects.[2] Finally, it requires a new approach to wood waste management. Wood waste refers to the non-merchantable slash and residues that result from forest health treatments. Wood waste is typically disposed of via open pile burning or is simply left to decompose on the forest floor. These practices result in significant greenhouse gas (GHG) emissions, as well as negative air quality and public safety impacts. At the scale of FCP implementation, which equates to generating hundreds of millions of new tons of wood waste, without alternative disposal options, the GHG emissions from these practices would substantially undermine the state's climate goals. Overall, a new strategy is needed which can support FCP implementation and align the state's forest health and climate goals.

One strategy to achieve this objective is to sustainably remove, collect, and process wood waste into wood products. New and innovative wood products, such as renewable liquid and gaseous transportation fuels, mass timber, and others, provide an alternative and carbon-beneficial wood waste disposal option compared to open pile burning and decomposition. In addition, new wood products markets increase the value of wood waste, thereby generating revenue streams to support FCP implementation. Finally, and as an important added benefit, new wood products manufacturing could create economic development opportunities in rural communities. In summary, a strategy which aims to sustainably remove, collect, and process wood waste into wood products presents a viable pathway to support California's ambitious forest treatment, climate, and economic development goals.

[1] Executive Order B-52-18, 2018, https://www.ca.gov/archive/gov39/wp-content/uploads/2018/05/5.10.18-Forest-EO.pdf

[2] California State Budget 2019-20, http://www.ebudget.ca.gov/2019-20/pdf/Enacted/BudgetSummary/FullBudgetSummary.pdf

Current Problem: Lack of Reliable Feedstock Supply

Prospective wood products businesses face high barriers to market entry in California. This is due to an inability to easily obtain reliable, long-term (i.e. 10- or 20-year) supplies of wood waste feedstock. As background, in order to borrow capital to build a new plant or facility, wood products businesses need to demonstrate access to a reliable, long-term feedstock supply. There are few existing mechanisms, whether it be a type of contract or other arrangement, that can generate a reliable, long-term supply of wood waste from forested lands in California. For example, the longest contract that wood products businesses can obtain with the United States Forest Service (USFS), which manages 60% of the state's forests, is a 3-5 year project-level feedstock supply contract. In the case of other landholders, such as commercial timberlands, state lands, and small private lands, while it is feasible that wood products businesses could negotiate long-term arrangements with these landholders, it is practically challenging. For example, state landholders have undeveloped internal processes for wood waste removal; and small private landholders typically generate an insufficient amount of wood waste on their own to negotiate a contract. Developing a new approach which can enable long-term feedstock supply from forested lands, notably federal lands, is the critical barrier to mobilizing and processing wood waste into wood products in California.

Proposed Solution: Forest Resilience Authorities

This paper proposes a new concept: regional wood waste management entities, which we refer to as Forest Resilience Authorities (FRAs). FRAs are public agencies created with the goal of facilitating long-term forest management in a region. FRAs perform a number of functions to achieve this goal, including: serving as a contracting hub for the region, thereby reducing costs for wood products businesses; providing environmental review services (e.g. NEPA; CEQA) to help facilitate projects in the region; and providing wood products business support services. Overall, FRAs provide a structured and transparent mechanism to facilitate the sustainable removal, collection, and processing of increasing amounts of wood waste in a region.

Additionally, FRAs present a new institutional arrangement which can feasibly provide for the reliable, long-term supply of wood waste from forested lands. In the case of federal lands, as public agencies, FRAs can enter into long-term agreements with USFS.[3] These agreements provide the authority for FRAs (and their subcontractors) to perform forest management on federal lands for periods up to 20 years. While these agreements do not contain prescriptions for wood waste removal volumes, which are limited to 3-5 year project-level contracts only, FRAs are anticipated to continually enter into project-level contracts for the lifetime of the agreement. From the perspective of wood products businesses (and lenders), this presents an institutional arrangement that will provide for the steady, reliable, and long-term supply of wood waste from federal lands. In the case of other landholders, FRAs can help overcome barriers to negotiating long-term arrangements. For example, FRAs can consolidate the feedstock supply of small private landholders to satisfy a wood product business supply contract. FRAs can also

[3] These include: Stewardship Agreements or Good Neighbor Agreements (GNAs). Stewardship Agreements are available to public agencies and non-profits. GNAs are available to public agencies only.

demonstrate and develop contracting approaches with state landholders, which would otherwise present a high barrier to engagement for an individual business. Overall, FRAs can ensure that a region has access to a steady, reliable, and long-term supply of wood waste from multiple landholders (Figure 1).

Figure 1: FRAs as contracting hubs

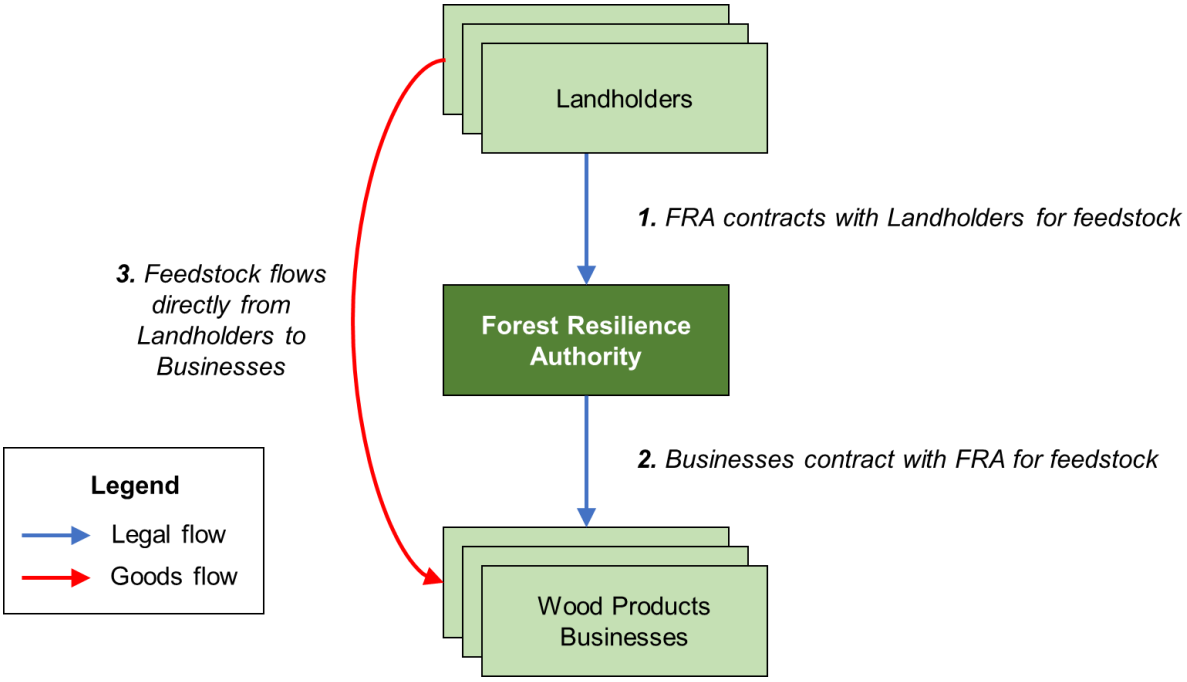

***Figure 1**: FRAs hold feedstock contracts with multiple different landholders in a region. As a result, businesses can coordinate with FRAs to access a reliable, long-term feedstock supply. FRAs perform a contracting function only; feedstock would flow directly from landholders to businesses.*

Legal Frameworks

The FRA concept could feasibly be developed or embedded in one of three existing legal frameworks. These include:

- **Joint Powers Authority (JPA)**: FRAs could be established as new JPAs. JPAs provide a number of advantages, including strong local engagement, the ability to operate flexibly and raise financing (e.g. tax increment financing; revenue bonds), and are relatively straightforward to establish. JPAs are also capable of retaining revenues from operations.[4] This is an important consideration, as it could allow JPAs to plan and establish capabilities (e.g. personnel; internal processes) designed to support the notion of multiple forest restoration projects occurring in a region over a long-term period.

