Calforests
California Forestry Association

1215 K Street, Suite 1830
Sacramento, CA 95814
916.444.6592

April 8, 2016

To: Forest Climate Action Team (FCAT)
Subject: California Draft Forest Carbon Plan Concept Paper:
Managing our Forest Landscapes in a Changing Climate (March 9, 2016)

These comments were emailed to: fcat.calfire@fire.ca.gov

CFA Commends FCAT:

Calforests would like to commend the FCAT for its work on the Forest Carbon Plan Concept Plan. We see a forward looking document that supports forest management in the state.

General Comments:

1) The March 23 Workshop

During the workshop of March 23, several commenters made statements that diminished the contributions of forest managers toward the goal of increased carbon sequestration. These comments questioned various forest practices such as even-aged management, the use of durable wood products, growth/harvest ratios, and biomass. We address these comments below.

The Intergovernmental Panel on Climate Change (IPCC) is the leading international body for the assessment of climate change. It was established by the United Nations Environment Programme (UNEP) and the World Meteorological Organization (WMO) in 1988 to provide the world with a clear scientific view on the current state of knowledge in climate change and its potential environmental and socio-economic impacts. In the same year, the UN General Assembly endorsed the action by WMO and UNEP in jointly establishing the IPCC.

The IPCC reviews and assesses the most recent scientific, technical and socio-economic information produced worldwide relevant to the understanding of climate change. It does not conduct any research nor does it monitor climate related data or parameters. Thousands of scientists from all over the world contribute to the work of the IPCC. Review is an essential part of the IPCC process, to ensure an objective and complete assessment of current information.

Because of its scientific and intergovernmental nature, the IPCC embodies a unique

opportunity to provide rigorous and balanced scientific information to decision makers. By endorsing the IPCC reports, governments acknowledge the authority of their scientific content. The work of the organization is therefore policy-relevant and yet policy-neutral, never policy-prescriptive.

The Intergovernmental Panel on Climate Change (IPCC) has emphasized that assessments of the mitigation potential in the forest sector should be based on estimates of carbon stock changes and the resulting GHG emissions in forest ecosystems, in the harvested wood product (HWP) sector and of the avoided emissions that result from the substitution of emissions-intensive products such as steel and concrete with HWPs.

IPCC AR4 WG III

The IPCC Working Group III report states as one of its objectives:

> *"Increase efforts to replace high energy input materials with wood, and encourage further recycling of forest products in order to provide for long-term storage of carbon".*

It goes on to state:

> *"Wood products derived from sustainably managed forests address the issue of saturation of forest carbon stocks. The annual harvest can be set equal to or below the annual forest increment, thus allowing forest carbon stocks to be maintained or to increase while providing an annual carbon flow to meet society's needs of fibre, timber and energy. The duration of carbon storage in wood products ranges from days (biofuels) to centuries (e.g., houses and furniture). Large accumulations of wood products have occurred in landfills (Micales and Skog, 1997). When used to displace fossil fuels, woodfuels can provide sustained carbon benefits, and constitute a large mitigation option (see Box 9.2).*
>
> *Wood products can displace more fossil-fuel intensive construction materials such as concrete, steel, aluminum, and plastics, which can result in significant emission reductions (Petersen and Solberg, 2002). Research from Sweden and Finland suggests that constructing apartment buildings with wooden frames instead of concrete frames reduces lifecycle net carbon emissions by 110 to 470 kg CO2 per square metre of floor area (Gustavsson and Sathre, 2006). The mitigation benefit is greater if wood is first used to replace concrete building material and then after disposal, as biofuel."*

In terms of the over role of forest management in sequestering carbon, in C. E. Smyth et al.: Quantifying the biophysical climate change mitigation potential of Canada's forest sector the following is stated:

> *The better utilization strategy was found to provide the greatest climate change mitigation for most locations. The strategy of maximizing the C in forests through the harvest less strategy generally ranked lower than the better utilization strategy, which supports the conclusion of IPCC AR4 WG III that, according to Nabuurs et al. (2007), "[i]n the long term, [a] sustainable forest management strategy aimed at maintaining or increasing forest C stocks, while producing an annual yield of timber, fibre, or energy from the forest, will generate the largest sustained mitigation benefit."*

