

BIOMASS FUEL AND LOG SUPPLY AVAILABILITY AND COST ASSESSMENT FOR A BIOMASS POWER FACILITY AND SAWMILL COLLOCATED AT LOYALTON, CALIFORNIA



Prepared for:



Prepared by:



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INTRODUCTION

The Lake Tahoe Basin is blessed with verdant stands of true fir and pine. In order to maintain the ecological integrity of these stands, forest thinning and dead tree removal are required. In recent years, timber harvest contractors have found limited markets for logs and forest slash. Unfortunately this has been exacerbated by the recent Chapter 7 filing of American Renewable Power, former owners of the biomass power facility at Loyalton. The recent acquisition of the plant by CTL Forest Management offers up a potential opportunity to re-structure the business model at Loyalton and provide a ready home for both biomass and logs from the Lake Tahoe region.

CTL has created Sierra Valley Enterprises (SVE) as the corporate entity managing the Loyalton site. Before SVE and their strategic partners can seek out capital funding to refurbish the power plant and consider siting a small sawmill (collocated at Loyalton), a resource supply availability assessment is needed. The private financial markets are very risk averse and require investment grade resource supply assessments in order to understand short-term and long-term biomass fuel and log supply risk.

The Tahoe Fund Strategic Plan includes project priorities that support forest health, including wood waste utilization projects. The Tahoe Fund has asked TSS to conduct an assessment of forest biomass and log supply availability and cost within economic transport distance of the Loyalton site.

Note that this report has all sensitive and proprietary data removed so that it can be distributed to a wider audience.

STUDY OBJECTIVES

Summarized below are the tasks that TSS implemented in support of this forest resource supply assessment.

- Task 1.** Conduct a biomass fuel and log market assessment to determine current supply availability and pricing trends meeting SVE biomass fuel specifications and Tahoe Fund log specifications. TSS recommends that the Resource Supply Area (RSA) radius be set at 75 miles (see Figure 1) in order to source biomass and log supply from a cost-effective transport distance (approximately 5 hours maximum round trip transport). TSS assumes a targeted annual biomass fuel usage of 130,000 bone dry tons (BDT)¹ per year and lumber production of approximately 21 million board feet (MMBF, log scale) per year.

¹ Bone dry ton represents 2,000 pounds of dry wood fiber.

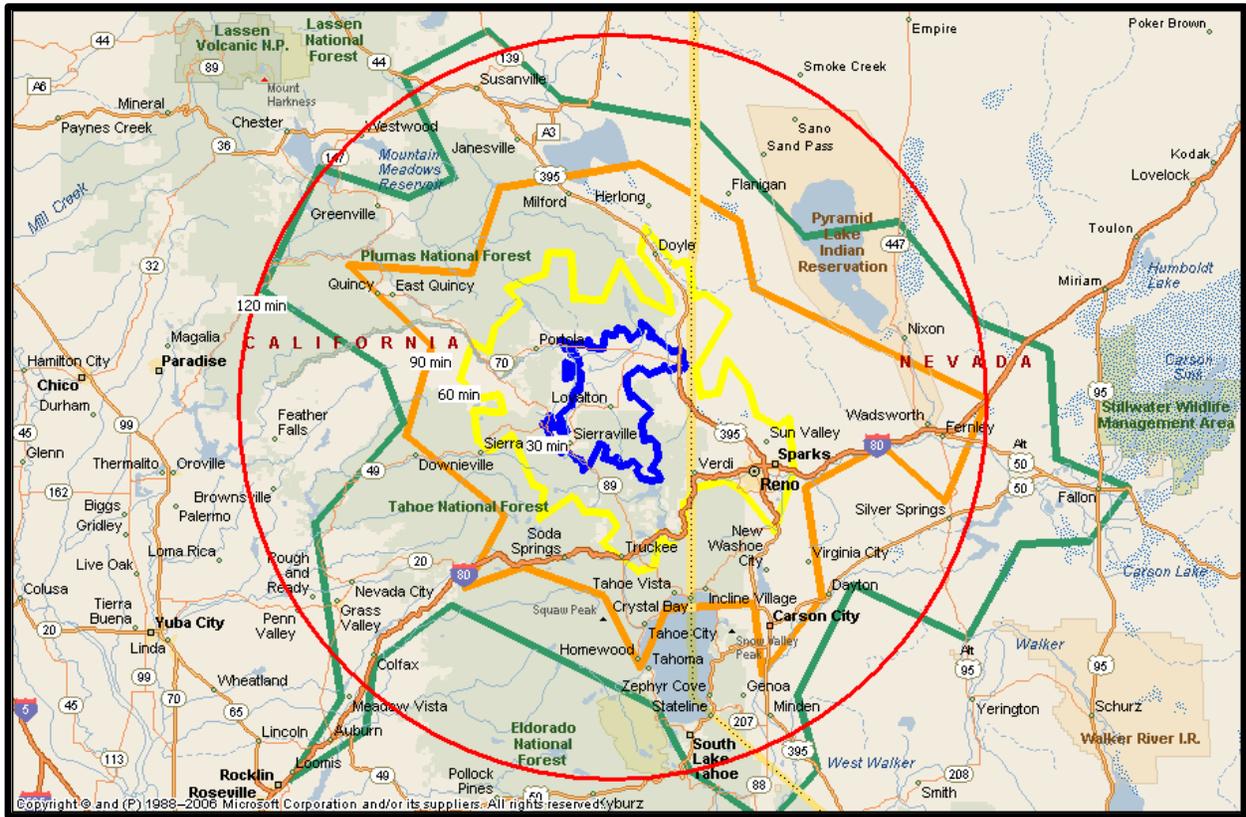
- Task 2.** Review current forest management activities within the RSA to forecast the amount of biomass and log supply considered potentially and practically available. Conduct geographic information system (GIS) analysis to confirm current forest ownership. Interview forest managers to confirm current and future plans including their professional opinions regarding biomass fuel and log supply availability. Emphasis will be on publicly managed forests, as they make up the majority of commercial forests located within the RSA. Utilize the state Department of Tax and Fee Administration database to confirm historic commercial timber harvest levels within the RSA.
- Task 3.** Conduct an urban wood waste supply analysis focused on metropolitan centers (e.g., Reno/Sparks and Carson City) to assess potentially and practically available wood waste supply. The SVE power plant has the capacity (per current power purchase agreement) to utilize up to 20% non-forest biomass as fuel.
- Task 4.** Develop a competition analysis focused on current market demand and pricing for biomass fuel and logs within the RSA.
- Task 5.** Identify future biomass and log supply sources and risks. Provide recommendations regarding biomass fuel and log supply chain logistics required to sustain a biomass power plant and sawmill operation collocated at Loyalton.
- Task 6.** Utilizing findings from tasks 1 through 5, prepare a biomass fuel and log supply availability and cost assessment report.

RESOURCE SUPPLY AREA

The Resource Supply Area is defined as that region from which economic and sustainable woody feedstocks can be sourced on a long-term basis. Interviews with Sierra Valley Enterprises staff² confirmed that the RSA should be configured at a 75-mile radius. Figure 1 is a map of the RSA. Note that drivetime zones (30, 60, 90 and 120 minute) are highlighted. A two-hour one-way transport is considered the economic range when transporting logs or biomass fuel.

² Jim Turner, Chief Operations Officer and John Pickett, Chief Financial Officer, Sierra Valley Enterprises.
Biomass Fuel and Log Supply Availability and Cost Assessment
TSS Consultants

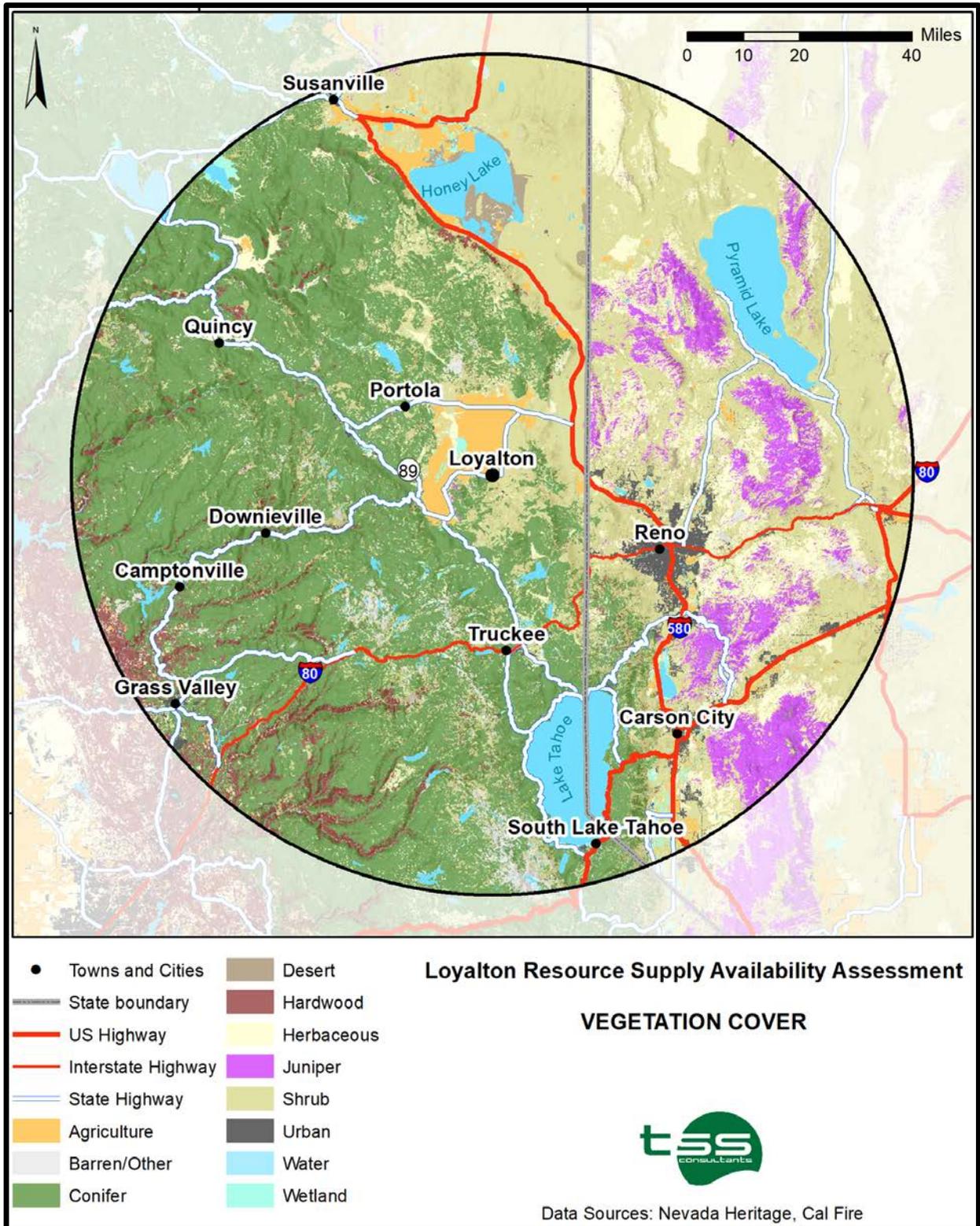
Figure 1. Resource Supply Area



Vegetation Cover

As noted earlier, the RSA encompasses all lands within a 75-mile radius of Loyaltan. This includes portions of the north Sierra Nevada Range and the Reno-Sparks metropolitan area. The northern Sierra Nevada Range includes a significant acreage of forestland which in turn supports forest products manufacturing and biomass power sectors. Using geographic information system data provided by Cal Fire and the Nevada Heritage database, TSS conducted an analysis of vegetation cover. Figure 2 is a map highlighting vegetation cover by type within the RSA.