[4] This is not the case for most public agencies, whose revenues are often absorbed and re-appropriated as part of the annual state budget process.

- **State Agency**: The FRA concept could feasibly be embedded within the California Natural Resources Agency in either the Forest Management Task Force; Department of Forestry and Fire Protection; State Conservancies; or Wildfire Safety Division. While state agencies certainly have the expertise to perform the function of FRAs, state agencies are unable to retain revenues from operations as reliably as JPAs.
- **Special District**: FRAs could be established as new special districts. This approach presents unique opportunities, including the ability to ensure that the special district can retain revenues under a variety of potential agreements. One key obstacle is the fact that the creation of special districts requires new legislation.

While this paper does not make a conclusive recommendation, we would like to highlight the benefits of establishing FRAs via JPAs. JPAs allow for substantial local and regional representation, and can be tailored to meet specific local needs and priorities. JPAs can also benefit from state agency expertise with state agency Board membership. JPAs are expeditious to set up, and are more likely to be financially sustainable than other options. While special districts could feasibly offer similar benefits, they are much more challenging to establish via the legislative process. While existing state agencies certainly have the expertise to perform the function of FRAs, and do present a stable option, generally, it is more challenging for these agencies to maintain robust local relationships and also retain revenues from operations.

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Introduction

California has set a goal to increase forest management on the basis that the state's forests are dense, overcrowded, and unhealthy.[5] Historically, naturally-ignited fires and those lit by Native Americans controlled the accumulation of shrubs, understory trees, and other surface fuels.[6] However, since the early 20th century, and following a series of highly destructive fires at that time, the federal government adopted strong fire suppression policies. This resulted in California's average annual wildfire burn acreage declining to less than 6% of its historical average.[7] As a result, fuels accumulation has become widespread in California, which is a principle cause of the catastrophic wildfires we experience today. More broadly, fuels accumulation has led to the deterioration of forest health statewide, by exacerbating impacts of wildfire, drought, disease, tree mortality, and climate change.[8] Active forest management, including fuels reduction and similar treatments, is necessary to restore California's forests to their healthy, resilient, and historic state, and to reduce the risk of catastrophic wildfire.[9]

[5] Executive Order B-52-18, 2018, https://www.ca.gov/archive/gov39/wp-content/uploads/2018/05/5.10.18-Forest-EO.pdf; *See also* Forest Climate Action Team, 2018, "California Forest Carbon Plan: Managing Our Forest Landscapes in a Changing Climate", https://resources.ca.gov/CNRALegacyFiles/wp-content/uploads/2018/05/California-Forest-Carbon-Plan-Final-Draft-for-Public-Release-May-2018.pdf.

[6] Little Hoover Commission, 2018, "Fire on the Mountain: Rethinking Forest Management in the Sierra Nevada", https://lhc.ca.gov/sites/lhc.ca.gov/files/Reports/242/Report242.pdf; *See also* Kelsey, R (The Nature Conservancy), 2019, "Wildfires and Forest Resilience: the case for ecological forestry in the Sierra Nevada", https://www.scienceforconservation.org/assets/downloads/WildfireForestResilience_2019_Kelsey_2.pdf.

[7] Little Hoover Commission, 2018.

[8] Sierra Nevada Conservancy, 2017, "The State of Sierra Nevada's Forests – From Bad to Worse", https://sierranevada.ca.gov/wp-content/uploads/sites/326/2019/12/SOS-v2-a11y.pdf. *See also* North Coast Resource Partnership, 2018, "Heathy Watersheds, Vital Communities, Thriving Economies – Actionable Strategies for California's North Coast Region", https://northcoastresourcepartnership.org/site/assets/uploads/2018/06/NCRP_Report_Greenprint_v3.pdf.

[9] Kelsey, R, 2019; *See also* Stephens, S et al. (UC Berkeley), 2019, "Perspectives from a long-term study of fuel reduction and forest restoration in the Sierra Nevada", https://nature.berkeley.edu/stephenslab/wp-content/uploads/2020/02/Collins-et-al.-Tree-Rings-article.pdf; Collins et al. (UC Berkeley), 2017, "Impacts of different land management histories on forest change", https://nature.berkeley.edu/stephenslab/wp-content/uploads/2018/12/Collins-et-al.-2017-Impacts-of-different-land-management-histories-on-forest-change.pdf.

Barriers to increasing pace and scale

As stated above, California has set an ambitious forest restoration goal, which, if accomplished, would produce many benefits, including wildfire risk reduction;[10] GHG emissions reductions;[11] and improvements to air quality,[12] water supply,[13] biodiversity protection,[14] and public safety.[15] However, wood waste management presents a key obstacle to realizing these benefits. Wood waste, or biomass waste, refers to the non-merchantable slash and residues that result from forest health treatments.[16] Wood waste is typically a liability for project managers, and is often open pile burned, or left to decompose on the forest floor. These actions result in significant GHG emissions, substantially reducing the climate benefits associated with performing forest management.[17] Pile burning also releases smoke and particulate matter, which is harmful to public health.[18] Finally, wood waste that is left to decompose still presents a fire hazard, minimizing the public safety benefit of performing the forest treatment in the first place.[19] Overall, the climate, public health, and public safety benefits of increasing forest management are largely negated if wood waste cannot be reliably collected, transported, and processed in more beneficial ways. In some cases, wood waste can be diverted to biomass power plants, which offer benefits such as community grid resilience. However, these projects typically require substantial public subsidies, and combustion results in GHG emissions.[20]

While wood waste management is already a problem today, hundreds of millions of new tons of wood waste will be generated in the coming decade if California increases forest management in accordance with state goals.[21] Without a new approach to wood waste management, all of

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[10] Little Hoover Commission, 2018; *See also* Sierra Nevada Conservancy, 2017; North Coast Resource Partnership, 2018; Kelsey, R., 2019.

[11] Sanchez, D & Cabiyo, B (UC Berkeley), 2019; *See also* California Air Resources Board, 2019, "California Wildfire Emissions Estimates", https://ww3.arb.ca.gov/cc/inventory/pubs/ca_wildfire_co2_emissions_estimates.pdf; Department of the Interior, 2018, "New Analysis Shows 2018 California Wildfires Emitted as Much Carbon Dioxide as an Entire Year's Worth of Electricity", https://www.doi.gov/pressreleases/new-analysis-shows-2018-california-wildfires-emitted-much-carbon-dioxide-entire-years.

[12] Stone, S et al. (US EPA), 2019, "Wildfire Smoke: A Guide for Public Health Officials", https://www.airnow.gov/sites/default/files/2019-10/wildfire-smoke-guide-revised-2019.pdf.

[13] Bales, R et al. (UC Merced), 2011, "Forests and Water in the Sierra Nevada: Sierra Nevada Watershed Ecosystem Enhancement Project", https://ucanr.edu/sites/cff/files/146199.pdf; *See also* Podolak, K et al. (The Nature Conservancy), 2015, "Estimating the Water Supply Benefits from Forest Restoration in the Northern Sierra Nevada", https://www.lgc.org/wordpress/wp-content/uploads/2018/11/WATERSUPPLYBENEFITSfromForestRestorationMarch2015-2.pdf.

[14] Manley, P (USFS), 2004, "The Future of Biodiversity in the Sierra Nevada Through the Lake Tahoe Basin Looking Glass", https://www.fs.fed.us/psw/publications/documents/psw_gtr193/psw_gtr193_5_5_Manley.pdf.

[15] Sierra Nevada Conservancy, 2017.

[16] We define wood waste as small-diameter trees less than 8 inches in diameter breast height (DBH), logging slash like limbs and tops, and brush.