In the study, *documenting the Full climate benefits of Harvested Wood Products in Northern California: Linking Harvests to the Us Greenhouse Gas Inventory. Stewart and Nakamura* the following conclusion is reached:

> *When current utilization practices throughout the full wood products use cycle are considered, the total estimated climate benefits per unit of harvest volume are two times larger than estimates based on historical wood utilization coefficients.*

In regards to current practices, the Forest Practice Act and Rules were thoroughly vetted by the Air Resources Board for consideration under adoption of the Forest Protocols. The Forest Protocol provides requirements and methods for quantifying the net climate benefits of activities that sequester carbon on forestland. The protocol provides offset project eligibility rules; methods to calculate an offset project's net effects on greenhouse gas (GHG) emissions and removals of CO_2 from the atmosphere (removals); procedures for assessing the risk that carbon sequestered by a project may be reversed (i.e. released back to the atmosphere); and approaches for long-term project monitoring and reporting. The protocol is designed to ensure that the net GHG reductions and GHG removal enhancements caused by an offset project are accounted for in a complete, consistent, transparent, accurate, and conservative manner and may therefore be reported as the basis for issuing ARB or registry offset credits.

These practices were accepted for use in the Protocols. It is fundamental that the Carbon Plan be consistent with these standards.

2) Biomass is a critical component to the Forest Carbon Calculator:

Biomass is a critical component of an overall strategy to address carbon sequestration. In a recent analysis for the California Energy Commission, Fried, etal. (Fried, Jeremy, Sara Loreno, Benktesh Sharma, Carlin Starrs, William Stewart. (University of California, Berkeley). 2016. ***Inventory Based Landscape-Scale Simulation to Assess Effectiveness and Feasibility of Reducing Fire Hazards and Improving Forest Sustainability in California With Biosum.*** CEC-600-11-006) concluded that the optimal scenario for carbon sequestration would:

> *Assuming a 0.8% annual probability of a severe wildfire, the optimal scenario would generate 46% more net carbon benefits than a no action, Grow-only scenario. The level of benefits goes up substantially if the FVS net growth rate is discounted by 25% to account for the apparent overestimate compared to empirically measured growth rates.*
>
> *In addition to the carbon sequestration benefits from reducing fire hazards to prepare for a future with an equal or greater incidence of wildfire, the optimal scenario is projected to reduce fire hazards on about 400,000 acres per year while producing 9 million bone dry tons of bioenergy feedstock and 11 million bone dry tons of merchantable logs.*

In order to accomplish both hazard reduction and sequestration, a biomass industry is crucial.

3) Use of Wood Waste in a Biomass Boiler Reduces Pollutants by 98% Compared to Open Pile Burning

Two studies by Placer County have sown the net environmental benefits of chip, haul, and consumption of wood waste at a biomass powerplant versus open pile burning (Sept. 2015. Springsteen etal, "Forest biomass diversion in the Sierra Nevada: Energy, economics and emissions" and Oct. 18, 2013. Springsteen etal, "Emission Reductions from Woody Biomass Waste for Energy as an Alternative to Open Burning").

A 98% reduction in pollutants from burning wood waste in a biomass boiler compared to open pile burning has been known since 1979 (Attachment #1).

4) Actionable Items Integral in the Forest Carbon Plan

CFA believes the Goals and Strategies listed on pages 21-27 of the Draft Plan are well done. However, for the Plan to be successful, we believe that each Strategy needs a list of specific **"ACTION ITEMS"** if there is to be a positive outcome to the Plan.

The Forest Service as a Full Partner in the Carbon Plan

To have a successful Forest Carbon Plan that leads to improved forest health and resilience, the Forest Service has to be a partner. We believe the Forest Service is a full partner in this endeavor in writing but we're not sure so we're bringing it to your attention.

Importance of Known Information 2011-2015

The Forest Carbon Plan has to incorporate not just the 2001-2010 FIA data, but also what's known since 2010. There's good data available on wildfire burn intensity and emissions, the impact of the insect and disease epidemic, and forest health and fuels reduction accomplishment.

Page-Specific Comments:

Pages 1-3

It is unclear if the "Vision" and the "Purpose and Scope" includes federal forest lands? Is this Carbon Plan going to "deliver forest-based policy" (p. 2) for federal land?