Figure 2. Vegetation Cover



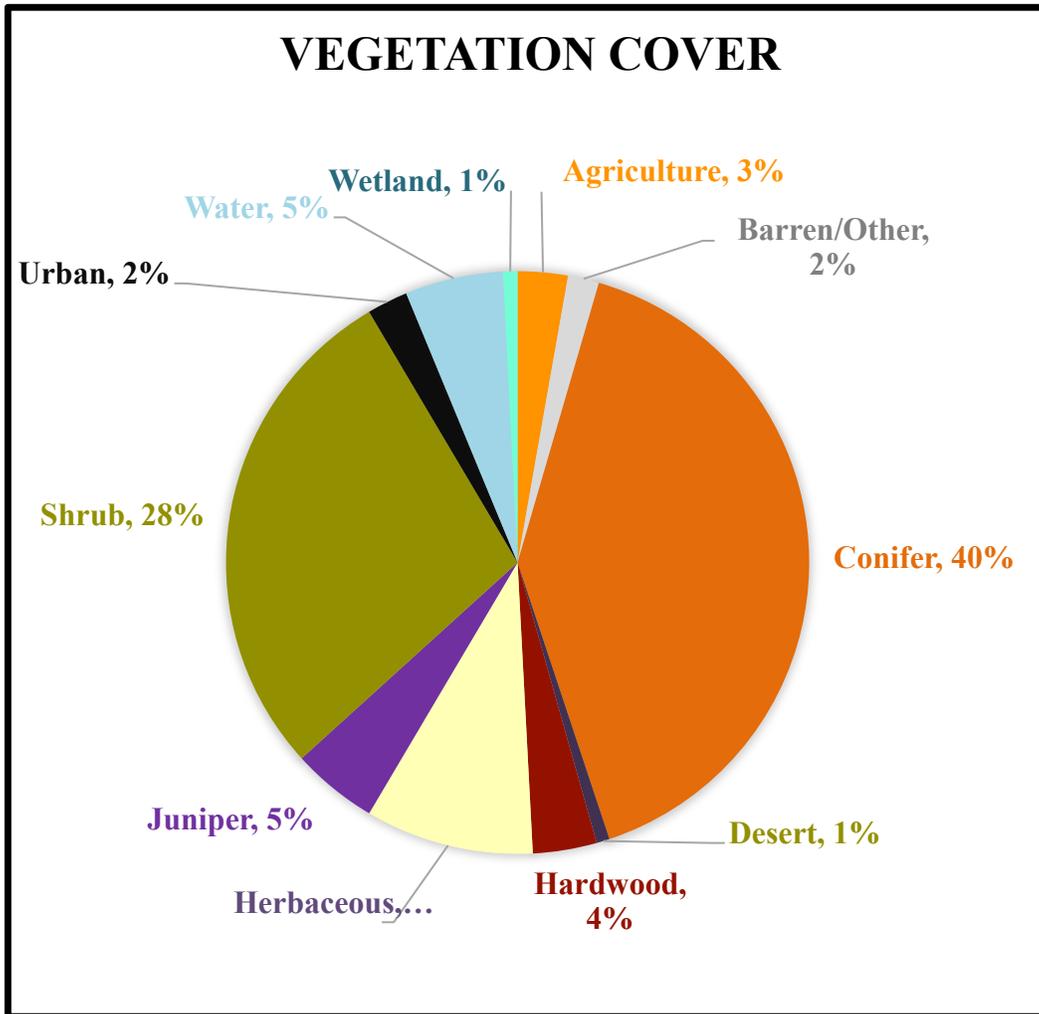
Outlined in Table 1 is a summary of vegetation cover acreage by type.

Table 1. Vegetation Cover Acreage by State Within the RSA

Vegetation Cover	California	Nevada	Total	Percent of Total
Agriculture	239,982	74,017	313,999	3%
Barren/Other	173,853	21,183	195,036	2%
Conifer	4,392,278	176,520	4,568,799	40%
Desert	52,326	29,891	82,217	1%
Hardwood	382,738	17,845	400,583	4%
Herbaceous	188,032	867,628	1,055,660	9%
Juniper	2,704	536,701	539,405	5%
Shrub	1,446,105	1,746,024	3,192,129	28%
Urban	43,209	213,244	256,453	2%
Water	336,082	278,550	614,632	5%
Wetland	49,804	41,062	90,866	1%
Total Acres	7,307,113	4,002,667	11,309,780	100%

Note that the RSA includes approximately 11,309,780 acres total of which the most significant cover type is conifer forest at 4,568,799 acres. Almost all (96%) the conifer dominated acres are located within California. Both sawlogs and forest biomass are currently being sourced from this conifer dominated acreage. Figure 3 graphically represents vegetation cover within the RSA.

Figure 3. Vegetation Cover Acreage Within the RSA by Percent of Total



Conifer

The most dominant commercial tree species within the RSA is ponderosa pine. When milled, ponderosa pine lumber has a yellow hue and is commonly referred to as yellow pine. Other conifer species within the RSA include true fir, Doug fir, incense cedar and western white pine.

Utah Juniper

Within the rangelands of the RSA, the Utah juniper tree (UJ) has dominated significant acreage due primarily to successful fire suppression efforts. Now considered an invasive weed species, land managers seek to eradicate UJ in order to restore rangelands and improve habitat. Unfortunately, UJ is more of a shrub species (unlike western juniper) and is not economical to collect, process, transport and utilize as fuel.

FOREST RESOURCE SUPPLY

This analysis focused on four types of forest resources currently available within the RSA.

- Timber harvest residuals (limbs, tops)
- Sawlogs
- Forest fuels reduction residuals (small stems)
- Sawmill residuals (sawdust, bark, shavings)

Forestland Ownership

Forest resource supply availability is very dependent upon forest resource management activities within the RSA. Each forestland ownership has specific goals and objectives. Public land management agencies such as the USDA Forest Service (USFS), Bureau of Land Management (BLM) and the U.S. Fish and Wildlife Service (USF&WS) are mandated by public policy to manage for a variety of attributes including recreation, wildlife habitat, ecosystem services and resource outputs (e.g., sawtimber, water). Forest resource outputs such as sawlogs and recovery of forest thinning material and timber harvest residuals as forest biomass fuel are not a priority.

Private forest ownership including commercial ownership (e.g., Sierra Pacific Industries) and small non-industrial ownership (typically family owned) make up most private forestland ownership within the RSA. Industrial ownership is usually focused on active forest management and production of marketable commodities such as sawlogs. Non-industrial forest owners are typically families that are managing for a variety of resources, including production of sawlogs as a long-term revenue source.

TSS was able to secure GIS shape files from the Bureau of Land Management Surface Data and Cal Fire to conduct the land ownership analysis. Figure 4 incorporates this data to highlight land ownership within the RSA.

Figure 4. Land Ownership Within the RSA

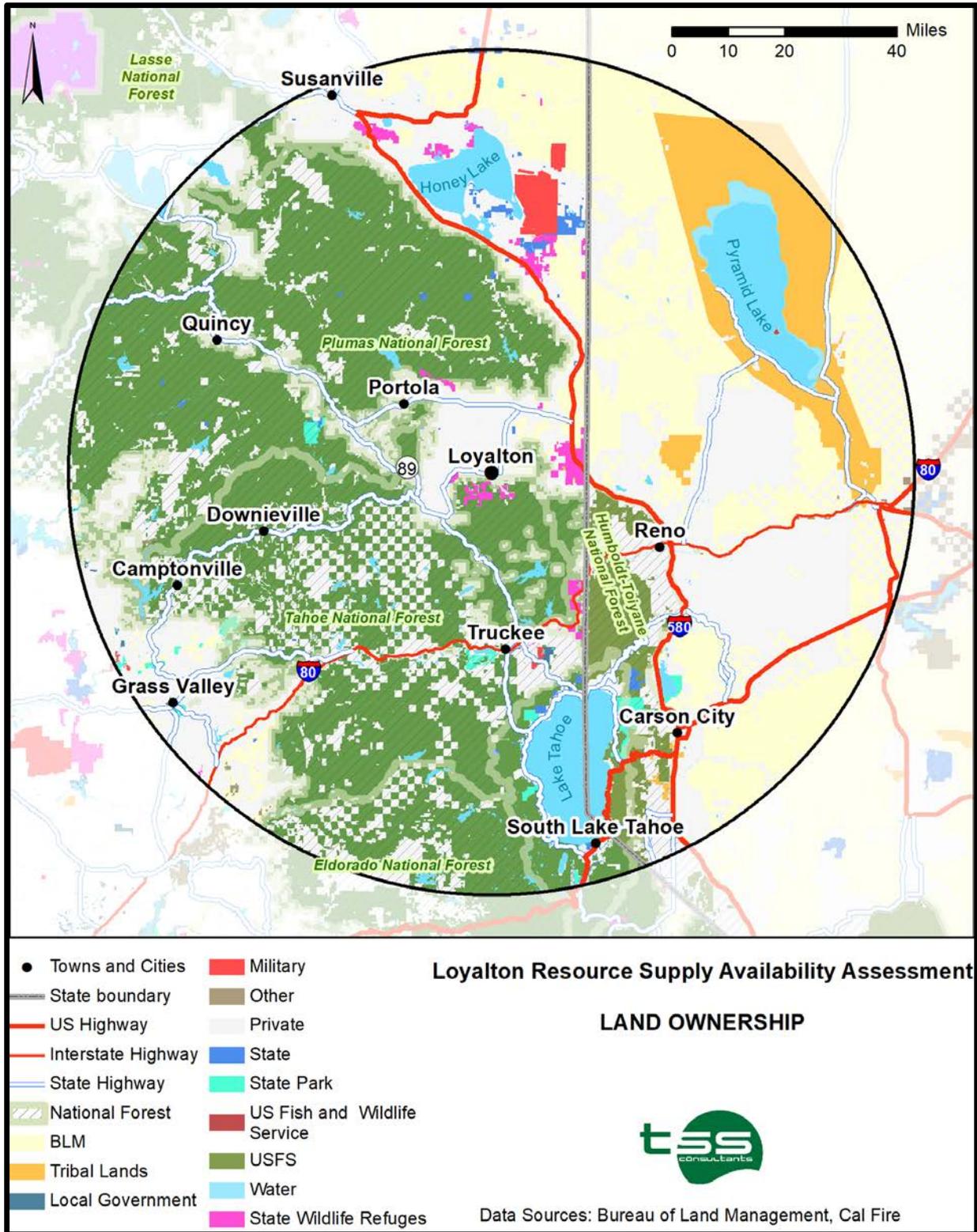


Table 2 summarizes conifer forest and juniper dominated rangeland ownership within the RSA.

Table 2. Conifer and Juniper Acreage by Ownership

Ownership	California			Nevada		
	Conifer	Juniper	Total	Conifer	Juniper	Total
BLM	43,646	1,129	44,775	3,079	292,825	295,904
Tribal Lands	636		636	237	49,578	49,815
Local Government	5,410		5,410			-
Military	619		619			-
Other	2,726		2,726	425	183	608
Private	1,375,215	817	1,376,032	32,364	175,309	207,673
State	12,025		12,025	3,023	221	3,243
State Park & Wildlife Refuges	35,078	154	35,232	15,953	599	16,552
US Fish and Wildlife Service					3	3
USFS	2,916,923	604	2,917,527	121,440	17,984	139,424
Total Acres	4,392,278	2,704	4,394,982	176,520	536,701	713,222

Table 2 confirms that conifer forest cover acreage within the RSA is predominantly concentrated on USFS managed lands with 3,038,363 acres (67%) and private ownership at 1,407,579 acres (31%). Figure 5 highlights the location of private forest ownership within the RSA.

Figure 5. Private Forestland Ownership Within the RSA

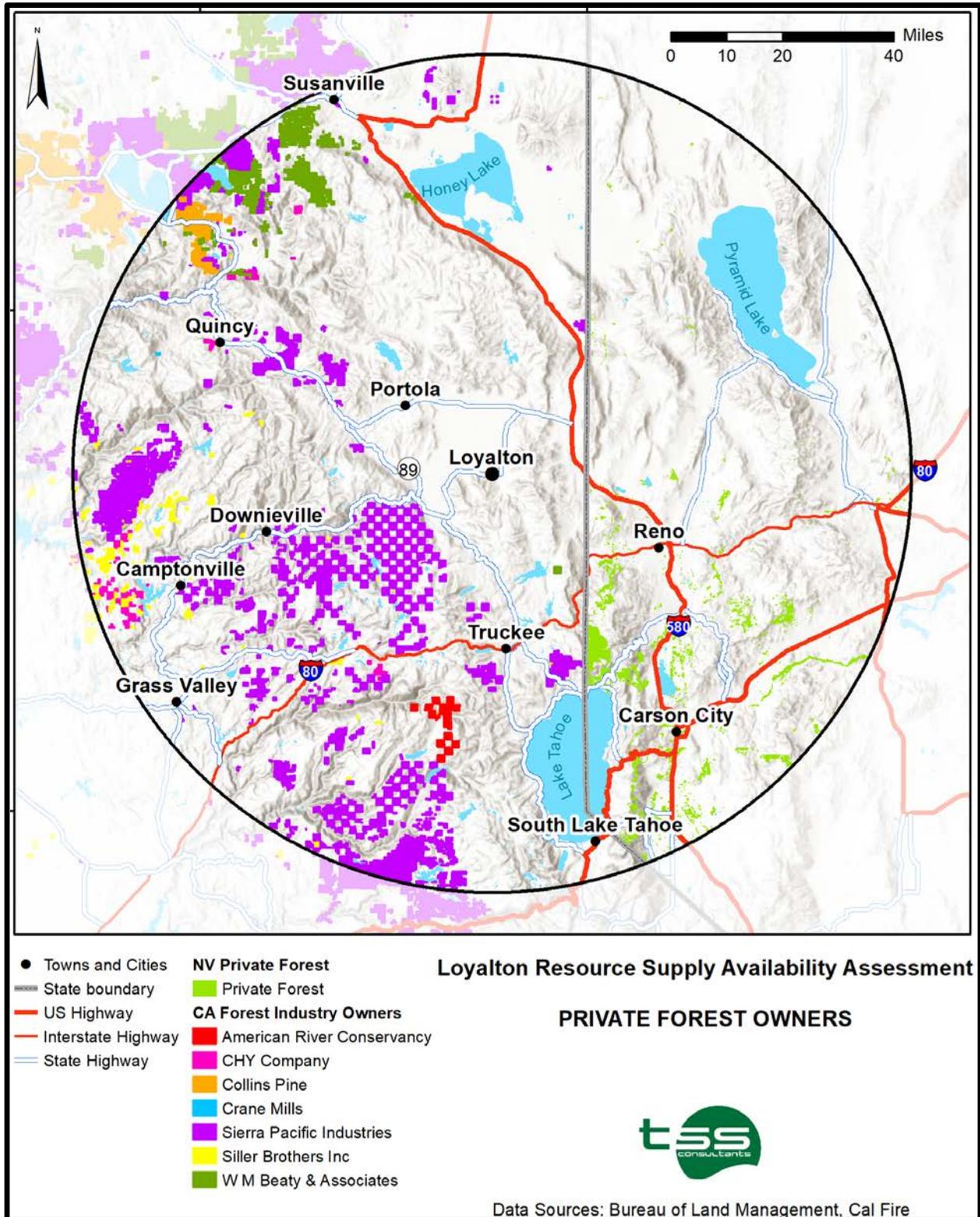


Table 3 provides ownership data for the private forest ownership (Cal Fire and Nevada Division of Forestry data sets) within the RSA. Non-industrial forest owners are the dominant private forest ownership at 620,743 acres (43%) with Sierra Pacific Industries a close second at 578,122 acres (40%) and W M Beaty a distant third at 80,878 acres (6%).