[17] California's forests are already an annual GHG source. *See*: https://ww3.arb.ca.gov/cc/inventory/pubs/nwl_inventory.pdf; *See also* Sanchez, D, 2019.

[18] Stone, S et al., 2019.

[19] In this case we are referring to large burn piles that are left to decompose on the forest floor, and so present a significant fire hazard. It is certainly the case that retaining some wood waste on the forest floor is important, particularly as it provides critical habitat for endangered species.

[20] Springsteen, B et al. (Placer County Air Pollution Control District), 2015, "Forest biomass diversion in the Sierra Nevada: Energy, economics, and emissions", https://escholarship.org/content/qt29d705xw/qt29d705xw.pdf?t=nwtotz.

[21] Baker, S et al. (Lawrence Livermore National Laboratory), 2020, "Getting to Neutral – Options for Negative Carbon Emissions in California", https://www-gs.llnl.gov/content/assets/docs/energy/Getting_to_Neutral.pdf.

these impacts will be multiplied; substantially reducing the net benefits of performing forest management work, and potentially undermining the state's efforts to achieve its carbon sequestration and carbon neutrality goals.[22]

Turning a problem into a solution

If wood waste could be diverted from open pile burning and decomposition, and instead be processed into wood products, this would both overcome the climate, air quality, and public safety challenges mentioned above, and present new opportunities for rural economic development and jobs creation. Wood products upgrade wood waste from a liability into something of value, thereby providing financial support for expanded forest health treatments. Billions of new dollars will be required each year, for at least the next 20 years, for California to achieve its forest treatment goals.[23] A viable wood products industry can support this goal by creating a circular forest health and restoration economy, as well creating jobs in communities that were severely affected by the downturn in the timber industry in the 1990s.

In a recent report, the Joint Institute for Wood Products Innovation evaluated the commercial and technological readiness of different innovative wood products.[24] The report described a number of potentially viable wood products and highlighted the following as the most promising derived from wood waste: converting wood waste into liquid and gaseous transportation fuels, such as renewable hydrogen and renewable natural gas. Separately, Lawrence Livermore National Laboratory (LLNL) underscored the climate benefits of processing wood waste into biofuels with carbon capture and storage (CCS).[25] The report also highlighted that mass timber products, such as cross-laminated timber, present a highly promising wood product option. However, these products primarily require a merchantable timber feedstock.

Wood products – and a sustainable wood products industry in California – presents a viable solution to help the state achieve its ambitious forest treatment goals in a way that is aligned with climate, air quality, and public safety objectives, and creates rural economic benefits. However, prospective wood products businesses currently face high barriers to market entry in California. This is due to an inability to easily obtain long-term feedstock supply.

[22] California Air Resources Board, 2017, "California's 2017 Climate Change Scoping Plan", https://ww3.arb.ca.gov/cc/scopingplan/scoping_plan_2017.pdf; *See also* Executive Order B-55-18, 2018.

[23] This can be demonstrated through a simple calculation: If we reasonably assume, on average, total treatment costs of $2,000/acre, then: 1 million acres/year * $2,000/acre = $2 billion/year.

[24] Joint Institute for Wood Products Innovation, 2020, "Literature Review and Evaluation of Research Gaps to Support Wood Products Innovation", https://bof.fire.ca.gov/media/9688/full-12-a-jiwpi_formattedv12_3_05_2020.pdf.

[25] Baker, S et al., 2020. In the report, LLNL highlights how biofuels production with CCS deployment ("negative emissions") is a critical strategy for California to achieve carbon neutrality by 2045.

Long-term feedstock supply

“Long-term” feedstock supply refers to wood products businesses having access to a guaranteed, reliable supply of wood waste for at least 10, but ideally up to 20, years. Wood products businesses are unable to raise financing from banks or other institutions to build new plants or facilities if they are unable to demonstrate long-term feedstock supply. While the gold standard for demonstrating long-term supply is an executed contract, in many cases an executed contract is not required if a party can demonstrate a set of conditions that effectively assures a steady, reliable, feedstock supply. In California, there are few existing mechanisms, whether it be a type of contract or other arrangement, that can generate a reliable, long-term supply of wood waste from forested lands. This is primarily a problem for USFS-managed federal lands, which account for almost 60% of the state’s forests, and where there is no existing mechanism available. While it is feasible that long-term arrangements could be negotiated with other landholders (e.g. commercial timberlands; state lands; small private lands), it is practically challenging. In short, a new approach which can enable long-term feedstock supply from forested lands, notably federal lands, is the critical barrier to mobilizing and processing wood waste into wood products in California.

Overview of this paper

The remainder of this paper is outlined as follows. First, we provide a short summary of the different USFS contracting options, which provide a foundation for exploring different applications of the FRA concept. We review USFS contracting in more detail given the significant land management role of USFS in California. Second, we introduce the FRA concept, including how it provides for long-term feedstock supply, as well as a structured and transparent mechanism to facilitate wood waste management in a region. Third, we evaluate the various legal frameworks within which the FRA concept could be developed or embedded. Finally, we summarize the findings of this paper and identify areas for further research.

1. Contracting with USFS

There are a multiple contracting instruments available to non-federal entities to engage with USFS. These instruments vary in terms of their prescriptiveness and function. Some instruments are broad in nature ("Agreements"), and function to provide the general authority for non-federal entities to work on federal lands, as well as articulate shared goals and objectives in relation to natural resources management. Other instruments are specific in nature ("Contracts"), and function to support project implementation, including with clearly defined roles and responsibilities, treatment plans, schedules, removal volumes, product prices, and more. Ultimately, these instruments involve USFS allowing non-federal partners to engage in some degree of federal lands management, ranging from helping to develop natural resources management goals, through planning, to project implementation on federal lands.

Overview[26]

Generally speaking, there are three different types of instruments that govern wood removal from federal lands: Timber Sales Contracting,[27] Stewardship Agreements,[28] and Good Neighbor Agreements (GNAs).[29] Each of these instruments are discussed below.

Timber Sales Contracts

Timber Sales Contracts apply to individual projects, are generally entered into by private forest contractors with USFS, and contain prescriptions related to timber removal volumes (e.g. DBH limits) and product prices (e.g. $/MBF).[30] Timber Sales projects are not forest health or restoration projects. USFS relies on Timber Sales projects under certain circumstances to raise revenue through the commercial sale of timber. Timber Sales Contracts may include prescriptions for wood waste. However, as wood waste typically has low, no, or negative value, it is often not a focus of Timber Sales Contracts; as contractors seek to dispose of wood waste in the most cost-effective way possible. Timber Sales Contracts are highly specified, and present one pathway of removing wood from federal lands.

In contrast, Stewardship Agreements and GNAs (discussed below) are broadly defined instruments that provide state and local government agencies, tribes, and non-profit partners the authority to work on federal lands for the purpose of forest health and restoration.[31] The Agreements are usually entered into by public agencies, are defined at the landscape-level, and do not contain prescriptions related to removal volumes or prices. Instead, the Agreements provide a framework and bounds for any prescriptions contained in subsequent project-level

[26] Note that it is not the intention of this paper to comprehensively review and evaluate different USFS contracting options, which are complex, and are subject to ongoing rule changes. Instead, we intend to provide a broad overview of available options only, which can allow us to then explore different applications of the FRA concept.
[27] 16 U.S Code §472a Chapter 2.1.
[28] 2014 Farm Bill, §8205 of Public Law 113-79.
[29] 16 U.S Code §2113a.
[30] MBF = "thousand board feet."
[31] Note that GNAs are available to public agencies only.

contracts. Stewardship Agreements and GNAs (and their subsequent contracts) primarily differ from Timber Sales Contracts in that their function is not to raise revenue, but rather, to facilitate forest restoration. While the Agreements allow for some revenue to be raised to help cover project costs (e.g. sale of wood waste and limited timber resulting from forest health treatments), to the extent this revenue exceeds project costs, this revenue is retained ("retained receipts"), and used to fund future forest health projects. Stewardship Agreements and GNAs are the relevant USFS instruments for the purpose of this paper.