Page 5 – Table 1 and 1st Paragraph

Table 1 and the first paragraph should be expanded to fully display Table A2-2 from the 2001-2010 FIA data that was released early March 2016 so that the reader can see unreserved versus reserved forest land by ownership and can see "timberland", "other forest" , and "non-forest" for both reserved and unreserved by ownership. By reproducing the FIA Table A2-2 in the Carbon Plan, then you and the reader know it's consistent with 2010 FIA.

Page 5 – 2nd paragraph

More detail should be provided explicitly displaying in graphs growth, mortality and harvest from each ownership group.

The text should be more explicit about FIA data up to 2010 on growth (3.8 billion board feet (bbf)/year on private industrial and non-industrial; 4.0 bbf on Forest Service; Mortality (0.8 bbf/year on private; 2.6 bbf/year on Forest Service) and a graph of harvest private, Forest Service, and Total since 1980 (from the Board of Equalization (B.O.E.) statistics). Then adding some text about what percent removal expressed as a percent of growth by ownership would be helpful (see Attachments #2 and #3). For example, from 1978 through 2014, private harvest is at about 48% of annual growth while the Forest Service is at about 9% of growth. In 2014, harvest from private ownership was at 32% of growth while the Forest Service was at 6% of growth.

Page 5, Forest Health, Paragraph 1

The text suggests there's been climate change that has led to an increase in frequency of natural disturbance agents. Since we are experiencing increased number, size, and intensity of wildfires, and now experiencing an insect and disease epidemic, there should be text here that describes what climate change California has already experienced (not just what's expected to happen in the future) that has led to this rapid increase in the frequency and intensity of the natural disturbance agents.

Page 6, Forest Health

There should be a substantial expansion of text and graphs to display the current increase in frequency and intensity of the natural disturbance agents.

For example, since 2001, on average, the acres of National Forest burned is 320,174 acres/year (see Attachment #4). Further the burn intensity has been dramatically increasing from about 21% high severity in 1986 to near 50% in 2014 (King Fire). These wildfires are annually emitting an estimated 21.5 million tons of CO2 equivalent.

And now, the drought-induced and overly dense forest condition has led to an insect and disease epidemic. On January 28, 2016, the Forest Service estimates 5.1 billion

board feet of dead trees in the six county area (Tuolumne, Mariposa, Madera, Fresno, Tulare and Kern) in the southern Sierras (see Attachment 5). From plots taken by the Sierra National Forest late summer 2015, they find that at least 60% of the pine vegetative type is dead. They will take more plots this spring and early summer and expect to find that now 85% of the pine vegetative type is dead. The epidemic is moving north. Beetle activity has continued throughout the winter with notable die-off of trees in Tuolumne, Calaveras, Amador and Eldorado Counties. It could spread throughout northern and central California with double the amount of current mortality by the end of summer 2016.

The Forest Service, State and Private Forestry, will begin their annual aerial flights to map mortality starting in the southern Sierras next week.

Page 7, The Growing Forest Health Threat

The text should be expanded to incorporate the known reduction in productive forest land due to natural disturbance agents that the Forest Service has identified as being in need of restoration and reforestation (see Attachment #6). There are 3.5 million acres cumulatively since 1986 in need of reforestation. This data, from the Forest Service FACTS database, does not include the estimated additional 2.0 million acres of mortality identified from insect and disease in just 2015 alone. About 85% of the insect and disease mortality is on Forest Service forest land.

There's a high likelihood that there will be another 2.9 million acres of mortality from insect and disease in 2016 and 2017. That cumulatively suggests that perhaps 4 million acres (33%) of Forest Service productive forest land could be in need of reforestation by the end of 2017. The Forest Service total unreserved productive forest land is only 12.1 million acres (2001-2010 FIA, Table A2-5). The Forest Service may already be about to surpass Krist etal's estimate that 25% of standing live trees will be dead due to insect and disease by 2027.

Page 8 (bottom of the page), Implications for Forest Carbon Sinks

The text needs to be updated to include acres burned by year on Forest Service land through 2015 (with the associated estimate of 21.5 million tons of CO2equivalent annual emissions) and to include the Forest Service's 1/28/2016 estimate of mortality from insect and disease (5.1 billion board feet) (Attachments #4 and #5). The text needs to be expanded to analyze the amount of live tree carbon versus dead tree carbon with the dramatic increase in dead from natural disturbance agents particularly in the last 5 years. The analysis needs to include displaying how much

of the dead material has been removed and utilized in biomass powerplants versus what has been left on the landscape to decay (or was pile burned). The analysis needs to estimate the emissions associated with the dead material that was either burned or is still on the landscape decaying, which produces substantially more methane than pile burning or burning dead material in a biomass boiler.

