To: Forest Climate Action Team

Re.: Forest Carbon Plan

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Many of these recommendations are best addressed by multi-agency collaboration, CA and Federal.

The decreased CO2 sequestration due to deforestation (including active management) is nearly 5 times the amount of CO2 emitted by fossil fuel use - both at current rates. Increasing the acreage of healthy forests in CA is therefore a high priority. Diminishing risk of wildfires is vital as is increased rates of new planting. Have you considered establishing annual goals for net increase of acreage (new planting minus wildfire, logging, and active management attrition of trees)?

Trees also filter out other anthropogenic pollution from the air, e.g., nitrogen, soot, and acids. In addition, dust and pollen levels are decreased. Conifers decrease the number of airborne microbes.

Prohibition of open pile burning on private and public lands would decrease GHG emissions. Education about the many benefits of using biomass for mulch and compost may increase use. CalFire already provides free on-site chipping. Adding the service of haul away would be a source of revenue for CalFire, when the chips/biomass are sold in commercial markets. Or this could be used by CalFire when doing restoration and new planting.

Clear cutting on private and public lands inflicts environmental damage. It decreases watershed and climate protection, resulting in more erosion. It fills streams with silt, diminishing water quality and killing aquatic life. Runoff of precipitation is more rapid, posing a risk of flooding downstream communities. It increases risk of wildfire more than selective harvesting. It removes all trees from a tract, including the largest specimens that are sequestering the most carbon. It eradicates wildlife habitat and increases transpiration rate. It replaces a multispecies, multiage natural forest with a mono-age and mono-species tract of seedlings. This is less drought-tolerant and resilient than multispecies, multiseral forests. These trees exhibit drier needles and more shedding. In conifers, which are the most popular monocultures in CA, these needles are high in flammable compounds - increasing fire risk. Herbicides are oft broadcast to prevent growth of unwanted species. These poison nearby forest, wildlife, water, land, and our crops. Because biomass, other than the newly-planted seedlings, is removed, there is none left to provide the multitude of benefits of mulch and compost. Compaction of the soil with heavy equipment diminishes absorption of precipitation and decreases depth of root growth: This increases the risk of toppling in a storm.

Prohibiton of fireplace use on a regular schedule, regardless of weather conditions, e.g. Aug. – Nov., is easier for people to follow a schedule than to perform a daily check of weather and fireplace restrictions. This would decrease GHG emissions.

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Research is needed to determine the emissions from dead pools v emissions from each of the following ways to remove these:

prescribed fire

production of biomass electricity

compost + mulch (broadcast in forest v sold commercially)

This requires annual projections over many decades. The emissions from all sources (labor; equipment manufacture, maintenance, and operation; processing plants, mining, use of fossil fuels and electricity, transportation - of producers and any consumers, and other resource utilization entailed in operating a business) need to be factored in.

Separate research is needed to track emissions from standing severely-stressed and dead trees v removal methods.

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Issuing annual reports of GHG and black carbon emissions from: a) wildfires and separately from b) prescribed fires would reveal a ratio that is an indicator of the efficacy of prescribed burning.

Re. Page 27…

Some research indicates that after use of herbicides on burned forest, botanic diversity increases after a number of years. Has it been determined whether the biodiversity is worth the costs?

~ pollution of land and water, which damages wildlife, nearby trees, and crops

~ price and carbon cost of manufacturing, transporting, and broadcasting herbicides

~ costs of cleaning up the adjacent environment (at last check, effective methods have not been discovered)

Of course, if herbicides were not used there would be maximum biodiversity of vegetation and wildlife.

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In 2016 the IMF released a study of many nations concluding that the most effective means for mitigating emissions are incentives and taxation. An example to help fund the FCPlan is to increase THP fees and impose sales taxes statewide on all timber products (from any state or nation). Why not decrease THP fees for companies which do one or more of the following?

use Forest Service Certified practices

abstain from pile burning, herbicide application, and clear cutting

limit harvest to sustainable levels (e.g., a different 1% of acreage per century)

leave at least one of the three largest healthy tree specimens on each acre harvested

decrease percent of their forest that is harvested by at least 10% from 2016 levels

Because active management (thin or burn) increases net GHG emissions and decreases sequestration during initial years; ways of preserving and increasing our forest acreage are needed to offset this. E.g., issue only a sum of THPs that diminish total harvest to 90% (or less) of 2016 levels.