Stewardship Agreements[32]

There are two types of Stewardship Agreements: Stand-Alone Agreements (SAAs) and Master Services Agreements (MSAs). These Agreements are fairly similar in function: they are typically entered into by public agencies; they provide the authority for these agencies to work on federal lands; they define goals and objectives related to forest health and natural resources management; and they serve as an overarching framework for subsequent project-level contracts. However, they differ in that SAAs are not usually defined in relation to a specific region, while MSAs are defined in relation to a specific region (e.g. National Forest; county). The project-level contracts that tier-off SAAs are called Stewardship Contracts[33], while the project-level contracts that tier-off MSAs are called Supplemental Project Agreements (SPAs). Both Stewardship Contracts and SPAs require matching funds of up to 20% on the part of project partners. SAAs can be operative for up to 10 years, while MSAs can be operative for up to 20 years.

While it is promising that long-term Stewardship Agreements are possible, it should be noted that subsequent project-level contracts do not maintain the same terms as these Agreements; and it is in these project-level contracts where removal volumes are prescribed.[34] Project-level contracts tend to obtain, at best, 3-5 year feedstock supply terms. This presents a problem for existing public agencies or wood products businesses who need to demonstrate a reliable, long-term feedstock supply, and prevents them from engaging directly with USFS.

Good Neighbor Agreements

GNAs are a relatively new federal tool, and are designed to be more flexible than Stewardship Agreements. GNAs can only be entered into between state, local, and tribal entities with USFS. GNAs have no requirement for matching funds and are applicable to a larger variety of project-level activities than Stewardship Agreements. GNAs allow retained receipts (called "program income" under GNA) to be applied to either future project implementation or planning-related activities (e.g. NEPA permitting). However, it should be noted that this allowance is available to state agency partners only at this stage.[35] While Stewardship Agreements also allow retained

[32] Appendix A provides a summary of some current projects which implement Stewardship Agreements in California.
[33] Note that the Stewardship Contract is technically a different USFS tool compared to the Stewardship Agreement, however, can be applied to SAAs to facilitate project-level work.
[34] There are a number of complicated, underlying reasons for this, including USFS' current approaches to National Environmental Policy Act (NEPA) permitting and approvals, established internal processes, and more. It is unlikely that this set of challenges and processes will be able to easily be resolved.
[35] Further guidance on this issue from USFS is forthcoming.

receipts to support either future projects or planning-related activities,[36] GNAs are designed to provide state partners with more autonomy regarding how program income is managed and directed for these purposes.[37] GNAs can be operative for up to 10 years, but likely still face the same constraints as Stewardship Agreements related to maintaining these terms at the project-level. GNAs are not defined in relation to a specific region, and the project-level contracting mechanism is the Stewardship Contract. Current examples of GNAs in California include a GNA between USFS Regions 4 and 5 and the California Natural Resource Agency, and another GNA between USFS Regions 4 and 5 and the Sierra Nevada Conservancy (SNC).[38]

Key takeaways

For the purpose of this paper, there are three key takeaways regarding contracting with USFS. First, there are a number of contracting instruments available for public agencies and non-profits to enter into long-term, forest health-oriented agreements with USFS, including SAAs, MSAs, and GNAs. Second, GNAs provide some benefits over SAAs and MSAs, including no requirement for matching funds, as well as increased autonomy over the management of program income (provided the partner is a state agency). Finally, while SAAs, MSAs, and GNAs can be operative for long-term periods, in isolation, they do not provide a long-term, guaranteed feedstock supply that could be passed on to wood products businesses.

[36] Historically, retained receipts under Stewardship Agreements could support future projects only. However, recent USFS guidance (July 2020) has broadened the applicability to use these funds to support planning actions also.

[37] In the case of either Stewardship Agreements or GNAs, it should be noted that the ability to manage and direct revenues in this way is a general rule only, and may be subject to differences depending on the terms negotiated as part of individual Agreements. For further information on this as it relates to GNAs, see the Rural Voices for Conservation Coalition report, titled *Understanding Good Neighbor Authority: Case Studies from Across the West*: https://static1.squarespace.com/static/562e839ee4b0332955e8143d/t/5bb64dde7817f799e3355fed/1538674144568/RVC+GNA+2018_web_.pdf.

[38] USFS Region 5, “Partnership: Good Neighbor and Stewardship Authorities,” 2020, https://www.fs.usda.gov/detailfull/r5/workingtogether/partnerships/?cid=fseprd646022&width=full.

2. A New Approach: Forest Resilience Authorities

In this section we introduce the idea of establishing new, regional wood waste management entities, which we refer to as Forest Resilience Authorities (FRAs). FRAs are public agencies that present a new institutional arrangement which provides for the reliable, long-term supply of wood waste from forested lands in California. FRAs also provide a structured and transparent approach to facilitating sustainable wood waste management in a region.

Forest Resilience Authorities

FRAs are new public agencies created with the goal of facilitating long-term forest management in a region. FRAs perform a number of functions to achieve this goal (Figure 2). FRAs foremost function is to serve as a contracting hub for a region and to facilitate a sustainable wood waste management system. FRAs contract for feedstock with landholders, and then make these contracts available to wood products businesses, thereby reducing costs and barriers to entry for prospective wood products businesses. FRAs also contract with forestry professionals to perform forest health treatments and remove wood waste. Additionally, FRAs perform an environmental review function to help facilitate projects in the region. FRAs employ professional staff to assist with reviews related to the Forest Practices Act, NEPA, and California Environmental Quality Act (CEQA). Finally, FRAs provide business support services (e.g. business planning; cash flow management; loan and grant application assistance) for prospective wood products businesses seeking to enter the wood products industry.

Figure 2: Summary of FRA functions

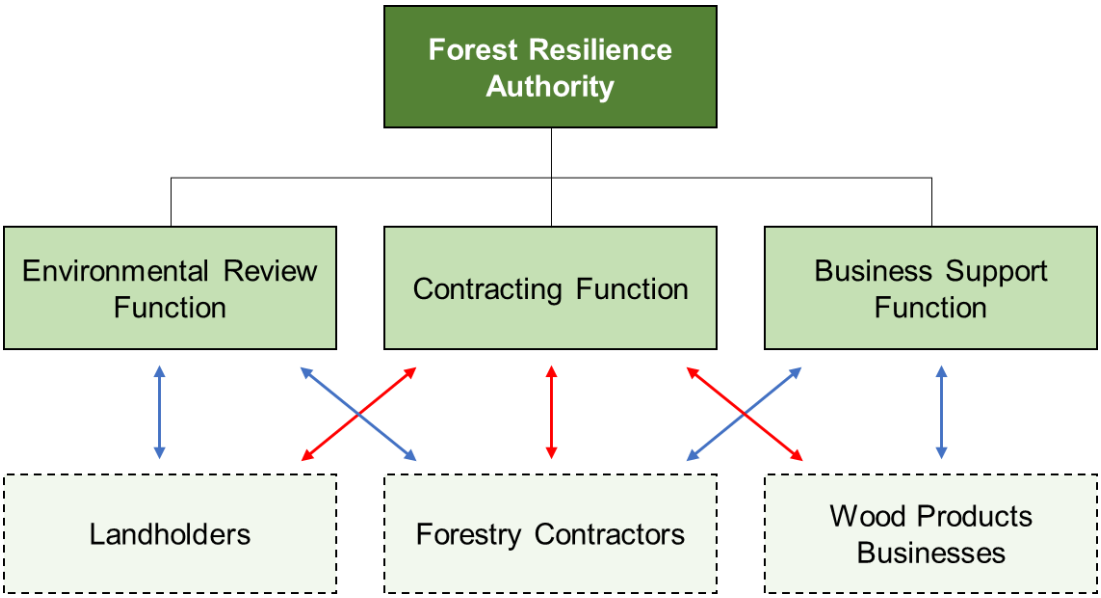

***Figure 2**: FRAs perform three key functions. The way each of these functions are anticipated to interact with landholders, forestry contractors, and wood products businesses are highlighted in the diagram. It is anticipated that an FRAs contracting function would be relevant to all parties.*