Page 10, Species Range Shift

The 2014 work by McIntyre, Thorne etal should be added to this section ("Twentieth-century shifts in forest structure in California: Denser forests, smaller trees, and increased dominance of oaks.")

Page 13, middle of the page, a Vision for California's Forest

Uncertainty of future climate is noted but it should also be noted that there's uncertainty in how aggressive private non-industrial and Forest Service productive forest lands can move toward resilience.

Page 15, 2nd paragraph, Carbon Storage

The text states that above ground carbon in down wood is not included. FIA (2001-2010) displays above ground carbon in down wood at Table A2-96.

Page 18- Table 5

There is sufficient data available since 2010 to estimate mortality from megafires and the recent insect and disease epidemic. These estimates should be included in a separate column in Table 5 (see Attachment #4 and #5).

Page 18- Forest Service Timberland

There is sufficient data since 2010 that can be included, which will provide a current display of the total mortality on the Forest Service – Timber land (see Attachment #2, #4 and #5).

Page 19 – Non-Corporate Timberland

The text should note that for small private forest parcels, it is impossible to economically manage their forestland given the constraints of the California Forest Practices Act and its implementing regulations.

Pages 21-22; Goals and Management Strategies

CFA believes there is more than sufficient data to make annual inventory assessments of net CO2 equivalent for private forestland and public forestland. By incorporating: 1) emissions from megafires (2010-2015), 2) the estimate of insect and disease mortality (2013, 2014, 2015, 2016) by ownership, 3) harvest statistics, 4) a calculation of amount of harvest that goes to long-lived wood products, and 5) existing data on amount of forest feedstock and mill residuals used at biomass powerplants, it should be straightforward to make very reasonable estimates.

Annual growth can also be intelligently adjusted until the 2015 FIA publication comes out. We know that growth on private 2001-2005 FIA was about 3.5 billion board feet; the FIA 2010 data indicates about 3.8 billion board feet. For the Forest Service, annual growth FIA 2001-2005 versus FIA 2010 is flat at about 4.0 billion board feet.

Page 23 –Enhance; Strategies

Having the Forest Service as a full partner in this Forest Carbon Strategy is of extreme importance since they control over ½ of the productive forest land in the State. The text correctly notes that the Forest Service wants to move to about 500,000 acres/year of forest health and fuels reduction accomplishment. That direction has been in-place with the Regional Forester's Ecological Restoration: Leadership Intent publication March 2011. Since 2011, the Forest Service's accomplishment has actually declined.

In addition, the National Forests are being consumed by wildfire at an annual average rate of 320,174 acres per year (Attachment 3). Further, we know that burn intensity has drastically increased for high intensity burn from about 21% in 1986 to near 50% on the King Fire. We also know that what was mapped as vegetative low and moderate severity burn following megafires is now being consumed by insect and disease (Rim Fire is the best example). The Forest Service shows low severity wildfire burned acres as "accomplishment". All of that acreage within mega

fire perimeters need to be re-evaluated by the Forest Service as much of it is now dead.

Thank You for the Opportunity to Comment!

CFA appreciates this opportunity to comment on the Draft Carbon Plan and look forward to participating in helping with its continuing development.

Sincerely,

Steve Brink
Vice President-Public Resources
steveb@calforests.org
916-208-2425

George Gentry
Vice President- Regulatory Affairs
georgeg@calforests.org
916-584-2950

Enclosures:

Enclosure #1 - Comparison of Emissions Between Biomass Boilers and Field Burning

Enclosure #2 – 1980-Present Growth, Mortality, and Harvest on Forest Service forest land (FIA 2010 and Board of Equalization Timber Yield Statistics)

Enclosure #3 - 1980-Present Growth, Mortality, and Harvest on Private forest land (FIA 2010 and Board of Equalization Timber Yield Statistics)

Enclosure #4 - 1980-Present Growth, Mortality, and Harvest on Private forest land (FIA 2010 and Board of Equalization Timber Yield Statistics)

Enclosure #5 – Forest Service Estimate of Mortality in the Southern Sierras (January 28, 2016)