Table 3. Private Forest Ownership

Owner	Acres	Percent of Total
American River Conservancy	16,731	1%
CHY Company	21,636	2%
Collins Pine	29,140	2%
Crane Mills	221	< 1%
Sierra Pacific Industries	578,122	40%
Siller Brothers Inc	28,564	2%
W M Beaty & Associates	80,878	6%
California Non-Industrial Private	620,743	43%
Nevada Private Forest*	58,876	4%
Total Acres	1,434,908	100%

*Nevada database does not distinguish between industrial and non-industrial forestland ownership.

High Hazard Zone

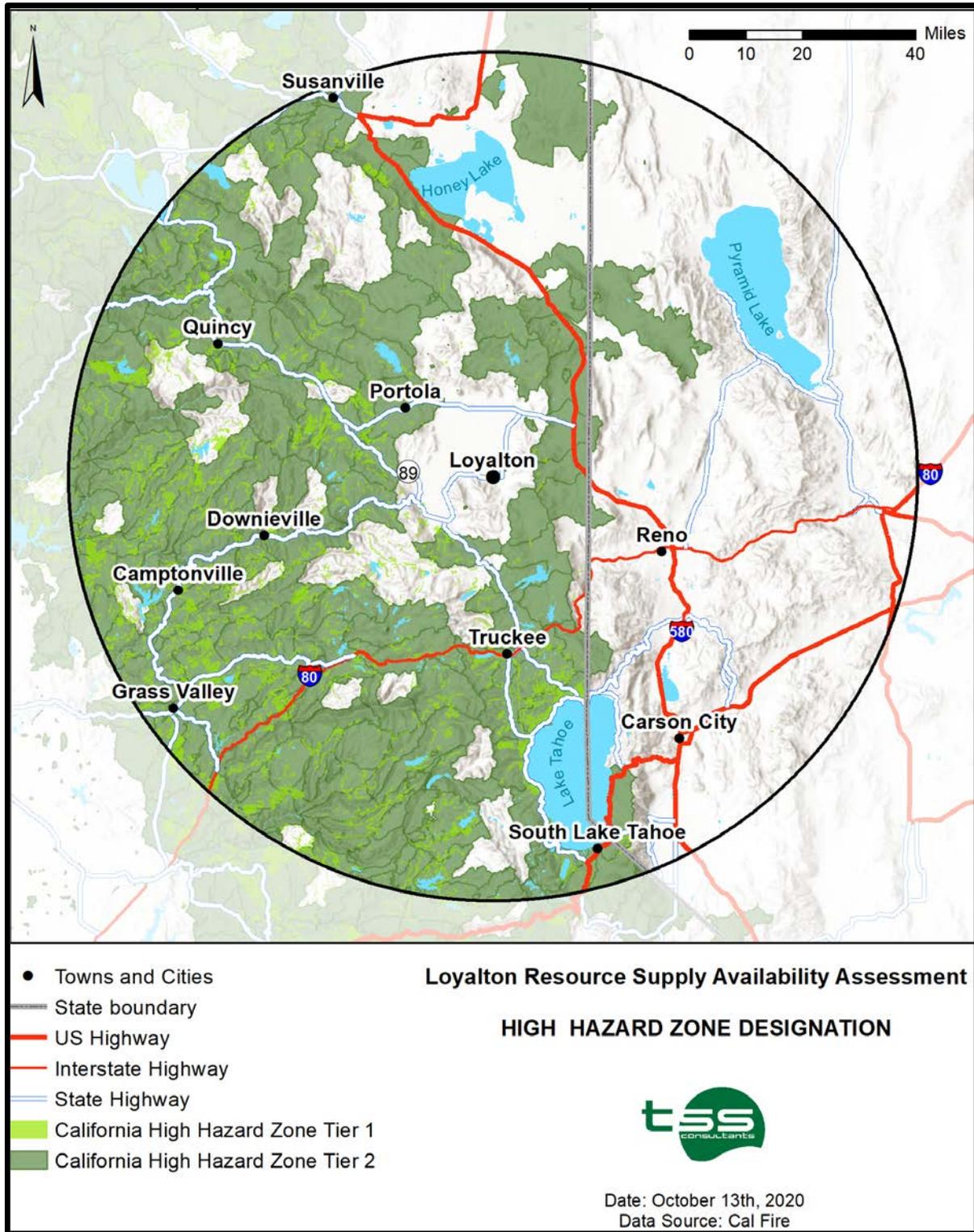
A key provision of the recent BioRAM II power purchase agreements (PPA) is monthly fuel requirements tied to procurement of sustainable forest sourced biomass (80%) and fuel from High Hazard Zones (60%) as designated by CAL FIRE. Assuming annual fuel usage of 130,000 BDT³ and monthly fuel usage of 10,833 BDT, at least 80% (8,666 BDT) would need to be sourced from sustainable forestry operations⁴ and 60% (6,500 BDT) of the 10,833 BDT would need to be sourced from HHZ. The balance (20%) of monthly fuel usage is 2,167 BDT which can be made up of more cost effective urban wood and tree trimmings from the Reno/Sparks/Carson City area.

TSS was able to secure recently updated HHZ figures and shape files from Cal Fire to conduct this analysis. Figure 6 highlights HHZ location within the RSA. Note that practically all of the land dominated by conifer vegetation cover within the RSA is considered HHZ.

³ Annual fuel usage figure provided by Jim Turner, COO, Sierra Valley Enterprises.

⁴ Sustainable forestry operations include unevenage management (no clear cuts).

Figure 6. High Hazard Zone Land Within the RSA



Timber Harvest Residuals

Timber harvest residuals in the form of limbs, tops and sub-merchantable stems are generated on a regular basis as a byproduct of commercial timber harvest activities. Once collected and processed, these residuals are an excellent fuel (low moisture, high heating value). Discussions with area foresters confirmed that very little timber harvest residual volume is recovered (post harvest) for value added utilization. Much of the residual is left on the landing (adjacent to roads) as the preferred timber harvest technique is whole tree yarding with trees processed at roadside landings using delimiters.⁵ The delimiting process generates piles of limbs, tops and sub-merchantable trees. Currently, these residuals are either piled and burned onsite or scattered onsite. Note that the window for pile burning can be narrow and the liability of pile fires escaping containment can be significant. It is so significant that Sierra Pacific foresters no longer pile and burn timber harvest residuals, opting instead to scatter limbs and tops across the harvest area.

As a byproduct of commercial timber harvests, the availability of timber harvest residuals rises and falls with timber harvests within the RSA. TSS reviewed California Department of Tax and Fee Administration (CDTFA) records to confirm timber harvest trends for the last five years (that data is available), 2014 through 2018. Note that CDTFA records track commercial timber harvest by county and ownership type (private and public). Discussions with Nevada Division of Forestry staff⁶ confirmed that very little commercial timber harvests occur within Nevada.

Table 4 provides historic private timber harvest sawlog volumes from the eight California counties located within the RSA. Note that harvest estimates are presented in thousand board feet⁷ measure (MBF).

Table 4. 2014 to 2018 Private Timber Harvest by County Within the RSA

County	2014 (MBF/Yr)	2015 (MBF/Yr)	2016 (MBF/Yr)	2017 (MBF/Yr)	2018 (MBF/Yr)	Five-Year Avg (MBF/Yr)
Butte	34,106	60,559	43,201	60,683	54,650	50,640
El Dorado	43,650	176,670	34,140	36,185	66,499	71,429
Lassen	27,070	55,187	60,411	54,792	48,814	49,255
Nevada	7,266	9,684	9,437	14,510	17,134	11,606
Placer	40,278	43,990	17,429	17,868	6,091	25,131
Plumas	68,938	72,907	74,860	86,079	57,754	72,108
Sierra	20,001	5,646	11,246	11,828	23,154	14,375
Yuba	10,353	6,336	12,696	20,950	29,050	15,877
Totals	251,662	430,979	263,420	302,895	303,146	310,420

⁵ Commercial scale equipment designed to remove limbs and tops as well as cut stems to preferred lengths for transport to the sawmill.

⁶ Mike Vollmer, Forester, Nevada Division of Forestry.

⁷ Thousand board feet (MBF) is a common unit of measure used in the timber industry to express relative volume of sawtimber. One board foot measure is approximately equal to a board that measures 12" by 12" and 1" thick.

Table 5 provides historic public (primarily USFS) timber harvest sawlog volumes from the eight California counties located within the RSA.

Table 5. 2014 to 2018 Public Timber Harvest by County Within the RSA

County	2014 (MBF/Yr)	2015 (MBF/Yr)	2016 (MBF/Yr)	2017 (MBF/Yr)	2018 (MBF/Yr)	Five-Year Avg (MBF/Yr)
Butte	8,693	0	610	802	6,270	3,275
El Dorado	11,721	3,362	26,213	37,421	24,454	20,634
Lassen	2,236	2,635	7,108	12,336	3,352	5,533
Nevada	945	674	0	8,648	2,638	2,581
Placer	34,323	3,940	24,178	11,773	14,676	17,778
Plumas	28,269	21,856	30,866	31,313	23,220	27,105
Sierra	4,460	3,903	5,426	4,840	8,458	5,417
Yuba	0	411	6,322	1,636	9,302	3,534
Totals	90,647	36,781	100,723	108,769	92,370	85,858

A comparison of Tables 4 and 5 confirm that timber harvest activity on public lands is approximately 28% of timber harvest on private lands. As noted earlier (see Forest Ownership section), public land management agencies such as the USFS (predominant public land management entity within the RSA) are mandated by public policy to manage for a variety of attributes including recreation, wildlife habitat, ecosystem services and resource outputs. Resource outputs such as sawlogs and recovery of forest thinnings and timber harvest residuals as forest feedstocks are not a priority.

Table 6 combines both private and public timber harvest sawlog volumes from the eight California counties located within the RSA.

Table 6. 2014 to 2018 Private and Public Timber Harvest by County Within the RSA

County	2014 (MBF/Yr)	2015 (MBF/Yr)	2016 (MBF/Yr)	2017 (MBF/Yr)	2018 (MBF/Yr)	Five-Year Avg (MBF/Yr)
Butte	42,799	60,559	43,811	61,485	60,920	53,915
El Dorado	55,371	180,032	60,353	73,606	90,953	92,063
Lassen	29,306	57,822	67,519	67,128	52,166	54,788
Nevada	8,211	10,358	9,437	23,158	19,772	14,187
Placer	74,601	47,930	41,607	29,641	20,767	42,909
Plumas	97,207	94,763	105,726	117,392	80,974	99,212
Sierra	24,461	9,549	16,672	16,668	31,612	19,792
Yuba	10,353	6,747	19,018	22,586	38,352	19,411
Totals	342,309	467,760	364,143	411,664	395,516	396,278

Some counties have historically produced more sawtimber than others with two counties (Plumas and El Dorado) producing about 48% of the harvest volume between 2014 and 2018.

Adjusting the timber harvest figures in Table 6 to account for the fact that portions of counties listed are located outside the RSA, TSS estimates that the five-year average timber harvest within the RSA is approximately 233,605 MBF/year. Based upon TSS' experience working with logging and chipping contractors in the West, the recovery factor for biomass feedstock processed from timber harvest residuals is approximately 0.9 BDT/MBF of woody biomass (treetops and limbs) that could be generated from each MBF of timber harvested.

Using the 0.9 BDT per MBF recovery factor and the 233,605 MBF/year (five-year average) harvest estimate, there are 210,245 BDT/year of timber harvest residuals potentially available within the RSA. Not all timber harvest residuals are recoverable, as topography and road systems will impact economic collection and transport. TSS conducted a GIS analysis of the topography within the RSA and found that approximately 59% of the landscape is located on slope gradient of 35% or less. Most forest biomass collection activities occur on slopes of 35% or less. Using this metric, TSS found that approximately 59% of forestland is on topography and road systems that will accommodate economical collection and transport (using chip van trailers) of forest biomass. Using the 59% figure results in a practically available timber harvest residual estimate of 124,044 BDT/year.

Interviews with local contractors that manage timber harvest residual collection and processing operations confirmed that costs range from \$32 to \$35/BDT FOB⁸ truck at the landing. Transportation costs vary by transport distance. Note that transportation cost offsets are offered by programs such as My Sierra Woods.⁹ See Appendix A for additional information on the Forest Biomass Transportation Incentive program managed by My Sierra Woods. In addition, some USFS timber sale contracts mandate that the timber purchaser remove timber harvest residuals. This mandate provides an incentive for the timber sales purchaser to underwrite the cost to deliver forest biomass to power plants, thus discounting the deliver price.