In addition to providing a number of important support functions for a region, FRAs also provide for the reliable, long-term supply of wood waste from forested lands. In the case of federal lands, as public agencies, FRAs can enter into long-term Stewardship Agreements or (preferably) GNAs with USFS. FRAs long-term commitment to forest management in a region implies that FRAs will then continually enter into project-level feedstock contracts for the lifetime of the agreement. From the perspective of wood products businesses (and lenders), this presents a new institutional arrangement which assures that a steady, reliable, and long-term supply of wood waste will be available from federal lands. In the case of other landholders, FRAs can help overcome barriers to negotiating long-term arrangements. FRAs can consolidate the feedstock supply of small private landholders to satisfy a wood product business supply contract. FRAs can also demonstrate and develop contracting approaches with state landholders, which would otherwise present a high barrier to engagement for an individual business. Overall, FRAs can ensure that a region has access to a steady, reliable, and long-term supply of wood waste from multiple landholders (Figure 3).

Figure 3: FRAs as contracting hubs

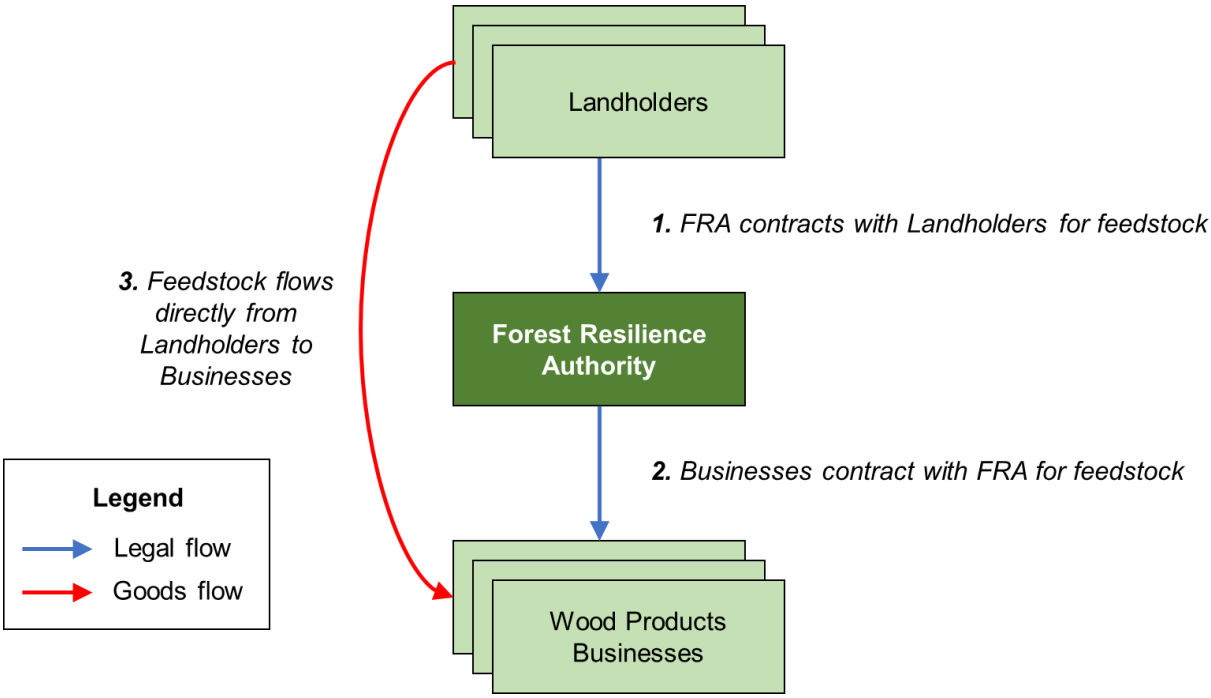

***Figure 3**: FRAs hold feedstock contracts with multiple different landholders in a region. As a result, businesses can coordinate with FRAs to access a reliable, long-term feedstock supply. FRAs perform a contracting function only; feedstock would flow directly from landholders to businesses*

The paragraphs below provide additional considerations related to the functions of FRAs.

Contracting function

- FRAs should utilize existing local experts and collaboratives to develop the underlying forest management and treatment plans contained in agreements and project-level contracts. This would ensure that forest management is led and guided by regional stakeholders, and reduce perceived conflicts of interest.[39] It is not anticipated that FRAs would develop forest management plans. Rather, the role of FRAs is to facilitate wood waste management in a region through contracting and by providing environmental review and business support functions only.
- FRAs should aim to support and enhance existing efforts being undertaken by local forestry professionals, Resource Conservation Districts, non-profits, and collaborative partnerships. FRAs should seek appropriate opportunities to assist these groups with non-forest related demands, such as grant applications and contracts administration.
- FRAs should ensure fair and open contracting processes that provide a level playing field for the private business community, including a robust Request for Proposal process that encourages both existing and new businesses to participate.
- FRAs should be self-sustaining entities. FRAs costs for contract management should be incorporated into the transactions it facilitates as a contracting hub. Moreover, FRAs should aim to retain revenues where relevant to support future regional projects.
- Risk management mechanism(s) should be considered in the event that less feedstock is available than contracted to businesses. This will be particularly important where FRAs channel feedstock supply from federal lands to wood products businesses. Further work is needed to explore potential insurance tools to support this scenario.[40]
- Notwithstanding the challenge of entering into long-term project-level contracts with USFS, FRAs, where possible, should seek to negotiate these terms. This might be more feasible as FRAs establish themselves in regions. The reason is that it will create pressure for innovation related to the multiple but different ways in which short-term project-level contracts are self-reinforced, such as via current approaches to NEPA, and as part of any institutionalized processes within USFS.

Environmental review function

- The cost of environmental review often presents a significant barrier to project implementation. FRAs environmental review function is designed to help overcome this barrier to help increase the pace and scale of forest management in a region.
- FRAs can provide support for USFS and federal lands projects in particular, given challenges related to predicting National Forest discretionary budgets; multi-year regulatory planning process; and high staff turnover rates.

[39] Exploring what a mechanism might look like (e.g. local experts could be certified to develop these plans for FRAs) presents a key and important area for future research.

[40] Example mechanisms might include something akin to California Air Resources Board's (CARB's) special fund approach to protect its forest carbon credit program in the event of wildfire.

- It should be noted that SB 901 provides a CEQA exemption for projects performed on federal lands that reduce the risk of severe wildfire if those projects have an approved NEPA review and are undertaken through Stewardship Agreements or GNAs.[41]

Business support function

- FRAs provide targeted business support services for prospective wood products businesses. In addition to the business planning; cash flow management; and loan and grants application assistance, FRAs could also assist with insurance pooling.

[41] California Public Resources Code §4779.05 (d).

3. Legal Frameworks

In this section, we consider three distinct legal frameworks within which the FRA concept could be developed or embedded. FRAs could be developed in the following ways: as new Joint Powers Authorities (JPAs); within existing California Natural Resources Agency (CNRA) departments, including either the Forest Management Task Force, Department of Forestry and Fire Protection (CAL FIRE), State Conservancies, or Wildfire Safety Division; or as new special districts. We consider relevant background as well as the pros and cons of each framework.