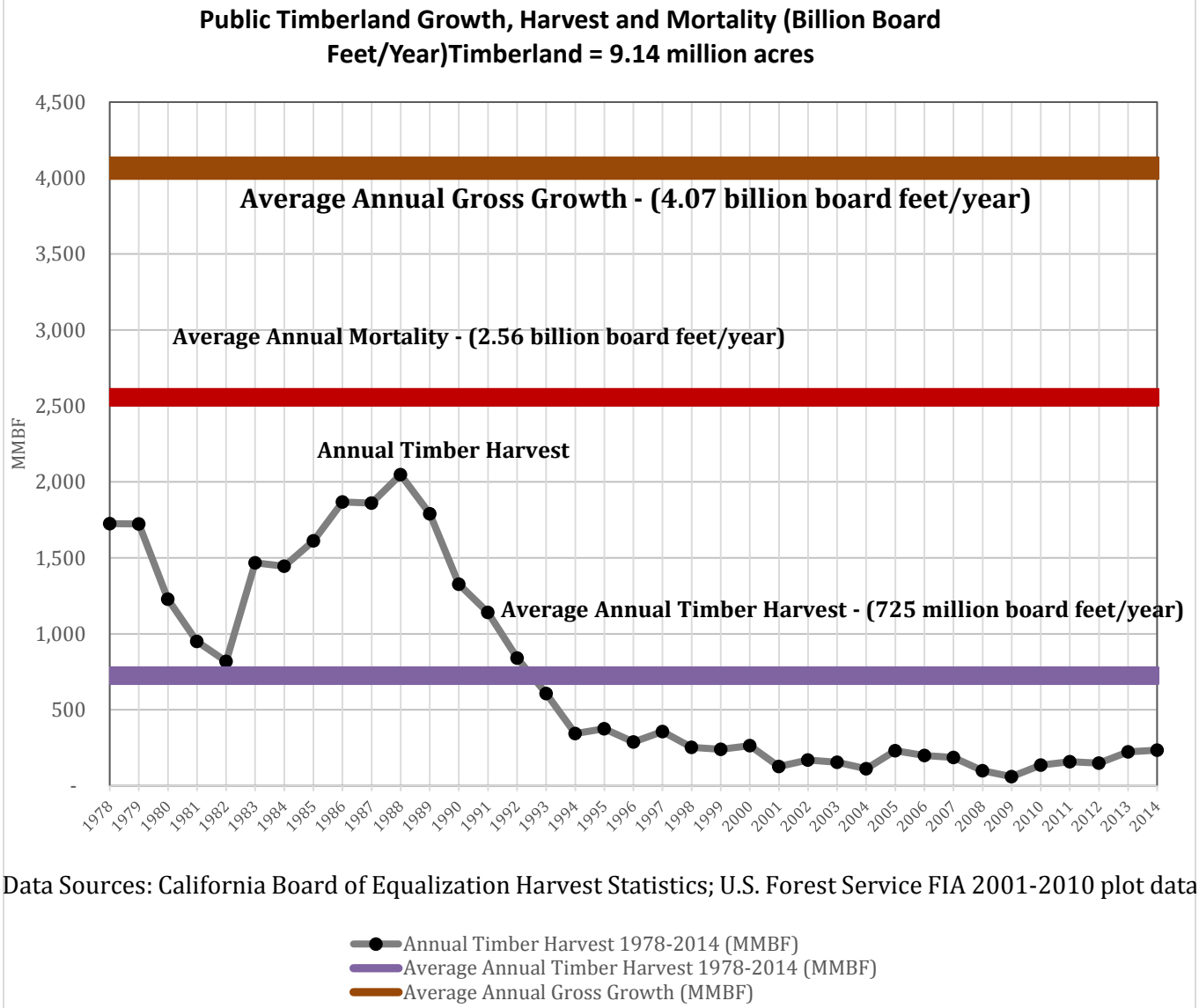
Enclosure #6 – Forest Service Identified Acres in Need of Restoration and Reforestation 1986-2015 (Data Source: Forest Service Facts Database)