Sawlogs

Discussions with SVE staff¹⁰ confirmed that the preferred business model for the Loyaltan site is the collocation of a sawmill facility. This optimizes the utilization of both logs and forest biomass produced by CTL Forest Management (an affiliate of SVE). In addition, the symbiotic relationship between sawmill and biomass power plant is significant. The sawmill creates residuals (sawdust, sawdust, chips) that can be utilized as fuel for the power plant. The power plant generates process steam (excess to steam demand for the power plant) that can be used to provide steam for the lumber kilns, thus facilitating cost effective lumber drying. Kiln dried lumber is more valued in the marketplace than green lumber. In addition, the transport of kiln dried lumber is more cost effective as this lumber has reduced moisture content and thus is lighter in weight (when compared to green lumber). The sawmill collocated with biomass power plant business model is replicated throughout the Western U.S. and has demonstrated financial success.

⁸ FOB = freight on board.

⁹ <https://www.mysierrawoods.org/programs/>

¹⁰ Jim Turner, Chief Operating Officer, Sierra Valley Enterprises.

As shown in Figure 5, most of the private forestland is owned and managed by Sierra Pacific Industries. Discussions with SPI foresters confirmed that all sawlogs harvested from SPI lands are delivered to SPI sawmills. In addition, SPI is actively procuring sawlogs from private and public lands to provide sawlogs to the Quincy, Oroville and Lincoln sawmills. The most viable sawlog procurement option for a Loyalton sawmill is sourcing logs from public forest management activities.

Interviews with logging contractors working within the RSA confirmed timber harvest costs ranging from \$120 to \$130/MBF for sawlogs FOB truck on the landing. Transportation costs vary by transport distance. Delivered log prices have been trending upward lately due to a relatively strong lumber market. Table 7 summarizes current delivered log prices by species in the northern Sierra Nevada region (including the RSA).

Table 7. Delivered Log Prices Within the Northern Sierra Nevada Region

Log Species	Low Range (\$/MBF)	High Range (\$/MBF)
Ponderosa Pine	\$290	\$315
White Fir	\$365	\$405
Doug Fir	\$415	\$500
Incense Cedar	\$530	\$560

Note that log prices are likely headed lower in the short term as fire salvage logs flood the market from 2020 fire restoration efforts. In the next 18 months, over 1,000 MMBF of sawlogs are expected to be salvaged from private forest ownerships within the North Complex fire and the August Complex fire.¹¹

As noted earlier, sawlog availability for a sawmill collocated at the Loyalton site will rise and fall with forest management activities on public lands within the RSA. Adjusting Table 5 data to account for public forestland located within the RSA results in an average timber harvest (2014 to 2018) of 55,828 MMBF. This represents a significant sawlog volume. State Department of Tax and Fee Administration data confirms that timber harvests on public lands within the RSA are concentrated in Plumas and Placer counties. The Loyalton site has a distinct location advantage to source sawlogs from these counties. In addition, Loyalton is closer to the Lake Tahoe Basin than any of the SPI sawmills and is positioned well to source both logs and forest biomass from the Basin.

Lake Tahoe Basin Management Unit

Much of the forested landscape within the Lake Tahoe Basin is under the jurisdiction of the USFS. Due to significant public interest in the maintenance of forest health and recreational opportunities within the Basin, the USFS created the Lake Tahoe Basin Management Unit (LTBMU) in 1973. Carved out of the Tahoe, Eldorado and Humboldt-Toiyabe National Forests, the LTBMU serves as a separate management unit within the USFS National Forest system. In

¹¹ Discussions with Niel Fischer, Forest Manager, Collins Pine Company.

1997 President Clinton convened a presidential forum that is now an annual event known as the Lake Tahoe Summit. As a result of the initial summit, \$26 million were allocated to support the Lake Tahoe Environmental Improvement Program (EIP) with a focus on forest health and improving the clarity of Lake Tahoe. Since 1997, Congress has mandated federal dollars in support of the EIP. In addition, a number of non-profit foundations have actively invested in the Basin, including (but not limited to): Tahoe Fund, National Forest Foundation, Great Basin Institute, Wild Turkey Foundation, and the National Fish and Wildlife Foundation. Support for the Basin has been consistent and last August, the 24th annual Lake Tahoe Summit was held (with Tahoe Fund as a primary sponsor).

Interviews with LTBMU staff¹² confirmed that the LTBMU has comprehensive plans for vegetation management and will be treating between 1,800 and 2,100 acres of forestland per year between 2022 and 2025. This level of forest treatment is forecast to generate 4 to 8.4 MMBF of sawlogs and between 15,000 and 19,000 BDT of forest biomass per year.

SVE and affiliates (CTL Forest Management, Markit Forestry) have been actively bidding on service contracts (primarily Integrated Resource Service Contracts) within the LTBMU¹³ and currently have nine projects under contract for a total of 2,405 acres and 17.5 MMBF of sawtimber. Appendix B provides a summary of current vegetation management projects within the LTBMU. Considering the high level of public interest in the Lake Tahoe Basin, there will be continued federal and private sector funding allocated in support of forest treatments that will produce sustainable volumes of sawlogs and biomass.

Forest Fuels Reduction

Due to high fire danger conditions and overstocked forests, there are concerted efforts across all forest ownerships to proactively reduce hazardous forest fuels in support of fire resilient forest ecosystems. Forest landowners are regularly conducting forest thinning activities to achieve fuels treatment and stocking control (reduce the number of trees per acre as plantations or wild stands age over time and tree size increases). In California, the state has allocated \$1 billion over five years to address hazardous forest fuels across all ownership types. This investment will increase the opportunities for Fire Safe Councils and Resource Conservation Districts to administer forest fuels reduction projects at landscape scale. Federal funding through the Natural Resources Conservation Service (NRCS) is available and targets non-industrial forestland.

TSS interviewed both private and federal land managers to secure information regarding current forest management activities in the region. These discussions confirmed a strong interest in providing sustainable volumes of forest biomass fuel and possibly sawlogs from forest restoration and fuels treatment operations for the Loyalton facility. Data was collected on acreage treated including methods and anticipated future restoration and fuels treatment

¹² Brian Garrett, Assistant Staff Officer, Vegetation Management, LTBMU. Victor Lyon, Staff Officer, Vegetation Management, LTBMU.

¹³ CTL Forest Management has been active within the LTBMU since 1996.

activities. Interviews confirmed that most of the planned fuels treatment activities are concentrated on federal lands, in particular, lands managed by the USFS.

While the state of California has confirmed its intent to invest \$1 billion over five years for fuels treatment activities, the Governor and legislature is currently dealing with severe economic conditions brought on by the Covid-19 pandemic and has rescinded funding allocations. This places a hold on state funded projects, which significantly impacts plans to treat private and public lands. TSS anticipates that due to the compelling statewide issue of catastrophic wildfire, the Governor and state legislature will re-allocate forest fuels treatment funding soon. TSS feels that current state funding issues are temporary and will not impact fuels treatment activities on federally managed lands.

In August 2020, the state and the USFS signed the Shared Stewardship Agreement (Appendix C) which sets out a coordinated strategy to increase the pace and scale of forest fuels treatment activities across the state. Ultimately, as laid out in the agreement, the state hopes to facilitate treatment of 500,000 acres/year of fuels treatment on private and state lands, with the USFS completing 500,000 acres/year of fuels treatment on federal lands. Considering that 4.4 million acres in California were impacted by wildfire this year, the timing of this agreement is critical and when implemented, it will help make available forest biomass and sawlogs (including within the RSA).

Using data collected through interviews with USFS staff, TSS was able to confirm historic levels of fuels treatment for each National Forest and the LTBMU. Table 8 provides a seven year historic record of fuels treatment on USFS managed land (by forest).

Table 8. 2014-2020 Fuels Reduction Treatment Acres by National Forest

National Forest	2014	2015	2016	2017	2018	2019	2020	Average
Eldorado	2,671	1,483	11,318	14,605	15,373	18,705	23,093	12,464
Humboldt-Toiyabe	12,000	27,500	15,500	21,000	17,500	22,000	18,600	19,157
LTBMU	5,309	5,939	5,006	9,988	2,534	5,501	2,590	5,267
Plumas	6,960	12,389	6,847	9,945	11,671	11,942	10,664	10,060
Tahoe	10,984	7,225	7,946	8,052	5,934	20,827	20,588	11,651
Totals	37,924	54,536	46,617	63,590	53,012	78,975	75,535	58,598

Data presented in Table 8 shows a clear increase in acres treated over time. This is reflective of the USFS focus on fuels treatment activities including increased federal appropriations resulting in more acres treated.

Not all of the treatment acres noted in Table 8 include removal of forest biomass. Land managers deploy a range of techniques to reduce forest fuels including prescribed fire, managed fire, mastication, hand treatments, pile/burn, thinning and biomass removal. Data collected from 2019 and 2020 fuels treatment activities (see Appendix D) confirmed that between 8% and 11%

of the total acres treated on USFS managed lands within the RSA included forest biomass removal. TSS assumes that if the Loyalton facility is in commercial service and is actively procuring forest biomass from fuels treatment operations within the RSA, approximately 30% of the average acres treated per year will include biomass removal. Forest managers will seek out opportunities to divert forest biomass disposal away from pile/burn or chip and scatter techniques if a ready market exists. Using the average acreage treated of 58,598 acres/year and a 30% metric, approximately 17,579 acres within the RSA are potentially available for forest biomass removal.

TSS' experience with forest restoration and fuels treatment operations confirms a recovery factor of approximately 12.5 BDT per acre applies for pre-commercial forest thinning operations in mixed conifer and ponderosa pine stands within the RSA. At 17,579 acres and 12.5 BDT/acre removal, approximately 219,737 BDT/year is potentially available.

As discussed earlier, slope conditions and terrain will define landscapes that are practically available for forest biomass removal operations. Using the previously discussed 59% topography adjustment, approximately 129,645 BDT/year of forest biomass is considered practically available from USFS managed lands within the RSA.

Sawmill Residuals

The RSA includes over 4.5 million acres of conifer dominated forestland (see Table 1). This represents approximately 40% of the RSA land cover. Due to the relative abundance of conifer dominated forestland and deep fertile soils supporting sustainable production of sawtimber, this region is home to several sawmills. Currently there is one commercial-scale sawmill operating within the RSA. Located at Quincy, the Sierra Pacific Industries (SPI) sawmill is designed to process both small and large diameter logs. Collocated with the sawmill is a 28 MW biomass power plant providing process steam for lumber kilns, onsite power and power sales to PG&E. Discussions with SVE staff familiar with the SPI Quincy operation confirmed that the sawmill produces residuals in balance with onsite demand, but will procure fuel from orchard removal operations in the Sacramento Valley and from forest operations to augment fuel supply. This allows SPI to sell sawdust and hog fuel to outside markets (including Loyalton). In 2018 the Loyalton power plant received over 10 loads per day of residuals (sawdust, chips).

A range of sawmill residuals are produced as a byproduct of the forest products manufacturing process including chips, shavings, bark, sawdust, and hog fuel (blend of sawdust and bark). An estimate of sawmill residuals produced by the sole sawmill located within the RSA is summarized in Table 9.

Table 9. Sawmill Residuals Produced Within the RSA

Sawmill	Chips (BDT/Yr)	Shavings (BDT/Yr)	Bark (BDT/Yr)	Sawdust (BDT/Yr)	Hog Fuel (BDT/Yr)	Total (BDT/Yr)
Sierra Pacific Industries, Quincy	143,000	27,625	65,000	48,750	13,000	297,375

Discussions with fiber managers in the region confirmed that commercial markets for sawmill residuals are quite dynamic. Recent discussions with Forisk,¹⁴ Ampine¹⁵ and Collins Pine Company¹⁶ confirmed that a variety of markets exist for sawmill residuals produced within the RSA including:

- Landscape cover
- Soil amendment
- Animal bedding
- Power generation

Table 10 provides an estimate of current delivered prices for sawmill residuals produced within the RSA. Note that sawmill residual pricing is quite dynamic and changes based on a number of variables impacting wood fiber markets. For example, fiber prices have been flat to falling over the last few quarters, primarily due to the general downturn in the economy due to Covid-19 pandemic issues and the oversupply of residuals as sawmills increase production to meet the recent demand for lumber. Fiber supply pricing within the RSA is typically expressed in \$/bone dry ton. Table 10 expresses delivered fiber prices \$/BDT.

Table 10. Current Sawmill Residuals Delivered Pricing

Sawmill Residual Type	Low Range (\$/BDT)	High Range (\$/BDT)
Chips	\$45	\$65
Shavings	\$35	\$60
Bark	\$35	\$65
Sawdust	\$25	\$45
Hog Fuel	\$25	\$45

Seasonal Availability

Forest feedstocks in the form of timber harvest residuals, forest fuels reduction residuals, sawmill residuals and sawlogs are not necessarily available year round. Key issues such as weather impact accessibility. Table 11 summarizes seasonal availability of forest feedstocks produced within the RSA.

¹⁴ Tim Gammell, Wood Fiber Analyst, Forisk.

¹⁵ Rob Crummett, Fiber Manager, Ampine.

¹⁶ Niel Fischer, Forest Manager, Collins Pine Company.