Joint Powers Authorities

Established by the Joint Exercise of Powers Act[42] (the Act), JPAs involve combining two or more existing public agencies to create another legal entity.[43] JPAs are typically created to eliminate duplicative services, consolidate services into a single entity, or to deliver more cost-effective services. California has established more than 1,800 JPAs in its history.[44] JPAs are commonly exercised to work on projects like groundwater management, transportation planning, or habitat restoration. JPAs must be formed through an agreement, signed by each member agency, which outlines the powers and expectations of the JPA. As a legally separate entity, JPAs can enter into contracts, sue or be sued, are required to conduct annual audits, hire staff, obtain financing, and manage property. JPAs have a governing board mostly comprised of member agency officials, but also external experts and community representatives where applicable. JPAs must function under the pre-existing powers that are common to all parties.[45] If a power is not shared by all members, then it cannot be exercised by the JPA.

The types of public services JPAs can provide are broad, ranging from planning[46] to project implementation, and could include forest restoration[47] and fire reduction activities.[48] The formation of a JPA is unique in public governance because it is not created by signatures, petitions, approved by a public vote, or created for a specific purpose by the Legislature. Rather, the Legislature established the process for agencies themselves to create JPAs. The structure of a JPA allows for maximum flexibility for multi-level government agency voluntary collaboration to agree upon mutually held powers to handle a common or complex set of issues. JPAs are public agencies and are subject to the public interest laws that ensure political transparency.

[42] Joint Powers Agreements [6500-6539.6] (Article 1 added by Stats. 1976. Chapter 84).
[43] Note that the authority established by the Act is generally exercised through two processes, referred to as Joint Powers Agreements and Joint Powers Agencies. This report focuses on the use of Joint Powers Agencies only. References to “JPA” in this report can be understood as references to Joint Powers Agencies under the Act.
[44] California State Legislature – Senate LGC “Governments Working Together: A Citizen’s Guide to Joint Powers Agreements.”
[45] *Oakland v. Williams*, 15. Cal 2d 542 (Cal 1940).
[46] For example, see California Association of Councils of Governments.
[47] See Cal Govt Code §6514.5.
[48] See Cal Govt Code §6503.1.

Funding

JPAs are often established specifically to facilitate capital financing, including via tax increment financing (TIF), selling bonds, or other mechanisms. TIF refers to the practice whereby future property tax revenues for a defined area are diverted to support a specific public project. JPAs can facilitate TIF. Examples include Enhanced Infrastructure Financing Districts and Community Revitalization and Investment Authorities, both of which are typically developed to offset redevelopment costs for local government agencies.[49] Further work is needed to explore if TIF could be leveraged by defining forestry projects as Community Revitalization or Infrastructure projects.[50]

Issuing bonds is another tool for JPAs to generate capital. Where local governments must obtain voter approval when issuing bonds for a major project, JPAs can issue revenue bonds without holding an election. This can only happen as long as member agencies of a JPA adopt local ordinances that permit the JPA to issue a bond. Using the Revenue Bond Act of 1941 and the Marks-Roos Local Bond Pooling Act of 1985, JPAs can generate capital for public improvement projects like jails, schools, parking lots, etc., and could potentially issue bonds for forest health projects. A thorough review of the possibilities for financing forest management projects through JPA bonds and TIF has recently been published within the Hastings Business Law Journal, which provides further valuable information.[51]

Insurance Pools

Another unique benefit of forming JPAs is the ability to offer a cost-effective alternative to commercial insurance through insurance pooling. This allows a JPA to pool funds and represent member agencies when seeking self-insurance. Through this tool, member agencies financially contribute to the JPA under a collective account in order to handle member agencies' claims. Insurance pooling can leverage lower-cost benefits for member agency employees and, in some cases, handle claims over $1 million through a "super JPA", although this is uncommon. Using these tools may be important to develop insurance for entities beyond members agencies, such as those who enter into contracts with FRAs. Further work is needed to develop methodologies and understand how this might work in practice.

Pros and Cons of JPAs[52]

JPAs are a promising option for an FRA. As a distinct legal entity, JPAs can offer a full suite of services, employ staff, and enter into feedstock contracts with landholders. JPAs are likely to be financially sustainable, as they can retain revenues from negotiated contracts, issue bonds, or leverage TIF. This is an important consideration, as the ability retain revenues could allow JPAs

[49] California Association for Local Economic Development, "FAQs on California's New Tax Increment Financing Tools," https://caled.org/wp-content/uploads/2019/07/TIF-Booklet-10-16.pdf.
[50] *Rider v. City of San Diego*, 18 Cal. 4th 1035 (1998).
[51] Anna Bernstein, *An Introduction to Joint Powers Authorities, Their Funding Mechanisms, and Why California Should Utilize One in Order to Create an Effective Forest Management System to Prevent Wildfires*, 16 Hastings Business Law Journal 231 (Summer 2020).
[52] Appendix B provides a summary of some existing and relevant JPAs in California.

to plan and establish capabilities (e.g. personnel; internal processes) designed to support the notion of multiple forest restoration projects occurring in a region over a long-term period. As public agencies, JPAs can access USFS GNAs. However, at this stage, JPAs must be formed with a state agency member (e.g. State Conservancy) to benefit from the ability to flexibly manage and direct revenues under GNAs.[53] JPAs also provide for strong local engagement, and can be tailored to meet unique local needs. Potential disadvantages of establishing JPAs can be the inability of members to easily exit the JPA, especially if there are protocols for members to maintain long-term participation in the JPA. In addition, the general public might find the formation of a new JPA an unnecessary layer of government.

Existing State Agencies

FRAs could be embedded within existing state agencies within CNRA. We evaluated each of the following agencies as potential options: Forest Management Task Force; CAL FIRE; State Conservancies; and Wildfire Safety Division. We ranked each of these agencies on their capacity to meet certain Administrative Readiness Metrics (metrics on a scale of 1 (low) to 5 (high)). This should be considered an initial and illustrative analysis only, and is by no means an exhaustive assessment of the various pros and cons related to each state agency. The Metrics include:

- Strength of connection to local governments and communities;
- Existing authority, structure, and expertise to perform the role of FRAs;
- Available budget for staff; and
- Ability to retain revenues from operations.

Forest Management Task Force

The Forest Management Task Force (FMTF) was convened in 2018 within CNRA for the purpose of implementing Executive Order B-52-18 as well as the FCP. FMTF contains representatives from local and state government agencies, academia, industry, and the non-profit community. FMTF has no specific jurisdictional authority, and most participants are voluntary. The objectives of FMTF are to enhance coordination and information flow between federal, state, and local governments, tribes, businesses, and the non-profit community, as well as develop regional strategies for forest restoration.[54] FMTF is comprised of seven Working Groups (WGs), including the Science Advisory Panel, Forest Management and Restoration, Prescribed Fire, Landowner Education and Outreach, Regulations, Tree Mortality and Wood Utilization WGs. The Wood Utilization WG is focused on various aspects of cultivating a robust wood products industry in California. Additionally, these WGs are supported by four regional subgroups, which communicate and help implement the efforts and ideas of FMTF on-the-ground.

[53] Further guidance on this issue from USFS is forthcoming.
[54] https://fmtf.fire.ca.gov/.

Transitioning FMTF to perform the function of FRAs could be feasible. FMTF provides a strong option in terms of its structure (i.e. defined by four regions) and expertise of current participants. However, key drawbacks are that FMTF is not a distinct legal entity, has no explicit authority, and most participants are voluntary. Therefore, a fairly significant (and likely legislative) effort would be needed to transition FMTF into a new, distinct entity within CNRA, with its own budget, so it could hire staff to perform the functions of FRAs.