Enclosure #1 - Comparison of Emissions Between Biomass Boilers and Field Burning

Pollutant	Field Burning (lb./ton)	Biomass Boiler (lb./ton)	Percent Reduction for Biomass Boiler (Percent Reduction)
Sulfur Oxides	1.7	0.04	97.6
Nitrogen Oxides	4.6	0.70	84.8
Carbon Monoxide	70.3	0.40	99.4
Particulate Matter (PM)	4.4	0.26	94.1
Hydrocarbons	6.3	0.00	100.0
Total	87.3	1.4	98.4

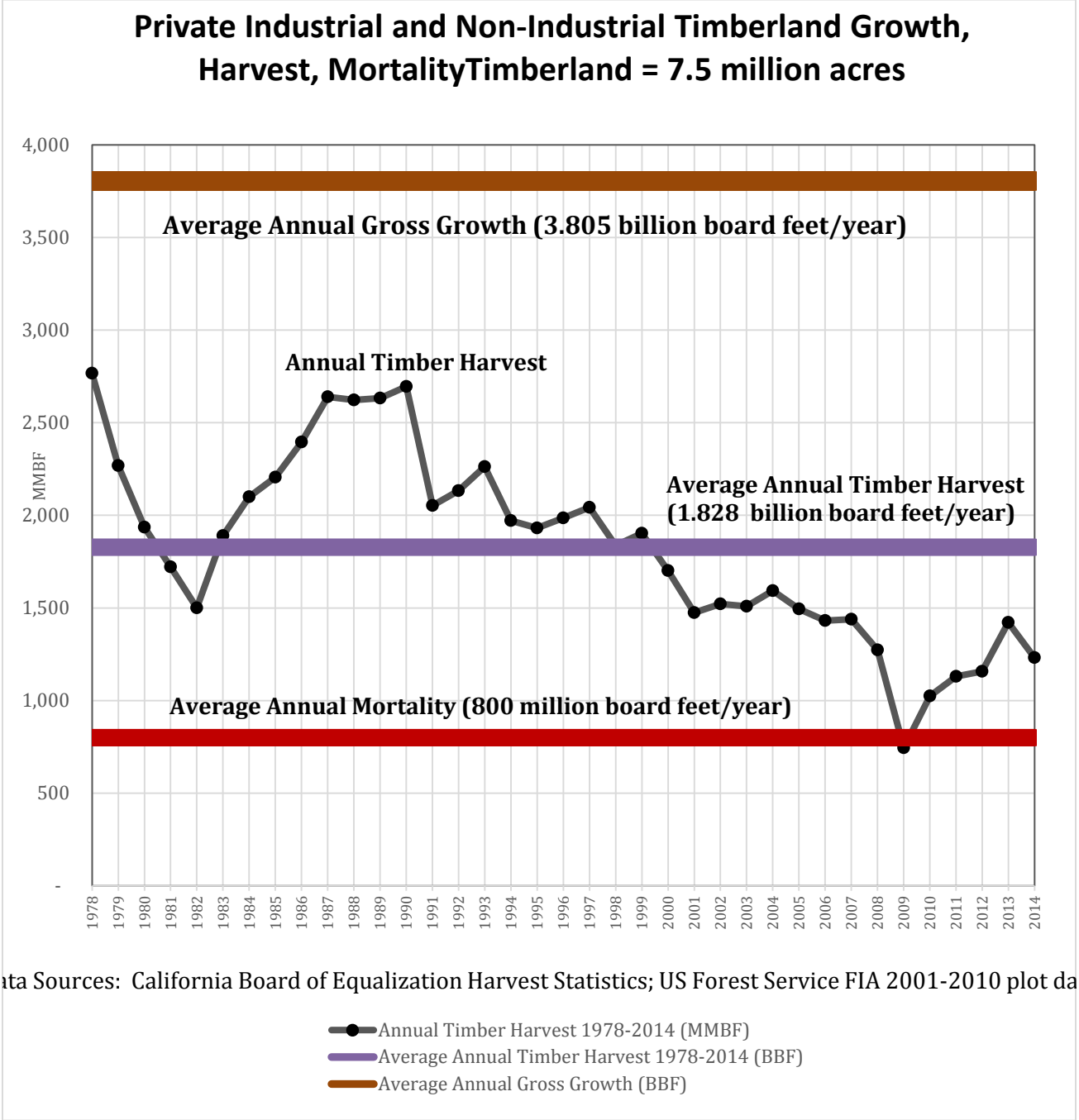
Emission factors from "Hydrocarbon Characterization of Agricultural Waste Burning", CAL/ARB Project A7-068-30, University of California, Riverside, E.F. Darley, April 1979.