Areas that are most suitable for the building of clean renewable energy projects include those that have been recently clear cut or destroyed by fire, have not grown indigenous wild forests (in recorded history), e.g., deserts, some recurrent HHZs, and land dumps that have been "sterilized" by sea salt from desalinization of ocean water. Profits could be used to fund the FCPlan. Many of these areas have low land values, pallid economic conditions, and are not arable.

By prioritizing environmental preservation over economic profit we give our children and grandchildren better odds of having both. E.g., promote the transition from deforestation profit (unsustainable timber harvesting) to profit from clean renewable energy, e.g., compost, mulch, wind, and photovoltaic solar. Education and consulting would help timber companies and private forest owners make this transition.

Cost/benefit projections of implementing the FCPlan are needed. This would include the value of clean air that has decreasing GHG density and an increase in healthy forest acreage. Also include the value - for all Californians - of biodiversity, clean surface water, aquafirs, and fertile land. Because this is difficult to quantify, use estimate$ that will motivate all consumers, producers, and agencies to purse FCPlan goals. (Many environmentalists estimate that we do not have enough time to wait for "marketplace forces" to determine this value. Many economists regard these forces as inadequate to establish a fair market value of natural resources.) The type and extent of each form of active management method used for our forests will generate unique cost/benefit ratios.

Process Conservation (PC):

PC is most suitable for healthy forests. It includes leaving fallen branches, leaves, and trunks where they fall. This provides mulch, gradual composting and humus creation, diminishes erosion, decreases transpiration, increases water retention in the earth, decreases flood risk, and provides habitat and nourishment for many species. The only financial or carbon cost of this labor of Nature is a very slow release of GHGs, which typically takes many decades. This is probably sequestered by the surrounding photosynthesizing forest and probably emits less GHGs than active management methods - all of which have significant financial costs and multiple deleterious environmental impacts. Some of these impacts are a) GHG emissions from the manufacture, operation, and maintenance of equipment; b) devastation of land for mining metals used for a) and c); c) GHG emissions for the manufacture, maintenance, and operation of vehicles; d) the multiple environmental impacts of human labor; and e) the impacts of constructing fire roads. Only PC preserves the natural, biodiverse aesthetics of forest, which are vital to their recreational and tourist value as well as superior biodiversity and resilience. The ratio of carbon stored to GHG emissions is probably higher for PC than it is for harvesting timber for paper and lumber as well as the active management methods.

In contrast, monocultures of trees in commercial forests are more susceptible to fungal damage. This diminishes the structural integrity of the tree, increasing its chances of toppling in a storm and failing to reach its peak biomass.

PC, via sunlight deprivation, attenuates growth of ladder understory as well as new trees, decreasing the density of trees per acre and promoting growth of larger trees. This is especially needed in hi-density forests and HHZs.

One of the most important forest habitats in which to use process conservation is watershed emptying (in part) into the ocean. Tree leaves that are emptied into the ocean contain an acid that promotes growth of plankton and therefore fish. Some fish, e.g. salmon, require habitats where streams empty into the ocean. Furthermore, a continuous corridor of riparian forest from coast to interior enables the growth of inland forests with maximum biodiversity and therefore resilience. Such forest, managed with PC, is the kind that is least likely to have wildfire.

The symbioses amongst trees, soil, and subterranean microbes (especially fungi networks which transmit information and carbon between trees) reaches its pinnacle in biodiverse forests that are centuries old and have grown wild without active management. Such forests have the slowest rate of CO2 release and avoid the anthropocentric emissions of active management.

To preserve our environment and decrease GHGs, the highest and best use of our land is healthy, continuous-canopy, biodiverse forest that is not disturbed by active management. The resources saved by abstaining from active management could be used for other forest priorities.

Logging, prescribed fire, and thinning expose the forest floor to sunlight, which increases the rate of humus consumption by microbes. This accelerates CO2 emissions and increases growth of understory and smaller trees, which may be a problem in forests that are already too dense. Each successive thinning exposes more of the forest floor to sunlight, which increases the "need" for more frequent thinning. If excessive, it also prevents the formation of a continuous canopy. Are there disadvantages, in healthy forests, of removal only of fuels that do not create gaps in the canopy? Why not limit removal to dry or infested fuels in HHZs while leaving moist fallen and growing biomass as long as it does not form a ladder adjacent to trunks?