Table 11. Seasonal Availability of Forest Resources

Feedstock	Available	Comments
Timber Harvest Residuals	April through November	Timber harvest residuals are typically available when commercial timber harvests are being conducted. Within the RSA there is opportunity to source timber harvest residuals between April and November every year. This is very weather dependent. Cold winter conditions occasionally facilitate winter timber harvest operations, but this is rare. Forest operations are sometimes curtailed in the summer due to severe wildfire conditions.
Forest Fuels Reduction Residuals	April through November	Forest fuels reduction residuals are typically available April through November (very similar to timber harvest residuals). Cold winter conditions occasionally facilitate winter fuels reduction operations, but this is rare. Fuels reduction operations are sometimes curtailed in the summer due to severe wildfire conditions.
Sawlogs	April through November	Very similar to timber harvest residuals and fuels reduction operations, timber harvests are conducted April through November. Cold winter conditions occasionally facilitate winter timber harvest operations. Timber harvest operations are sometimes curtailed in the summer due to severe wildfire conditions.
Sawmill Residuals	Year Round	Sawmill residuals are available year round. Some residuals, such as bark, have seasonal markets (landscape cover) which are most active in the spring. Shavings are typically in significant demand for animal bedding during winter months.

Summary of Forest Feedstock Availability

Utilizing findings from this analysis, TSS summarized forest feedstock potentially and practically available. Posted below in Table 12 is a summary of forest feedstock availability by type within the RSA.

Table 12. Forest Feedstock Supply Potentially and Practically Available

	Timber Harvest Residuals (BDT/Yr)	Forest Fuels Reduction (BDT/Yr)	Sawmill Residuals (BDT/Yr)	Totals (BDT/Yr)
Potentially Available	210,245	219,737	297,375	727,357
Practically Available	124,044	129,645	297,375	551,064

URBAN WOOD AND TREE TRIMMINGS

This analysis focused on two types of potential wood waste biomass fuel from urban, metropolitan communities currently available within the RSA:

- Urban Wood (e.g., construction, demolition and pallets)
- Tree Trimmings (also known as green waste)

Wood waste produced within urban communities in the form of tree trimmings, construction and demolition wood and industrial wood (e.g., pallets) is an excellent and very cost effective biomass fuel source. Typically low in moisture content (25% to 35% moisture)¹⁷ and available year round, much of the urban wood and tree trimmings material is currently landfilled or processed for soil amendments or landscape cover.

State and Local Policy

The most significant opportunities for SVE to source cost effective urban wood (UW) and tree trimmings (TT) is in the metropolitan areas of Reno/Sparks and Carson City. These communities are the most densely populated communities within the RSA and as such are prolific producers of UW and TT.

The state of Nevada does not have a statewide mandate to divert waste or recycle; however, there is a statewide goal of achieving a 25% recycling rate. Nevada Assembly Bill 320 (1991) required all counties with recycling plans to meet the 25% recycling benchmark two years after the recycling plan was finalized. Statewide, the 2019 recycle rate was 21.7%.¹⁸ This relatively low recycle rate can be attributed to the fact that landfill capacity in Nevada is significant (unlike other states), which places little motivation on the need for waste diversion.

Urban Wood Waste

Urban wood waste generated by a community or region is directly proportional to population. The higher the population within a given area, the more urban wood waste is produced. TSS utilized 2019 data from the US Census Bureau to estimate current population for every county within the RSA. Some counties such as Butte and Yuba were not included in this analysis due to the relatively small portion (< 15%) of the county that lies within the RSA.

Within the RSA there is an estimated population of 970,822 residents. Note that Washoe County (Reno/Sparks) and Carson City County (Carson City) have a combined population of 480,283 which represents approximately 49% of the entire population residing within the RSA.

Solid waste characterization studies are conducted sporadically throughout the U.S. A particularly comprehensive study was conducted in 2016 by the Oregon Department of

¹⁷ Per TSS experience.

¹⁸ As reported by the Nevada Department of Environmental Protection.

Environmental Quality (ODEQ). Using the 2016 ODEQ solid waste characterization study¹⁹ and a 2018 ODEQ solid waste generation report,²⁰ TSS utilized the findings to calculate UW generated within the RSA. As noted in the 2018 waste generation report, approximately 7.4 pounds of waste are produced daily per person. The 2016 characterization study found an estimated 10.6% of the solid waste stream generated as clean wood (paint free, no treated wood). Using this waste generation estimate, it was calculated that approximately 138,976 green tons (GT) of UW are generated annually within the RSA. The average moisture content of urban wood²¹ is about 25%. Employing the data and methodology above yields approximately 104,232 BDT/year of UW as potentially available. TSS experience confirms that in predominantly metropolitan regions such as Reno/Sparks/Carson City, approximately 70% of this volume is recoverable as clean wood meeting SVE fuel specifications, resulting in 72,962 BDT/year of UW as practically available. Table 13 summarizes UW produced within the RSA on an annual basis by county.

Table 13. Urban Wood Produced Annually Within the RSA

County	Population Adjusted for RSA	Potentially Available Urban Wood Fuel (BDT/Yr)	Practically Available Urban Wood Fuel (BDT/Yr)
Carson City	55,916	6,003	4,202
Douglas	44,015	4,726	3,308
El Dorado	77,137	8,282	5,797
Lassen	19,872	2,134	1,494
Lyon	40,278	4,324	3,027
Nevada	89,780	9,639	6,747
Placer	199,165	21,383	14,968
Plumas	13,165	1,413	989
Sierra	3,005	323	226
Storey	4,123	443	310
Washoe	424,367	45,562	31,893
Totals	970,822	104,232	72,962

Tree Trimming Material

As with UW, tree trimming material volume produced within a community or region is proportional to population. Based on the 2016 ODEQ waste characterization study,²² it is estimated that approximately 89 dry pounds of TT suitable for fuel are generated annually per capita. Employing the data and methodology above yields about 43,202 BDT/year of TT as potentially available. TSS experience confirms that in predominantly urban areas such as

¹⁹ <https://www.oregon.gov/deq/mm/pages/waste-composition-study.aspx>

²⁰ 2018 Oregon Material Recovery and Waste Generation Rates Report, Oregon Department of Environmental Quality.

²¹ Per TSS experience.

²² <https://www.oregon.gov/deq/mm/pages/waste-composition-study.aspx>

Reno/Sparks/Carson City, approximately 80% of this volume is recoverable as clean wood meeting SVE fuel specifications, resulting in 34,561 BDT/year of TT fuel as practically available. Table 14 summarizes TT fuel produced within the RSA on an annual basis by county.

Table 14. Tree Trimming Material Produced Annually Within the RSA

County	2019 Population Adjusted for RSA	Potentially Available Tree Trimming Fuel (BDT/Yr)	Practically Available Tree Trimming Fuel (BDT/Yr)
Carson City	55,916	2,488	1,991
Douglas	44,015	1,959	1,567
El Dorado	77,137	3,433	2,746
Lassen	19,872	884	707
Lyon	40,278	1,792	1,434
Nevada	89,780	3,995	3,196
Placer	199,165	8,863	7,090
Plumas	13,165	586	469
Sierra	3,005	134	107
Storey	4,123	183	147
Washoe	424,367	18,884	15,107
Totals	970,822	43,202	34,561

Summary of Urban Wood Waste and Tree Trimming Feedstock Availability

Utilizing findings from this analysis, TSS summarized urban wood and tree trimming feedstock potentially and practically available. Posted below in Table 15 is a summary of urban wood waste and tree trimming feedstock availability within the RSA.

Table 15. Urban Wood Waste and Tree Trimming Feedstock Supply Availability

	Urban Wood Feedstock (BDT/Yr)	Tree Trimming Feedstock (BDT/Yr)	Totals (BDT/Yr)
Potentially Available	104,232	43,202	147,434
Practically Available	72,962	34,561	107,523

BIOMASS FEEDSTOCK COMPETITION ANALYSIS

Competition for biomass fuel produced within the RSA comes primarily from existing biomass power plants, compost/soil amendment/landscape products, and animal bedding production facilities. A list of the current markets for woody biomass material within the RSA includes the following:

- Biomass power plants
- Compost/soil amendment/landscape cover operations
- Livestock bedding

Enterprises Currently Sourcing Biomass Feedstock from the RSA

There are three biomass power plants sourcing biomass feedstock from the RSA as summarized below.

Honey Lake Power

Honey Lake Power (HLP) is a 30 MW (net capacity) biomass power plant located at Wendel, California. HLP commenced operations in 1989 and is now selling 24 MW of generation to San Diego Gas & Electric under a BioRAM²³ power purchase agreement (PPA). HLP's PPA is similar to Loyalton's and requires procurement of 80% forest feedstock from sustainable forest management operations and 60% from high hazard zones. Most of the forest feedstocks utilized as fuel are sourced from forest operations located tributary to HLP and sawmill residuals from Collins Pine Company sawmills at Chester and Lakeview, Oregon. As shown in Figure 9, HLP is located tributary to the Lassen and Plumas National Forests. The HLP facility is equipped with a Zurn design travelling grate stoker boiler.

Sierra Pacific Industries Quincy

Sierra Pacific Industries' (SPI) Quincy sawmill complex includes a 28 MW (net capacity) biomass power plant. The Quincy power plant commenced operations in the late 1980s with power being sold to Pacific Gas & Electric. Most of the biomass fuel utilized is sourced from the Quincy sawmill as residuals – chips, sawdust, shavings and some bark. SPI does purchase orchard removal material and timber harvest residuals to supplement the sawmill residuals. This allows SPI to market residuals to power plants such as Loyalton. The Quincy facility is equipped with two stoker boilers including a Riley and a Zurn.

Rio Bravo Rocklin

Rio Bravo Rocklin is a 24 MW (net capacity) biomass power plant located at Rocklin. This facility commenced operations in 1989 and is now selling all 24 MW of generation to Southern California Edison under a BioRAM power purchase agreement (PPA). Rio Bravo's PPA is similar to HLP's and Loyalton's and requires procurement of 80% forest feedstock from sustainable forest management operations and 60% from high hazard zones. Rio Bravo is currently sourcing forest feedstocks from fire restoration activities in Butte County (2018 Camp Fire and 2020 North Complex fires). In addition, sawmill residuals are readily available from the SPI Lincoln sawmill (located 10 miles one-way transport from Rocklin). The Rio Bravo facility is equipped with a Combustion Engineering design circulating fluidized bed boiler.

Compost Facilities

In addition to power plants, there are several commercial-scale compost facilities that receive and process green waste in the form of tree trimmings, brush, and land clearing material. The two largest commercial facilities within the RSA are Full Circle Soils and Compost at

²³ Biofuel Renewable Auction Mechanism.

Gardnerville, Nevada and the Bently Ranch at Minden, Nevada. Both of these facilities source green waste raw material from the Lake Tahoe Basin, Carson City and Reno/Sparks.

In the process of creating compost and mulch from green waste, there are woody byproducts generated that are available for sale as hog fuel. Both Full Circle and Bently Ranch have provided wood fuel to Loyaltan and are expected to be key suppliers once Loyaltan is back in commercial service.

Table 16 provides an overview of the commercial-scale facilities currently utilizing forest feedstocks and tree trimmings produced within the RSA.

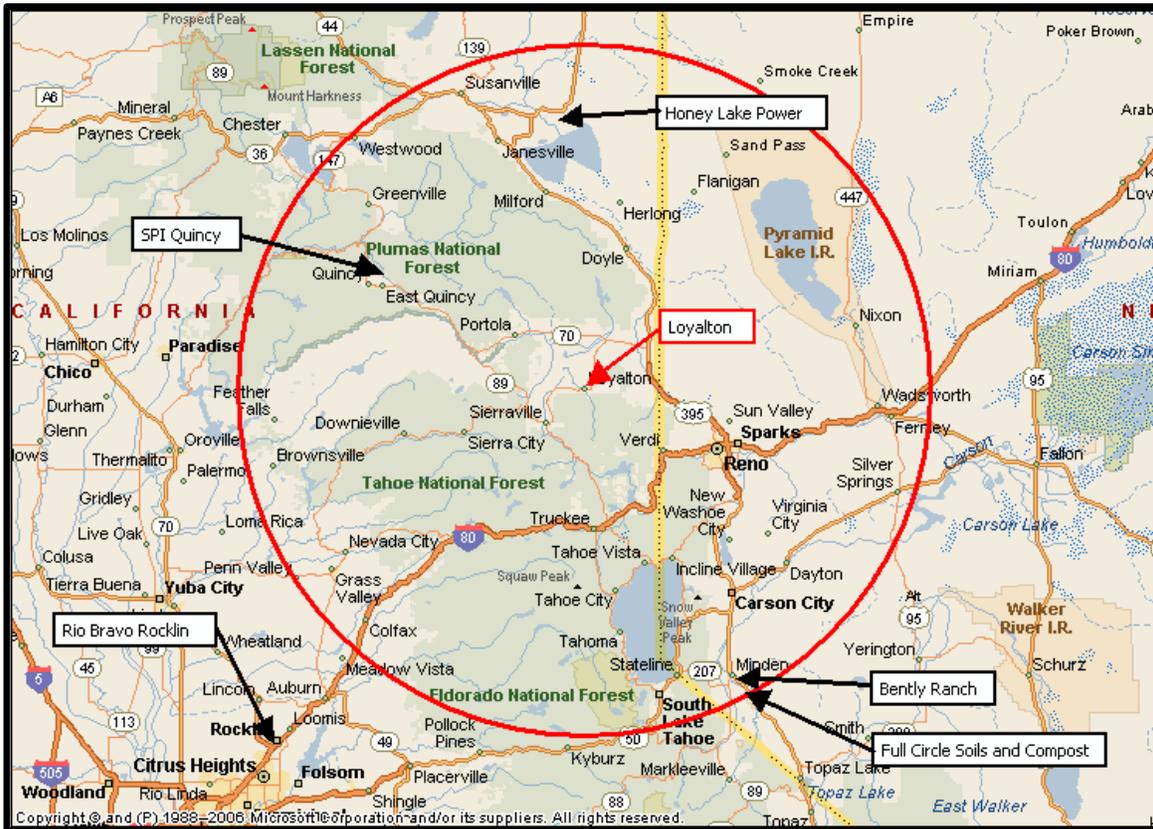
Table 16. Facilities Currently Sourcing Biomass Material from the RSA

Facility	Annual Feedstock Usage (BDT/Yr)	Wood Fuel Sourced from the RSA (BDT/Yr)			
		Forest*	Urban Wood	Tree Trimmings	Total
Honey Lake Power	192,000	80,000	38,400	0	118,400
SPI Quincy	280,000	220,000	0	0	220,000
Rio Bravo Rocklin	192,000	5,000	0	0	5,000
Bently Ranch	10,000	0	5,000	5,000	10,000
Full Circle Soil and Compost	15,000	0	5,000	10,000	15,000
Other Compost Operations	10,000	0	0	5,000	5,000
Firewood	5,000	5,000	0	0	5,000
Animal Bedding	5,000	5,000	0	0	5,000
Totals	709,000	315,000	48,400	20,000	383,400

* Includes timber harvest residuals, forest fuels reduction and sawmill residuals.