Administrative Readiness Ranking:

- Connection to local government and communities: 5
- Existing authority, structure, and expertise: 3
- Available budget for staff: 1
- Ability to retain revenues from operations: UNK[55]

CAL FIRE / Board of Forestry

CAL FIRE and the Board of Forestry and Fire Protection (Board) work together to carry out the California Legislature's mandate to protect and enhance the state's forest and wildland resources. The Board is a government appointed body within CAL FIRE responsible for developing the general forest policy of the state, determining the guidance policies of CAL FIRE, and representing the state's interest in federal forestland.[56] CAL FIRE has a comprehensive mission to manage and protect California's natural resources by being the first responder for all disaster-related incidents and overseeing the enforcement of the Board's forest regulations.[57] In the 2020-21 Budget, CAL FIRE was appropriated $90 million in General Funds with $93.2 million in ongoing funds to prepare for the expected active fire year for 2020.

Incorporating a new department within CAL FIRE or the Board to perform the functions of FRAs could be feasible. CAL FIRE has direct relationships with its California Climate Investments (CCI) grant recipients, which provides important engagement with local governments and communities. CAL FIRE and the Board together hold authority related to forest management activities in California. With the recent creation of the Wood Products and Bioenergy Program, there is arguably scope for CAL FIRE to expand its expertise related to wood products. Finally, CAL FIRE is well equipped to retain revenues from projects (i.e. sale of wood waste or timber) having developed a grant manual which outlines best practices for this. However, any added revenues it may be able to generate (e.g. through contract negotiation) which could allow for operational flexibility and to improve the capabilities of FRAs may be challenging to retain.[58]

Administrative Readiness Ranking:

- Connection to local government and communities: 4
- Existing authority, structure, and expertise: 3
- Available budget for staff: 3
- Ability to retain revenues from operations: 4

[55] There are no existing programs that bring revenue to FMTF, so this is unknown.
[56] https://bof.fire.ca.gov/.
[57] https://www.fire.ca.gov/
[58] AB 92 (California's 2019-20 Public resources: omnibus trailer bill) improves this somewhat in relation to GNAs.

State Conservancies

State Conservancies facilitate natural resources conservation, protection, and restoration efforts in key regions throughout California. Conservancies acquire and manage land, provide grants to local governments and non-profits, and coordinate regional stakeholders and conservation efforts. There are ten conservancies in California; however, for the purpose of this analysis, SNC, Santa Monica Mountains Conservancy (SMMC), California Tahoe Conservancy (CTC), and Coastal Conservancy have jurisdictions which overlap major forested areas. SNC is obviously a key agency given its role in relation to the Sierra Nevada, and the fact that USFS managed lands are primarily contained in the Sierra Nevada. SNC is already closely engaged with USFS on a number of key landscape-scale projects.[59] While the Coastal Conservancy is primarily focused on coastal issues, its jurisdiction does cover a large portion of North Coast forests. However, we note that large portions of coastal forests are held by private timber companies.

State Conservancies are regional in nature. They have strong local relationships and expertise related to the environmental issues in their region. Between SNC, SMMC, CTC, and the Coastal Conservancy, a large portion (but not all) of the state's forests are also covered. Finally, with their project experience, Conservancies are well positioned to retain revenues from projects; however, face the same challenges as CAL FIRE related to retaining other potential revenues.[60]

Administrative Readiness Ranking:

- Connection to local government and communities: 4
- Existing authority, structure, and expertise: 5
- Available budget for staff: 4
- Ability to retain revenues from operations: 4

Wildfire Safety Division

The Wildfire Safety Division (Division) is currently led by the California Public Utilities Commission (CPUC), with a primary directive to evaluate and approve or deny electrical corporation's Wildfire Mitigation Plans.[61] They also serve as an auditor to evaluate Investor-Owned Utility compliance, address faults, supervise Public Safety Power Shutoff protocols and issue safety certifications. After the devastating wildfire season of 2019, the California Legislature established a Wildfire Safety Advisory Board to advise and make recommendations to the Division.[62] In 2021 the Division will be transferred to CNRA's new Office of Energy Infrastructure Safety. We considered the prospect of establishing FRAs within the Division as it is related to forest health and it is going through a significant realignment, which might make sense from an administrative perspective to take advantage of this change.

[59] For example, see Tahoe Central Sierra Initiative: https://spark.adobe.com/page/lKuFG3mA6O2OM/.
[60] AB 92 (California's 2019-20 Public resources: omnibus trailer bill) improves this somewhat in relation to GNAs.
[61] https://www.cpuc.ca.gov/wsd/.
[62] *See* AB 1054 (2019).

Administrative Readiness Ranking:

- Connection to local government and communities: 1
- Existing authority, structure, and expertise: 3
- Available budget for staff: UNK
- Ability to retain revenues from operations: UNK

Alternative Options: CalRecycle; CDFA; Treasurer's Office; OPR; "All Wood" approach

There are alternative state agencies where FRAs could feasibly be embedded. FRAs could be embedded within the California Department of Resources Recycling and Recovery (CalRecycle), and serve a dual purpose to also support CalRecycle's efforts to implement SB 1383, which requires local governments to divert 75% of their organic waste from landfills into various products by 2025. FRAs could also support the California Department of Food and Agriculture (CDFA) in relation to agricultural wood waste management. Collectively, this represents an "all wood" waste management approach which could be explored further.[63]

FRAs could also be established as a special commission under the State Treasurer, similar to the California Transportation Financing Authority or California Alternative Energy Authority. Although, these administrative vehicles tend to be more narrowly focused on financing issues. Finally, FRAs could be embedded within the Governor's Office of Planning and Research (OPR), an agency with CEQA expertise and experience participating in the FMTF.

Special District

FRAs could be established as new special districts by the California Legislature. This presents a number of advantages, including the ability to specify the intent of FRAs (e.g. "to help increase the pace and scale of forest management in a region by facilitating feedstock contracting; providing for long-term feedstock supply; and other important support services"), and articulate the roles and responsibilities of each of the FRA departments. In addition, the Legislature can ensure that revenues from operations are able to be retained by the district. Finally, the Legislature can set up the special district such that it clearly meets the federal legal requirements for GNA. There is a current effort ongoing in Sonoma County, which is exploring the possibility of establishing a new special district focused on fire risk reduction (called the Natural Enterprise Complex). The major disadvantage of pursuing a special district is the challenge of passing legislation to establish a new special district – there is no guarantee a legislative proposal will successfully make it through the process.[64]

[63] In their recent report *Getting to Neutral: Options for Negative Carbon Emissions in California*, LLNL determined that there are 56 million bone dry tons (BDTs) of available organic waste in California, of which forest waste accounts for 24 million BDTs (or 43%); agricultural waste accounts for 13 million BDTs (or 23%); and municipal solid waste accounts for 19 million BDTs (or 34%). LLNL highlighted that diverting this waste to biofuels production with CCS is a critical strategy for the state to achieve carbon neutrality by 2045. This strategy is capable of reducing California's 424 million metric tons of CO_2-equivalent (Mt) GHG inventory by 33%, or 143 Mt, via a combination of avoided emissions and "negative emissions". An "all wood" approach would present a critical climate strategy for California.

[64] It should be noted that, instead of a special district, the Legislature could also create JPA. This may be relevant in the case that there is a desire to include non-governmental agencies on a JPA Board, which requires legislation (*see* Cal Gov't Code 6523.7)..

Conclusion

A strategy for the sustainable removal, collection, and processing of wood waste into wood products presents a viable pathway for California to achieve its forest health, climate, and economic development goals. FRAs present a new institutional arrangement which can provide for the steady, reliable, and long-term supply of wood waste feedstock from forested lands.

While this paper does not make a conclusive recommendation, we would like to highlight the benefits of establishing FRAs via JPAs. JPAs allow for substantial local and regional representation, and can be tailored to meet specific local needs and priorities. JPAs can also benefit from state agency expertise with state agency Board membership. JPAs are expeditious to set up, and are more likely to be financially sustainable than other options. While special districts could feasibly offer similar benefits, they are much more challenging to establish via the legislative process. While existing state agencies certainly have the expertise to perform the function of FRAs, and do present a stable option, generally, it is more challenging for these agencies to maintain robust local relationships and also retain revenues from operations.