Enclosure #2 – 1980-Present Growth, Mortality, and Harvest on Forest Service forest land (FIA 2010 and Board of Equalization Timber Yield Statistics)



Data Sources: California Board of Equalization Harvest Statistics; U.S. Forest Service FIA 2001-2010 plot data

Enclosure #3 - 1980-Present Growth, Mortality, and Harvest on Private forest land (FIA 2010 and Board of Equalization Timber Yield Statistics)



Enclosure #4 - 1980-Present Growth, Mortality, and Harvest on Private forest land (FIA 2010 and Board of Equalization Timber Yield Statistics)

Year	Forest Service Acres Burned	Total Acres Burned	Estimated Total CO_2 Emissions
			(@37 tons/burned Acre)
2001	106,798	329,126	12,177,662
2002	365,945	506,696	18,747,752
2003	363,964	793,402	29,355,874
2004	49,437	242,057	8,956,109
2005	19,583	202,754	7,501,898
2006	453,500	678,919	25,120,003
2007	551,932	1,087,110	40,223,070
2008	919,716	1,375,781	50,903,897
2009	305,371	405,585	15,006,645
2010	39,288	109,529	4,052,573
2011	41,777	126,854	4,693,598
2012	297,212	869,599	32,175,163
2013	350,642	577,675	21,373,975
2014	400,005	530,794	19,639,378
2015	537,446	893,362	33,054,394
Avg	320,174	581,950	21,532,133

Enclosure #5 – Forest Service Estimate of Mortality in the Southern Sierras (January 28, 2016)

WORKING DRAFT

Preliminary Summary of Estimated Tree Mortality Volume

Southern Sierra Nevada, California, 6 County Area
(Tuolumne, Mariposa, Madera, Fresno, Tulare and Kern)

Introduction

Following are preliminary estimates of tree mortality in the Southern Sierra Nevada for a 6-county area: Tuolumne, Mariposa, Madera, Fresno, Tulare and Kern. This area includes all or parts of the Sierra, Sequoia, Stanislaus and Inyo National Forests. The methodology and assumptions used to derive the estimates are included below after the tabular information.