Figure 7 highlights the locations of all five enterprises currently receiving wood fiber produced within the RSA.

Figure 7. Facilities Currently Sourcing Biomass Feedstocks from the RSA



Biomass Fuel Supply Availability

Table 17 provides a summary of key findings from the biomass fuel supply availability and competition assessment.

Table 17. Biomass Fuel Supply Availability Within the RSA

	Timber Harvest Residuals (BDT/Yr)	Forest Fuels Reduction (BDT/Yr)	Sawmill Residuals* (BDT/Yr)	Urban Wood (BDT/Yr)	Tree Trimmings (BDT/Yr)	Totals (BDT/Yr)
Potentially Available	210,245	219,737	297,375	104,232	43,202	874,791
Practically Available	124,044	129,645	297,375	72,962	34,561	658,587
Current Competition		315,000		48,400	20,000	383,400
Economically Available		236,064		24,562	14,561	275,187

*Does not include sawmill residuals from an onsite sawmill at Loyalton.

As noted in Table 17, approximately 275,187 BDT of forest biomass, urban wood waste, and tree trimmings are economically available on an annual basis. Assuming 130,000 BDT/year biomass fuel usage at the Loyalton facility, the fuel supply coverage ratio is 2.1:1. Private financial institutions typically require a minimum fuel feedstock supply coverage ratio of 2:1. A key finding from this assessment is that there are significant volumes of biomass fuel currently available economically within the Loyalton RSA, including enough forest fuel from sustainable forest management operations and HHZ to meet BioRAM PPA requirements.

FUTURE FEEDSTOCK SUPPLY SOURCES AND RISKS

Additional Sources

Summarized below are factors that will influence additional woody biomass feedstock supply across the RSA in the coming years.

Sawmill Residuals Outside the RSA

Sawmill residuals from mills located outside the RSA (e.g., Collins Pine at Chester and Lakeview, SPI Lincoln) could be available long term. HLP is currently procuring sawmill residuals from the Collins Pine sawmills, which reduces the need for HLP to source forest fuel from the RSA. SPI Lincoln sawmill residuals are currently being sold to Rio Bravo Rocklin, and this reduces the need for Rio Bravo to source forest feedstocks from the RSA.

Urban Wood Waste Policy

Commencing in 2025, landfill operations within California will be required to divert 75% of organic wastes (including wood) away from landfills. Senate Bill 1383, signed into law in 2016, seeks to mitigate short-lived climate pollutants (e.g., methane) by diverting organic wastes away from landfills. The Bill requires a 50% reduction in organic waste disposal from 2014 levels by 2020 and a 75% reduction by 2025. These legislatively driven policies will push even more urban wood and tree trimming material into the marketplace.

Risks

Potential woody biomass feedstock supply chain risks are summarized below.

Potential Competition

There are three facilities (one idle biomass power plant and two small biomass power plants in development) located within the RSA that may commence commercial operations and utilize forest biomass and small logs within the next five years.

Mt Lassen Power

The Mt Lassen Power generation facility at Westwood, California, is actively for sale. This currently idle facility is rated at 12 MW of generation capacity and was in commercial service between 1986 and 2012. The facility utilized primarily forest fuels including timber harvest residuals and sawmill residuals with total fuel usage of 96,000 BDT/year. Negotiations for the

purchase of this facility are ongoing and may conclude Q1 2021.²⁴ It is not clear if the new owner will attempt to operate this facility, as it currently lacks a PPA.

Indian Valley Wood Products Campus

The Sierra Institute for Community and Environment has been actively working to develop the Indian Valley Wood Products Campus project. Located at a retired sawmill site in Crescent Mills, California, the wood products campus would be scaled to receive and process between 35,000 and 60,000 BDT/year of small logs and biomass. A 3 MW biomass power generation facility is planned for the site with plans for a BioMAT²⁵ PPA with PG&E. Discussions with Sierra Institute²⁶ confirmed that the facility should be in commercial service by 2023 and there is strong community support (due in part to concerns regarding wildfire).

Camptonville Community Partnership Bioenergy Project

The Camptonville Community Partnership (CCP) is a small non-profit group focused on supporting rural communities in the Sierra Nevada foothills of Yuba County. Since 2013 CCP has been focused on the development of a forest biomass business center. The business center would serve as an incubator to support development of value-added utilization enterprises, seeking out economic uses for forest biomass material. CCP has successfully secured grant funding to support a 5 MW biomass power generation facility at Dobbins. This facility would utilize between 40,000 and 50,000 BDT of forest biomass as fuel per year. Like the Indian Valley Wood Products Campus, the CCP hopes to secure a BioMAT PPA with PG&E as the primary offtake agreement for power generation. If successful, this venture could bring the bioenergy facility into commercial service as early as 2024.

Seasonal Availability of Forest Fuel and Sawlogs

As noted earlier in this report, forest operations are typically seasonal in California. Inclement weather conditions (rain/snow) will impact operations. In addition, timber harvest operations will be curtailed during high fire hazard conditions (high temperatures/low humidity/high winds).

CONCLUSIONS

The RSA is an active and very dynamic marketplace with a variety of factors impacting biomass fuel and sawlog supply and demand. Examples are summarized below.

Sawmill Residuals

Recent changes in Pacific Rim fiber market demand and reduced domestic pulp and paper mill demand for chips have placed downward price pressure on sawmill residuals. More power plants (e.g., Rio Bravo Rocklin) are actively purchasing sawmill residuals as a result. Sawmill

²⁴ Per discussions with CCP Power Solutions (current owner of Mt Lassen Power facility).

²⁵ Biomass Market Adjusting Tariff.

²⁶ Jonathan Kusel, Executive Director.

residual prices are very sensitive to market demand (domestic and offshore) and market prices will likely continue to fall in the short term. Most of the sawmill residuals produced within the RSA are considered sustainable forest operation compliant and as such, are in high demand as fuel for the BioRAM compliant biomass power plants such as Rio Bravo Rocklin and Honey Lake Power.

Optimized Fuel Blend

A commercial-scale biomass power operation at Loyaltan is best served by utilizing a blend of fuel from a range of stable suppliers to mitigate fuel supply risk. This fuel supply analysis found that the most cost effective fuel is urban wood and tree trimmings. However, due to the BioRAM PPA fuel blend requirements, Loyaltan can only receive 20% of total fuel usage made up of urban wood and tree trimmings.²⁷ Summarized below are observations regarding biomass fuels listed from most to least cost effective.

- **Urban Wood Waste.** This is clearly the most cost effective fuel that is also available year round. A primary challenge will be constant monitoring to assure that urban wood fuel meets fuel specifications. TSS recommends a stringent quality assurance program that includes incentives for feedstock suppliers to deliver consistent quality material (low ash, low moisture content). Receiving unprocessed urban wood (e.g., pallets, clean construction wood) will allow onsite processing, thus maximizing the potential for quality control.
- **Tree Trimmings.** Like urban wood, tree trimmings are a cost effective fuel that is generally available year round. There is some competition for tree trimmings from soil amendment and compost production facilities. Some tree trimmings are HHZ and sustainable forest operations compliant.
- **Sawmill Residuals.** Market demand for sawmill residuals is significant. This is not likely to change, as sawmill enterprises are very adept at marketing residuals. Due to reduced offshore demand for pulp chips and the high production of sawmill residuals as forest products enterprises respond to relatively high demand for lumber with increased lumber production, sawmill residual prices are trending downward. This trend may continue for several quarters or even years, depending on how the domestic and world economies recover from the pandemic.
- **Timber Harvest Residuals.** As a byproduct of timber harvest activities, limbs and tops are readily available within the RSA. As timber harvest equipment and logging

²⁷ Some tree trimmings may be considered HHZ and sustainable forest operations compliant.

techniques have evolved, the collection of limbs and tops (aka, delimeter piles) at roadside landings has become the norm. The preferred disposal technique has been to burn these piles. However, with the advent of efficient and compact grinding equipment, deploying grinders to process limbs and tops into chips has become cost effective.

- **Forest Fuels Reduction.** Due to the significant costs associated with collection, processing, and transport of forest sourced material, this feedstock is relatively costly. Loyaltown is located close to forested landscapes (see Figure 3, Vegetation Cover Map) and therefore has ready access. Over time, forest landowners may be willing to subsidize the cost of collection, processing, and transport. However, this is not the case today. This feedstock is typically available on a seasonal basis (May through November).

APPENDIX A. Forest Biomass Transportation Incentive Program



Forest Biomass Transportation Incentive Program Payment Request Form

This payment form is designed for landowners to use to request payment from the AFF My Sierra Woods project as part of the Forest Biomass Transportation Incentive (FBTI) Program.

INSTRUCTIONS: Landowner or their designated Register Professional Forester - Please complete this form in its entirety and submit electronically via email to Chantz Joyce, California Conservation Manager, AFF: cjoyce@forestfoundation.org

Additional information regarding the FBTI program can be found on the My Sierra Woods website: www.mysierrawoods.org/programs

Authorized Payee Contact Information:

Name: _____

Mailing Address: _____

County: _____

Email: _____

Phone (Land line): _____ Phone (Cell): _____

Signature _____

Material Delivery Period:

From: _____

To: _____

Volume Delivered and Incentive Calculation:

Use this table to calculate total incentive request *for current delivery period*. Material delivered may have different round trip distance based on location of treatment area(s).

Refer to the rate schedule posted on the next page when calculating incentive payment request.

Harvest Unit #	BDT Delivered	One-Way Trip Distance	\$/BDT Incentive	Incentive
			Total Incentive Request	

FBTI Rate Schedules

Follow these rate schedules when completing the incentive calculation. *Single Landowner Projects* occur on land under one ownership. *Multiple Landowner Projects* occur on land with more than one ownership.

For questions on which table to apply to your project, please contact Chantz Joyce at cjoyce@forestfoundation.org

Single Landowner Project

One-way Trip Distance	\$/BDT Incentive
0 – 10	\$4.00
11 – 20	\$6.00
21 - 30	\$8.00
31 – 40	\$12.00
41 – 50	\$20.00
51 – 60	\$28.00
61 – 70	\$32.00
71 – 80	\$42.00
81 – 90	\$54.00
91 – 100+	\$60.00

Multiple Landowner Project

One-way Trip Distance	\$/BDT Incentive
0 – 10	\$2.00
11 – 20	\$3.00
21 - 30	\$4.00
31 – 40	\$6.00
41 – 50	\$10.00
51 – 60	\$14.00
61 – 70	\$16.00
71 – 80	\$21.00
81 – 90	\$27.00
91 – 100+	\$30.00

RPF Contact Information:

Please provide contact information for the registered professional forester that issued the THP, NTMP or CEQA Exemption# for the forest operation that generated material consistent with this request form.

Name: _____

License #: _____

Email: _____

Phone: _____

Facility Representative:

Print Name: _____ Title: _____

Attachments Required:

Please include the following:

- Copy of appropriate payment summaries from the facility indicating deliveries by date with corresponding weight certificate # and Trip Ticket # or,
- Weight certificates (with Trip Tickets # on each certificate). Scanned copy is fine.
- If alternate route utilized, map of haul distance, with written description for how distance was calculated.

FBTI Payment Request Form

For Internal Use Only: AFF Project Number _____

Funding for this project provided by the California Department of Forestry and Fire Protection as part of the California Climate Investments Program.