As you have reiterated, larger trees sequester more CO2 than the sum of many smaller trees. In addition the largest trees add more biomass per year than the sum of many smaller trees. To maximize CO2 sequestration, forestry best practices and THP regulations must preserve the largest healthy specimens on private and public lands (until the sum of proximal young upstarts sequesters more CO2/yr. than neighboring senescent elders).

For numerous reasons proven by biology and earth sciences, continuous-canopy forests maintain a cooler microclimate and preserve watershed more effectively than sparse forests. They also sequester more CO2 and store it for more decades.

5% of vintage public forests in Germany are managed only with PC. Consider setting a minimum percentage for California.

Sensible sites from which to remove dead pools include:

~ when it is impinging upon infrastructure (buildings, utilities, roads) or healthy trees

~ when it is infested (bark beetles, fungi, aphids)

~ when it is dry and clutters drought-stressed HHZs and excessively dense healthy forests

The benefits of managed burning are further offset by the risk of starting uncontrolled wildfires. Fire is inhumane because it terrifies wildlife, harms their health, destroys their homes, and is often fatal.

Is active management not most indicated in areas where it is most likely to decrease wildfire risk?

~ first cut down distressed, failing, and infested trees and understory in HHZs. Harvest the noninfested biomass for timber products including chips and mulch, leaving some of the noninfested trunks as habitat. Or distribute masticated smaller branches on forest floor.

~ then follow the above in low-risk zones, especially in urban-wildland interfaces

~ then harvest smaller trees and some of the fallen biomass in excessively dense healthy forests

Burning is a last resort. Harvesting of dead pools gives us useful resources. Fire destroys these resources. Removal of the same volume of excessive fuels via harvest or fire each equally decrease risk of wildfire and improve forest health. Prescribed burning emits more GHGs than sustainable harvesting.

For thousands of years we have used slash and burn agriculture and land management. This was not a problem until nearly 2 centuries ago. In light of the growing magnitude of global environmental degradation; the deforestation, desertification, and climate change effects of slash and burn have made it unacceptable - in known and unknown costs and risks. Because there is much we do not know about Nature, it is wise to use the contemporary equivalents “thin” and “managed fire” only where there are clear indications and no effective alternatives.

Instead of using fallen biomass for electricity production, why not use it to “grow” cleaner and more efficient forms of renewable energy? Like other product-based industries, solar and wind require paper and lumber: Use fallen biomass to make these. These industries can employ many workers, even in small towns.

Economics favors solar and wind over biomass energy production. Government subsidies will only prop up biomass energy transiently. Market forces will lead consumers including utility companies, to use solar or wind. The efficiency (energy output to input) is higher and the cost per kW is lower for solar and wind than it is for biomass energy. And their cost is decreasing. Solar and wind have been more thoroughly researched and widely used. CA has a large year-round surplus of untapped wind and sunlight in areas where there is little or no arable land. Wind and sunlight have few alternative human uses in these areas. In contrast, CA has a finite quantity of biomass from forests. There are many profitable alternate uses for biomass other than electricity production, e.g., paper, wood, compost and mulch. Increased use of the latter 2 would decrease use of ammonia-bound nitrogen fertilizers (which pollute our land and waterways) while providing a wide range of additional ecologic benefits.

The most eco-friendly use of forest biomass is to masticate or chip on-site and distribute it on the forest floor. This would provide hundreds of jobs within a convenient commute for nearby residents.

Wrap:

Research and government regulation since at least the early 1970s has shown that communities that set lofty environmental goals are more likely to achieve significant preservation. Because the new president and cabinet plan to eviscerate federal standards, monitoring, and agencies; CA must maintain its environmental leadership in spite of diminishing contributions from federal sources.

Achievement of FCPlan objectives would improve our environmental quality and benefit every CA resident and economic sector. Please use means to achieve this that are consistent with the ends. Maximize PC while minimizing slash and burn. Discover other ways of decreasing the risk of large-scale

wildfires. Decreasing wildfire risk is a vital objective, but fuels removal is the best practice in only some situations. Thank you for decades of valuable services to CA.