It should be noted that while there are differences between these options, we do not propose that they are mutually exclusive. For example, it might be relevant to pursue a JPA in one region, and a special district in another region, depending on the circumstances. It is feasible that different legal frameworks may be suited to establish FRAs in different parts of the state.

Further Research

Below we identify where further work is needed for the purpose of developing the FRA concept more fully, as well as in relation to addressing long-term feedstock supply challenges:

- Defining the functions, roles, and responsibilities of FRAs;
- Exploring a reliable mechanism/approach for engaging local and regional forest experts to lead on developing forest management and treatment plans which form the basis of FRA agreements and project-level contracts;
- Determining the circumstances under which FRA JPAs could leverage funding options including bonds and TIF related to forest restoration;
- While not considered in this paper, exploring the prospect of wood waste certification, and how Chain-of-Custody could support the FRA concept;
- Exploring the applicability of CARBs credit insurance model to forest restoration projects for the purpose of the FRA concept; and
- Exploring the set of challenges which prevent long-term project-level feedstock supply contracts (i.e. current approaches to NEPA; established processes within USFS), and how at least some of these might be able to be resolved.

Appendix A – Current USFS collaborative projects

This Appendix highlights some existing projects which involve collaboration and/or agreements in various forms with USFS.

Tahoe Central Sierra Initiative[65]

The Tahoe-Central Sierra Initiative (TCSI) is a landscape-level effort to restore forest and watershed resilience over 2.4 million acres by consolidating collaborative, agency and regional priorities into one unifying initiative. This is a pilot project under the Sierra Nevada Watershed Improvement Program. The boundary covers the Lake Tahoe Basin, and the American, Bear, Truckee and Yuba watersheds. In 2017, 8 entities entered into a Memorandum of Understanding (MOU) solidifying an agreement to support the TCSI and currently includes five active projects: Caples Ecological Restoration, Lake Tahoe West Collaborative, North Yuba Partnership, French Meadows and Sagehen Experimental Forest Projects. While all collaborative projects underneath TCSI are innovative in scope and scale, of particular interest is the North Yuba Forest Resilience Project (below).

North Yuba Forest Resilience Project[66]

The North Yuba Forest Resilience Project is a 275,000 acre project organized through an MOU between 9 agencies: the Tahoe National Forest, Yuba Water Agency, National Forest Foundation (NFF), the Nature Conservancy, South Yuba River Citizens League, Camptonville Community Partnership, the Rancheria Nisenan Tribe, Sierra County and Blue Forest Conservation. Through commercial mechanical harvesting they are expecting approximately 75,000 green tons – or 37,500 bone dry tons – of biomass removed from 1,194 acres. NFF is currently administering the active project within the North Yuba Partnership boundaries through an MSA and SPA with the Tahoe National Forest Yuba Ranger District. What makes this partnership innovative is the “pay-for-success” model being piloted through the Blue Forest Conservation’s Forest Resilience Bond (FRB).

The FRB couples traditional funding sources, like grants, with a “pay-for-success” environmental impact bond which relies on quantifying the benefits of restoration activities, contracting to convert benefits into payments from FRB recipients, and the financial structuring to turn payments into cash flows for private investors. Cash flows going into the FRB can also include dollars from public entities with a shared interest in improving the forest functioning in the project area including: USFS, Electric Utilities, Water Utilities and State and Local Governments. By combining both private and public investor pools, the FRB is able to leverage compelling

[65] *See* https://sierranevada.ca.gov/what-we-do/tcsi/ and https://tahoe.ca.gov/tahoe-central-sierra-initiative/.
[66] *See* https://www.yubawater.org/317/North-Yuba-Forest-Partnership#:~:text=The%20North%20Yuba%20Forest%20Partnership,the%20North%20Yuba%20River%20watershed.&text=The%20North%20Yuba%20watershed%20runs,to%20New%20Bullards%20Bar%20Reservoir.

economics to provide a safety net for implementation projects to be completed while also providing a return for investors.

Fall River RCD[67]

The Fall River Resource Conservation District has been pushing the limits on what an RCD can accomplish. Through their Burney-Hat Creek Community Forest and Watershed Group (Community Group) they are discussing ways to implement landscape scale restoration between two watersheds and a mix of public and private land ownership. The Community Group is a community-based collaborative of citizens, businesses, organizations, governments and landowners who want to create a long-term model of success by restoring livable rural communities within thriving ecosystems. They have projects funded through USFS's Wood Innovation Grant and CARB's CCI funding among other funding sources. They are actively collaborating with the proposed Hat-Creek bioenergy facility and have partnered with CAL FIRE to implement a forest operations workforce capacity program at Shasta Community College.

Mariposa County RCD[68]

The Mariposa County Resource Conservation District has recently obtained two large grants to work with Mariposa County, the Sierra National Forest, and Yosemite National Park to implement fuels reduction, reforestation, and biomass utilization projects. A $2 million grant from CAL FIRE's (CCI) Forest Health grant program provides the funds to remove 3,222 tons of dead and downed trees from around county facilities and along county roads as well as along Wawona Road in Yosemite and convert it to energy or biochar.

[67] *See* https://www.fallriverrcd.org/.
[68] *See* https://www.mcrcd.net/.

Appendix B – Examples of JPAs

This Appendix highlights some existing JPAs which could provide some insights for the purpose of conceptualizing and structuring FRAs.

Upper Mokelumne River Watershed Authority

The Upper Mokelumne River Watershed Authority (UMRWA) is a Joint Powers Agency comprising six water agencies and the counties of Amador, Calaveras and Alpine. With each of the nine entities holding a Board seat, the UMRWAs role is to perform water resource planning for the region, facilitate forest fuels reduction and restoration projects, secure grant funding and leverage federal and state investments for widespread regional benefit. UMRWA holds an MSA with USFS serving as lead partner for contracting forest fuel reduction and restoration projects. Leveraging over $2.3 million between USFS and SNC grant monies, this Agency is the lead agency to restore over 2,200 acres within the watershed.[69]

California Tahoe Emergency Services Operations Authority

In 2001, a Joint Powers Agency was formed between the Lake Valley Fire Protection District and the City of South Lake Tahoe Fire Department to create the California Tahoe Emergency Services Operations Authority. It operates three full-time ambulances and maintains two reserve ambulances for dispatch. The ambulance service is funded through County Service Area No. 3 and through Cal Tahoe's $3.2 million operating budget for FY 2019-20. As of 2017, Fallen Leaf Lake Community Service District was added as a member of the Agency.

California Tahoe Conservancy Agreements[70]

The California Tahoe Conservancy has two Joint Powers Agreements to facilitate the sharing of resources and administration of funding for forest and watershed improvement projects with SNC[71] and Tahoe RCD.[72] The JPA formed with SNC is intended to be used for the Dollar Creek Forest Health and Biomass Project by leveraging SNC's 2017 CAL FIRE grant award of $5 million California Climate Investments dollars for implementation. The Dollar Creek project is to reduce fuels on 151 acres and transport the forest biomass to a facility for renewable energy production.

[69] Upper Mokelumne River Watershed Authority Webpage, http://www.umrwa.org/irwm.html.
[70] It should be noted that these are Joint Powers Agreements, which were not considered in this paper.
[71] CTC Board Materials June 2018, Page 2, https://tahoe.ca.gov/wp-content/uploads/sites/257/2019/01/California-Tahoe-Conservancy-Board-materials-June-2018-1-of-2.pdf.
[72] CTC Board Packet December 12, 2019, Page 40, https://tahoe.ca.gov/wp-content/uploads/sites/257/2019/12/December_Board_Book_12.12.19.pdf.