APPENDIX B. LTBMU Current Vegetation Management Projects

Project	Purchaser	Award Date	Contract Terminates	Acres Remaining	Remaining Biomass GT	Remaining MMBF
Lake Valley CTL	CTL Forest Mgmt	7/11/19	7/10/24	287	8,613	4.3
Watson CTL	CTL Forest Mgmt	7/12/19	12/31/22	274	8,222	2.6
Ward Creek CTL	CTL Forest Mgmt	9/24/19	10/1/21	44	1,089	0.6
Osgood/BM CTL	CTL Forest Mgmt	6/29/17	10/31/21	161	5,579	1.7
Burton Creek WT IDIQ	Sierra Valley Enterprises	8/18/20	12/31/21	305	7,625	5.2
Tahoe Pines CTL IDIQ	CTL Forest Mgmt	8/18/20	10/15/23	358	8,875	3.8
Southeast CTL IDIQ	CTL Forest Mgmt	8/18/20	9/30/22	142	1,611	1.2
Tahoe City WT	Markit Forestry	12/3/20	12/31/23	370	9,250	4.2
Montreal WT	Sierra Valley Enterprises	10/29/20	12/31/22	465	1,069	3.7
Totals				2,406	51,933	27.2

APPENDIX C. Shared Stewardship Agreement

AGREEMENT FOR SHARED STEWARDSHIP OF CALIFORNIA’S FOREST AND RANGELANDS

**Between the
STATE OF CALIFORNIA
And the
USDA, FOREST SERVICE
PACIFIC SOUTHWEST REGION**

This MEMORANDUM OF UNDERSTANDING (MOU) is hereby made and entered into by and between the State of California, hereinafter referred to as “the State,” and the United States Department of Agriculture (USDA), Forest Service, Pacific Southwest Region, hereinafter referred to as “the U.S. Forest Service” and together referred to as “The Parties.”

TITLE: Agreement for Shared Stewardship of California's Forests and Rangelands

PURPOSE:

This MOU establishes a joint framework to enhance science-based forest and rangeland stewardship in California. The U.S. Forest Service and the State of California commit to maintain and restore healthy forests and rangelands that reduce public safety risks, protect natural and built infrastructure, and enhance ecological habitat and biological diversity. The Parties agree to develop shared tools, coordinated processes, and innovative approaches to increase the pace, scale, and effectiveness of forest and rangeland stewardship in California. The U.S. Forest Service and the State of California, through the California Natural Resources Agency, make this commitment in accordance with the following provisions.

STATEMENT OF MUTUAL BENEFIT AND INTERESTS:

Restoring healthy forests and rangelands in California will yield both ecological and community benefits. Healthy forests will improve climate resilience and reduce the risk of catastrophic wildfire, safeguard water quality and air quality, protect fish and wildlife habitat, enhance biological diversity, sequester carbon, improve recreational opportunities, and generate good jobs and economic opportunities.

BACKGROUND:

Home to some of the largest, tallest and oldest trees in the world, rich biological diversity, vast watersheds, and spectacular recreation, the grandeur of California’s wildlands has captivated generations. California’s forests naturally adapted to low-intensity fire, nature’s preferred management tool, but Gold Rush-era clearcutting followed by a wholesale policy of fire suppression resulted in the overly dense, ailing forests that dominate the landscape today. Compounding risks have made it nearly impossible for nature to self-correct. A cycle of catastrophic wildfires, longer fire seasons, severe drought, intense wind, tree mortality, invasive species, and human population pressure threaten to convert conifer forests to shrublands and shrublands to invasive grasses.

The health and wellbeing of California communities and ecosystems depend on urgent and effective forest and rangeland stewardship to restore resilient and diverse ecosystems. With California's landscape heavily divided among multiple landowners, coordinated stewardship is critical to success. The U.S. Forest Service's Pacific Southwest Region manages over 20 million acres across 18 National Forests in California. The State of California has nearly 14 million acres of private or state-owned forested lands within its jurisdiction. Together this represents over one-third of California's landmass.

In August 2018, the USDA announced a new Shared Stewardship Investment Strategy, committing to establish shared stewardship agreements with state partners throughout the nation. The USDA strategy outlined three core elements:

1. **Manage together.** Establish a joint forest stewardship plan to combine capacity and assets to achieve shared goals across jurisdictions.
2. **Do the right work in the right places at the right scale.** Identify and prioritize forest treatments and other investments that can do the most good to protect the most vulnerable communities, watersheds, fish and wildlife habitat, and economies.
3. **Use all available tools for better stewardship.** Utilize all available authorities, investments and programs to do more work on the ground, which includes carefully managed fire, appropriate timber harvest, non-commercial mechanical treatments, infrastructure maintenance and improvement, and other habitat and watershed restoration activities. Work with partners and stakeholders to utilize appropriate tools for each project.

California's Shared Stewardship Agreement will enable the Parties to increase pace and scale of science-based forest and rangeland stewardship efforts, and better protect California's people, infrastructure, and ecosystems. It is incumbent upon us to restore California's forest through stewardship that returns natural fire regimes to the landscape and restores the natural functions of California's ecosystems.

PRINCIPLES:

1. **Utilize Science:** Use science to inform and prioritize stewardship decisions. Adapt stewardship tools and techniques around improvements in scientific understanding. Support long-term research and studies to deepen our understanding of forest management. Use the best technology and tools to acquire accurate and detailed data. Share data, maps, and analyses and assess any gaps or duplication. Apply this science to all management techniques to ensure the right management plan support the right ecology, including taking into account California's wide variance in fire return intervals for shrublands vs. conifer forests.
2. **Prioritize Community Safety and Ecology:** Manage risk across broad landscapes by prioritizing vulnerable communities and ecosystems for improved fire suppression and

prevention capabilities. Protect vulnerable communities by expanding wildfire risk models beyond fire-prone topography and vegetation to include socioeconomic factors such as age, car ownership, disability, and ingress or egress corridors that hinder evacuation. Ensure that all management plans and projects incorporate ecological goals and protections to avoid solving one problem by creating another.

3. Improve Efficiency: Adopt efficiencies and streamlined regulatory procedures to quickly and effectively complete environmental review while maintaining environmental safeguards and opportunities for public engagement. Streamline and synchronize permits through on-line permitting systems. Utilize all tools available including but not limited to, state-delivered landowner technical assistance, forest health assistance, wildland fire suppression, prescribed fire, State and private forestry programs, Good Neighbor Authority and other Farm Bill authorities.

4. Scale Up Ecologically-based Forestry Across Sectors: Evaluate and deploy available resources such as staff and funding for targeted investment to help local governments, small landowners, tribal governments, and businesses scale up sustainable ecological forest management efforts that deliver multiple ecological and social co-benefits. Explore opportunities to leverage public-private partnerships and investments. Government investments should act as a force multiplier for private and local funds.

5. Coordinate Land Management: Wildfires don't stop at jurisdictional boundaries. Work with landowners, including small landowners, tribal governments, utility companies and owners of road rights-of-way to promote consistent, efficient, economic and environmental forest stewardship across a contiguous landscape.

6. Collaborate and Innovate with all Stakeholders: Utilizing the Governor's Forest Management Task Force, coordinate and collaborate with environmental and non-governmental organizations, academic institutions and other federal and state agencies, tribal governments, local governments, and private landowners. Consistent and clear communication and collaboration will result in more effective policy outcomes, foster better public understanding, encourage constructive engagement across multiple stakeholders and promote effective stewardship, problem-solving and decision-making. The Parties will embrace new thinking, innovation, and take measured risks to seize opportunities for shared success.

ACTIONS:

The Parties commit to the following actions to advance shared stewardship opportunities:

1. Treat One Million Acres per Year: The Parties will scale up vegetation treatment to one million acres of forest and wildlands annually by 2025, committing to each sustainably treat 500,000 acres per year. Treatments will follow a joint plan and will be driven by public safety and ecological goals including reducing wildfire impacts in high priority areas and maintaining or restoring healthy, resilient forests and rangelands.

2. Develop a Joint Plan: The Parties will develop a coordinated, statewide, 20-year project plan by 2021 for forest and vegetation management. This plan will be based on landscape level analysis, risk assessment and other relevant methods and will be updated at five-year intervals. This plan will be captured on a master map that includes recently completed, ongoing and planned vegetation management and forest thinning projects across State, Federal and private landowners. This project map will overlay landscape level risk assessments including ecological, wildfire and community risks, identifying any gaps and highlighting the highest priority areas. The Parties will consult with, and seek input from, tribal governments, local governments, other state and federal agencies, NGOs and other stakeholders in developing and updating this map. This map will be shared publicly to foster coordinated planning, dialogue and feedback among community and environmental stakeholders.

3. Use Sustainable Vegetation Treatments: The Parties will use science-based management to ensure vegetation treatment tools are ecologically appropriate to specific vegetation and landscapes. Treatments will include thinning in excessively dense stands, timber harvesting, mechanical fuel reduction, prescribed fire, grazing, and reforestation.

a. Expand Prescribed Fire: Expanding and accelerating the use of prescribed fire is key to effective stewardship at scale. The Parties will build public awareness about prescribed fire and develop tools to support expanding natural fire on the landscape.

b. World Class Research Forests: To effectively monitor treatment types and climate change, the Parties will establish a world-class monitoring and research program. Coordinating and expanding the existing network of 50-plus experimental forests in California, the Parties will partner with state and national parks, universities, and non- profits. Future sites can focus on non-forested areas like Southern California chaparral systems, ensuring that treatments are ecologically appropriate for non- conifer ecosystems.

4. Expand Forest Management and Associated Infrastructure: To increase the pace and scale of forest stewardship, especially for small landowners, the entire infrastructure behind forestry and vegetation management will need to expand, including the workforce, investments in projects and equipment, and technical support for small landowners to manage their land.

a. Improve Sustainable Timber Harvest: Californians purchase 7 billion board feet of lumber annually, but only 2 billion board feet is produced in the state. Given that California has some of the highest environmental standards for timber harvest in the world, producing California lumber could decrease demand for timber harvested with lower ecological standards. Given California's increasing housing needs and greenhouse gas emission goals, California has a direct interest in consuming ecologically sourced lumber. Improving ecologically and financially sustainable timber harvest in California will support rural economies, reduce transportation emissions from imported lumber, stem conversion of forestland to developments, improve air and water quality, promote carbon sequestration, protect biodiversity and

most importantly reduce wildfire risk.

To enable landowners to better harvest and thin their forestland, the Parties will work to streamline permitting, support public-private partnerships, continue to incorporate the latest science-based management standards and provide technical support to help small landowners design and execute timber harvest. The Parties will explore incentives for ecologically beneficial harvest outcomes like multi-age class stands, stable carbon storage, and biological diversity. The Parties will identify tools to promote timber as a California agricultural product using labels like “California Grown” and better integrate timber into policies that prevent conversion of agricultural land. The Parties can also better support landowners adjacent to or within State or Federal land to achieve contiguous forest health.

b. Increase Access to Capital: Shortages of equipment and resources for forest treatment is driving up the price per acre and slowing California’s capacity to restore forests. Parties will explore ways to incentivize investment in vegetation treatment equipment like masticators, chippers, and bulldozers and forest products processing facilities like mills. Parties will also support finance mechanisms like loan guarantees, revolving loan funds, and cooperative models to attract private investment.

c. Grow the Workforce: The Parties will support training and workforce development to increase the current labor pool available to meet the challenge of forest management, forest health and fuels reduction. The Parties will develop career pathways into forestry through high schools, community colleges, the California Conservation Corps, local certified conservation corps, and the Public Land Corps. Parties will promote alternative education venues such as vocational training targeted to specific professions such as timber faller, heavy machine operator, vegetation treatment crews, and ecological restorationists. State and Federal entities will work to avoid bottlenecks or oversight gaps.

d. Expand Landowner Agreements: Build on the existing fuels reduction MOUs and Good Neighbor Authority agreements to achieve efficiencies and increase support in forest and rangeland stewardship. Expand MOUs to include local governments, tribal governments, utility companies, consortiums of small landowners, and owners of road rights-of-way, like CalTrans and County Governments.

5. Promote Ecological Co-Benefits: In addition to public safety, recreation, job creation, and economic opportunity, restoring the ecological function of California forests will yield multiple ecological co-benefits. These include habitat protection, watershed health, air quality, and carbon sequestration.

a. Protect Biodiversity: California is a world biodiversity hotspot. Among the 50 states, California is home to more species of plants and animals and the highest number of species found nowhere else. Protecting and fostering that diversity is both fundamental to the citizens of California and will help to reduce wildfire risk. The California Biodiversity Initiative highlights state agencies roles to understand the

threats to biodiversity, protect native species, manage natural and working lands to promote biodiversity, and promote partnerships to achieve biodiversity protection. The Parties will incorporate increased biodiversity into forest management plans and prioritize vulnerable habitats and species for protection and restoration.

b. Protect Water Resources: California's forested watersheds function as critical natural infrastructure for wildlife and people. Catastrophic wildfire devastates both the natural and built infrastructure endangering California's drinking water. By prioritizing vulnerable watersheds for restoration and vegetation treatment, our work will protect and purify California's water supply for communities, agriculture, and critical fish and wildlife habitat. Much of California's physical water infrastructure including reservoirs and pipelines run through high risk fire zones. The Parties will focus on protecting water systems against damaging wildfire effects from the forest to the faucet.

c. Carbon Sequestration: The mega-fire phenomenon has turned California's forests into carbon emitters rather than carbon sinks. Well-managed forests provide a significant source of stable carbon storage. The Parties will manage for carbon sequestration by thinning dense stands and undergrowth and promoting growth of large trees, which provide hundreds of years of carbon storage. The Parties will work with experts like the California Air Resources Board to establish forest-specific carbon accounting techniques to incentivize stable carbon storage.