Table 1, Tree Mortality Volume by Ownership/Management and County

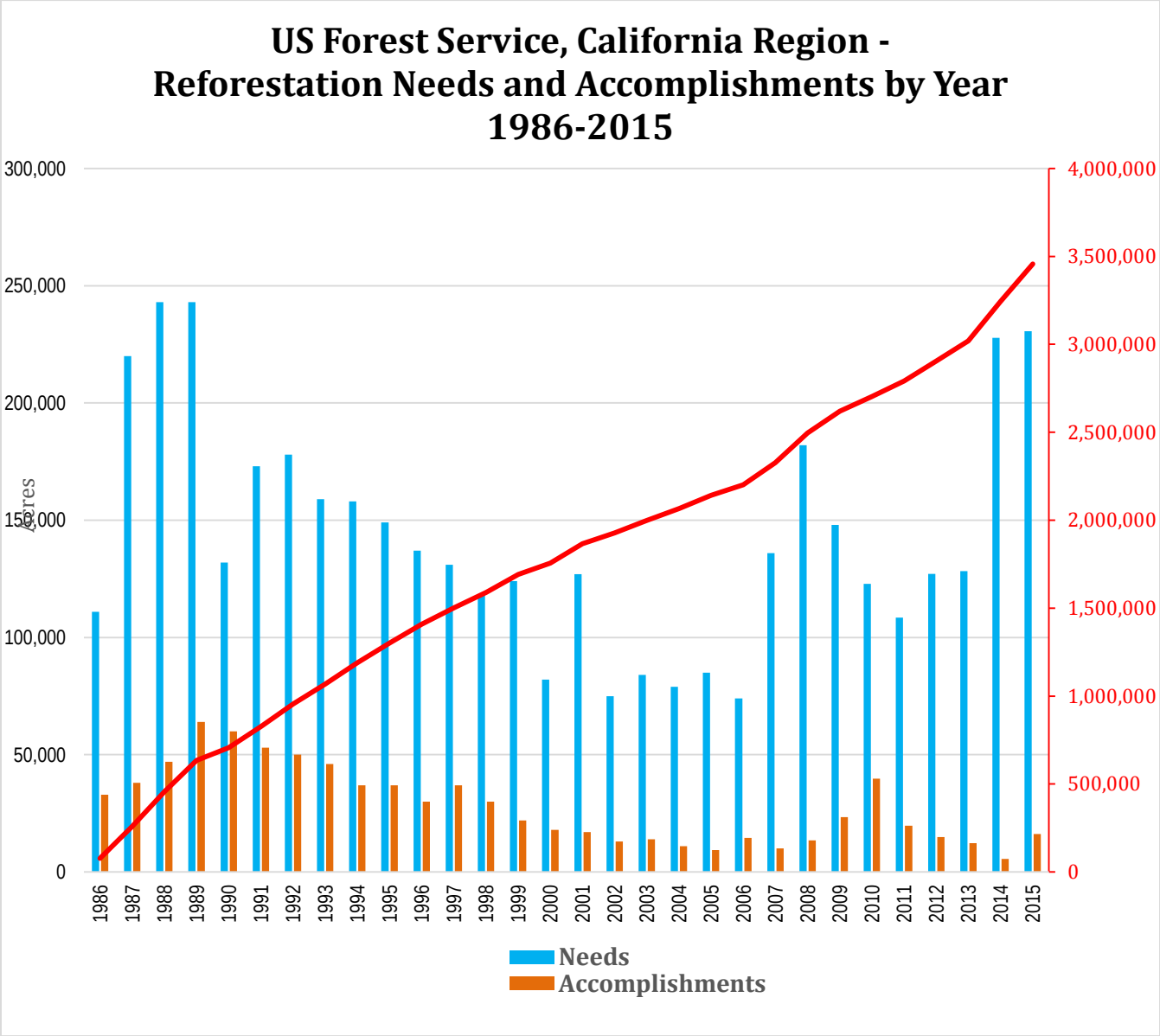
	FRESNO	KERN	MADERA	MARIPOSA	TULARE	TUOLUMNE	TOTAL
Other (non-USFS) (MBF)	59,341	123,698	33,054	44,599	180,128	10,893	451,713
Inyo (MBF)	30		103		9,771		9,905
Los Padres (MBF)		151,326					151,326
Sequoia (MBF)	265,797	206,139			1,124,773		1,596,709
Sierra (MBF)	1,227,869		917,091	234,542			2,379,502
Stanislaus (MBF)				91,442		485,363	576,805
TOTAL MBF	1,553,038	481,162	950,249	370,583	1,314,673	496,256	5,165,961
TOTAL BDT LOGS (bone dry tons)	4,659,114	1,443,486	2,850,747	1,111,749	3,944,019	1,488,768	15,497,883
TOTAL BDT LOGS, TOPS & LIMBS (bone dry tons)	6,212,152	1,924,648	3,800,996	1,482,332	5,258,692	1,985,024	20,663,844

Table 2, Draft CAL FIRE High Hazard Zone Tree Mortality Volume by Ownership/Management and County (MBF)

	FRESNO	KERN	MADERA	MARIPOSA	TULARE	TUOLUMNE	TOTAL
Other (non-USFS) (MBF)	745	9,904	2,584	6,189	9,389	2,425	31,236
Inyo (MBF)					382		382
Los Padres (MBF)		79,804					79,804
Sequoia (MBF)	28,297	23,097			187,995		239,389
Sierra (MBF)	164,842		115,452	35,363			315,657
Stanislaus (MB F)				31,366		104,391	135,757
TOTAL MBF	193,884	112,806	118,035	72,918	197,766	106,817	802,226
TOTAL BDT LOGS (bone dry tons)	581,652	338,418	354,105	218,754	593,298	320,451	2,406,678
TOTAL BDT LOGS, TOPS & LIMBS (bone dry tons)	775,536	451,224	472,140	291,672	791,064	427,268	3,208,904

Conversion Notes: Conversion factors used to generate "bone dry tons" (BDT) estimates include 6 green tons (GT)/MBF (drought wood), 1 BDT/2 GT, 1 GT/MBF tree tops and branches for average size tree mortality. Conversion factors will be refined as data are gathered from field operations.

Enclosure #6 – Forest Service Identified Acres in Need of Restoration and Reforestation 1986-2015 (Data Source: Forest Service Facts Database)



Cumulatively, 3.5 million acres of Reforestation Needed