6. Develop Markets for Wood Products and Recycle Forest Byproducts: The byproduct of forest management projects are limbs and small trees referred to as woody biomass. Currently woody biomass is either piled and burned in the forest or left to rot, diminishing air quality, increasing wildfire risk, or emitting green-house gasses. As pace and scale of forest management increases, it is imperative to develop cleaner and more sustainable alternative uses for woody biomass. Developing markets for wood products includes:

a. Innovation: The Parties will explore innovative uses for wood products and establish a strategy to signal, subsidize, or incubate alternate uses for woody biomass products. Innovative products like cross-laminated timber, gasification, or cellular reconstruction, sequester carbon or provide carbon-efficient alternatives to fossil fuels and building materials such as steel and concrete.

b. Biomass Energy: To avoid mass pile-burning, biomass energy will be a key component of forest recycling. To site or support new facilities, the Parties will use the principles of right scale, right place, right technology taking externalities into account like air quality impact, environmental justice, and wildfire avoidance. The Parties will help identify and untangle market distortions, inefficiencies, and obstacles to the use of forest waste for alternative energy.

c. Supply Signals: Investors are unlikely to build wood product facilities for logs, small logs, and woody biomass without a sustainable, uninterrupted raw material supply. The Parties will make their Joint Plan public so investors will know when and where

wood supply will be available. The Parties will work with stakeholders to develop additional supply signal tools to guarantee multi-year supply contracts and incentivize new investments in wood processing facilities in California.

7. Improve Access to Sustainable Recreation: Foster a range of forest and wildland opportunities that reflect the needs of and better serve California’s diverse population. The Parties will pursue mission-appropriate and sustainable recreation opportunities in ways that leverage resources and extend capacity through partnerships and alignment around a shared vision of access and diversity. Examples include improved transportation opportunities, more affordable lodging options, increasing accessible trails and facilities, and targeting low income communities that lack access.

8. Fire-Adapted Communities: Identify and protect communities most vulnerable to fire impacts. These vulnerability factors include proximity to high fire risk, communities without good ingress or egress corridors and socioeconomic factors that hinder evacuation such as age or car ownership. The Parties will work together to improve fire suppression and fire prevention capabilities that safeguard communities, including but not limited to, these vulnerable populations.

9. Advance Science and Share Monitoring and Data Analytics: Leverage scientific expertise and capacity to maintain healthy and resilient forests in a changing climate. Coordinated data will enable stakeholders to adapt priorities and management techniques to the dynamics of California’s changing ecosystems. The Parties will:

a. **Consolidate Data:** Consider co-locating data teams from State and Federal agencies to reduce redundancy and improve efficiency. Establish joint monitoring methods, joint protocols, and work on developing a single, statewide shared data set that all Parties can utilize and update.

b. **Ecological Monitoring:** Consistently monitor forest health, carbon sequestration, biological diversity, watershed quality, and other parameters that impact forest and wildlands in California. The Parties will coordinate closely with environmental organizations and universities to ensure monitoring techniques are addressing the most current ecological concerns.

c. **Research and Innovation:** Support long-term research and monitoring efforts. Enhance surveying and monitoring programs such as the Forest Inventory and Analysis program with joint funding contributions, allowing a greater number of monitoring installations to be remeasured more frequently.

MUTUAL UNDERSTANDING AND AGREEMENT BETWEEN THE PARTIES:

A. The Parties are bound by all applicable federal, state, and local statutes and regulations. If conflicts arise, the Parties will evaluate how authorities can best achieve the goals of a project.

- B. The Parties will protect sacred sites and preserve cultural resources and take all necessary actions to protect data collected from Native American tribes.
- C. All Parties will communicate on a regular basis to enhance and develop the institutional arrangements necessary to facilitate the purposes of this MOU.
- D. The Parties will meet at least twice a year to evaluate progress on the MOU and will meet regularly with stakeholders including the environmental community, local government, tribal governments, and industry.

NONBINDING AGREEMENT. This MOU creates no right, benefit, or trust responsibility, substantive or procedural, enforceable by law or equity. The Parties shall manage their respective resources and activities in a separate, coordinated, and mutually beneficial manner to meet the purpose(s) of this MOU. Nothing in this MOU authorizes or requires either of the Parties to obligate or transfer anything of value.

Specific, prospective projects or activities that involve the transfer of funds, services, property, and/or anything of value to, from, or between the Parties requires the execution of separate agreements and are contingent upon numerous factors, including, as applicable, but not limited to: availability of appropriated funds and other resources and administrative, regulatory, and legal requirements (including authorization by statute). This MOU neither provides, nor meets these criteria. If the Parties elect to enter into an obligation agreement that involves the transfer of funds, services, property, and/or anything of value to, from, or between the Parties, then the applicable criteria must be met. Additionally, under a prospective agreement, each party operates under its own laws, regulations, and/or policies, and any obligation of the Parties is subject to the availability of appropriated funds and other resources. The negotiation, execution, and administration of these prospective agreements must comply with all applicable authorities. Nothing in this MOU is intended to alter, limit, or expand the Parties' statutory and regulatory authority.

I. AUTHORIZED REPRESENTATIVES


Gavin Newsom, California Governor

 8/12/2020
Victoria Christiansen, Chief of Forest Service

 8/12/20
Randy Moore, Regional Forester Pacific Southwest Region

 8/12/2020
Frank R. Baum, Acting Regional Forester, Intermountain Region

 8/12/20
Wade Crowfoot, California Natural Resources Agency Secretary

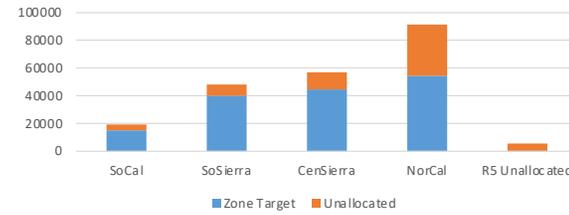
APPENDIX D. USFS Region 5 Acres Treated to Reduce Wildfire Risk – 2019 and 2020

Acres Treated to Reduce Wildfire Risk – Region 5 – FY19 October 24, 2019

Accomplishments are defined as treatments that are planned or contracted to occur. They are not necessarily completed on the ground.



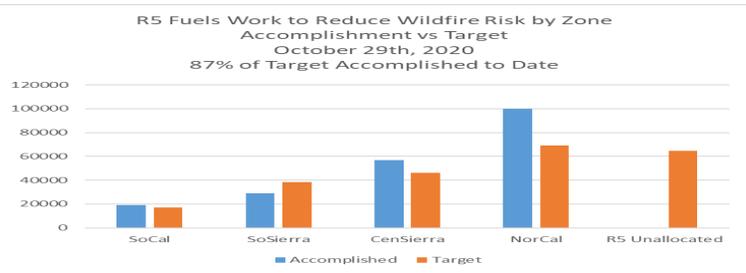
R5 Fuels Work to Reduce Wildfire Risk by Zone
Zone Target vs. Unallocated Target
October 24th, 2019
97% of Regional Target Accomplished to Date



Row Labels	Eldorado		Lake Tahoe Basin		Plumas		Tahoe		Central Sierra Total		NorCal		NorCal Total		SoCal		SoCal Total		Southern Sierra		Southern Sierra Total		Grand Total
Fire	2,328	86	2,533	2,599	7,546	7,387	2,900	177	3,080	3,124	576	17,244	543	1,211	338	941	3,033	5,363	2,072	1,351	6,600	15,386	43,209
Broadcast Burn	274	0	759	1,666	2,698	2,320	2,030	89	1,731	2,151	277	8,597	227	386	57	545	1,215	1,409	264	607	3,398	5,678	18,188
Fire Use	0	0	0	21	21	0	0	0	0	0	0	0	0	0	0	0	0	3,268	0	0	0	3,268	3,290
Jackpot Burn	0	0	0	0	0	29	0	0	0	0	0	29	0	0	0	0	0	0	10	0	0	10	39
Machine Pile Burn	2,054	86	1,774	912	4,826	5,038	870	88	1,349	973	299	8,618	316	825	281	396	1,818	686	1,798	744	3,202	6,430	21,692
Mechanical	16,377	5,167	9,257	18,229	49,030	35,501	9,417	3,174	13,274	10,587	2,203	74,156	2,967	4,751	3,934	4,440	16,092	1,071	9,801	4,496	14,684	30,052	169,330
Biomass Removal	1,624	378	0	4,496	6,498	11,691	2,912	1,407	0	1,184	223	17,416	56	181	0	0	237	0	1,362	46	1,378	2,786	26,938
Chipping	768	32	184	869	1,853	274	0	0	0	110	12	396	333	1,236	10	610	2,189	0	60	0	798	858	5,296
Crushing	312	918	0	3,394	4,624	0	339	0	0	151	0	490	107	56	0	626	789	94	0	0	758	852	6,755
Lop and Scatter	272	0	741	77	1,091	1,177	20	146	0	212	70	1,624	287	837	2,141	95	3,360	0	1,362	196	0	1,558	7,633
Machine Pile	1,341	616	1,775	1,994	5,726	7,510	3,747	1,018	429	1,070	684	14,457	577	835	215	1,464	3,091	112	2,930	2,292	5,185	10,519	33,794
Thinning	12,060	3,223	6,557	7,398	29,238	14,849	2,399	603	12,845	7,861	1,215	39,772	1,607	1,606	1,568	1,645	6,426	865	4,087	1,961	6,565	13,479	88,915
Other	0	247	152	0	399	0	0	100	0	0	0	100	0	84	0	0	84	0	0	584	1,971	2,555	3,138
Chemical	0	247	0	0	247	0	0	0	0	0	0	0	0	84	0	0	84	0	0	564	0	564	895
Grazing	0	0	152	0	152	0	0	100	0	0	0	100	0	0	0	0	0	0	0	20	1,971	1,991	2,243
Grand Total	18,705	5,501	11,942	20,827	56,975	42,888	12,317	3,451	16,354	13,711	2,779	91,500	3,510	6,046	4,272	5,381	19,209	6,434	11,873	6,431	23,255	47,993	215,677

Acres Treated to Reduce Wildfire Risk – Region 5 – FY20 October 29th, 2020

Accomplishments are defined as treatments that are planned or contracted to occur. They are not necessarily completed on the ground. (table does not include acres from wildland fire or planning, numbers may vary between table and dashboard due to data collection timing)



Row Labels	Central Sierra										NorCal					SoCal		Southern Sierra			Southern Sierra Total		Grand Total
	Eldorado	Lake Tahoe Basin	Plumas	Tahoe	Klamath	Lassen	Mendocino	Modoc	Shasta-Trinity	Six Rivers	Sierra	Sierra	Cleveland	Los Padres	San Bernardino	Inyo	Sequoia	Sierra	Stanislaus				
Fire	6,991	167	3,883	2,653	13,695	3,069	3,734	1,844	2,421	9,607	583	21,258	593	1,206	53	1,492	3,344	0	1,209	4,788	6,226	12,223	50,519
Broadcast Burn	1,165	0	314	949	2,429	940	1,841	780	0	8,957	0	12,518	126	460	0	274	860	0	99	996	0	1,095	16,902
Fire Use	2,604	0	2,312	0	4,916	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4,916
Jackpot Burn	0	0	0	0	0	0	0	0	1,198	97	0	1,295	0	0	0	0	0	0	22	0	0	22	1,317
Machine Pile Burn	3,222	167	1,257	1,704	6,350	2,129	1,892	1,064	1,223	554	583	7,445	467	746	53	1,218	2,484	0	1,088	3,792	6,226	11,106	27,385
Mechanical	15,544	2,423	6,781	17,935	42,682	28,518	20,820	5,995	10,253	12,061	1,011	78,658	5,817	3,757	2,508	3,520	15,602	2,031	2,354	3,169	8,543	16,097	153,038
Biomass Removal	135	330	0	4,177	4,643	1,837	1,500	1,215	0	1,085	0	5,637	320	0	0	716	1,036	496	152	98	0	746	12,061
Chipping	392	2	0	1,869	2,262	226	0	48	0	72	0	346	1,226	605	0	49	1,879	117	0	201	1,330	1,648	6,135
Crushing	668	476	0	1,199	2,343	828	1,605	0	0	40	0	2,473	112	4	0	140	256	0	0	224	332	556	5,628
Lop and Scatter	2,790	0	1,033	0	3,823	1,449	0	1,848	4,027	374	0	7,698	575	275	1,198	77	2,125	0	433	942	0	1,375	15,021
Machine Pile	5,402	0	927	2,918	9,247	6,792	5,087	1,287	1,812	913	352	16,242	631	814	214	997	2,656	500	1,039	336	1,623	3,498	31,643
Mastication/Mowing	0	0	0	0	0	0	0	0	0	0	0	0	79	0	0	79	0	0	0	0	0	0	79
Thinning	6,157	1,615	4,820	7,772	20,364	17,387	12,628	1,597	4,414	9,577	659	46,262	2,875	2,060	1,096	1,542	7,572	918	730	1,368	5,258	8,274	82,473
Other	558	0	0	0	558	0	0	0	0	0	0	0	0	125	0	125	0	0	469	0	469	469	1,152
Chemical	558	0	0	0	558	0	0	0	0	0	0	0	0	125	0	125	0	0	469	0	469	469	1,152
Grand Total	23,093	2,590	10,664	20,588	56,934	31,588	24,553	7,839	12,674	21,668	1,593	99,915	6,410	5,088	2,561	5,012	19,070	2,031	3,563	8,427	14,769	28,790	204,710