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**Re: Comments on 2030 Scoping Plan Dec. 14 Public Workshops on Carbon Sequestration Modeling Methods and Initial Results for Natural and Working Lands Sector**

Esteemed Ms. Sahota and Ms. Jahns:

On behalf of Friends of the Earth – United States (FOE-US) this letter is provided as comment on the *2030 Scoping Plan Dec. 14 Public Workshop on Carbon Sequestration Modeling Methods and Initial Results for Natural and Working Lands Sector* (Workshop). This letter will very briefly address a select variety of the items discussed in the presentations shared at the Workshop, as well as provide some comments on further study of the "CAlifornia natural and working LANDs (CALAND) carbon model" slide presentation (Slides). This brief letter will also include relevant material that can inform the design of effective climate change mitigation policy in California.

As with previous submissions, this letter is not comprehensive, but the comments provided here do go to the heart of our concerns that California climate policy fails to include the best available climate science. There are some points reiterated in this letter that have been made in previous comment submissions by FOE-US and other organizations. Many of the comments will be conceptual but will attempt to make specific reference to points shared in the Workshop or included in the Slides.

We want to extend our appreciation to the professionalism of Lawrence Berkeley National Laboratory researcher Alan Di Vittorio for the presentation made on Dec. 14 and for his availability to respond to questions outside of the presentation. We commend the Air Resources Board (ARB) and the Natural Resources Agency (NRA) for committing to world-class research in this process.

***Land Carbon Statistical Estimations are Highly Uncertain***

One of the early and striking impressions from the material presented at the Workshop and in the Slides is that the statistical estimation of land carbon stocks is highly uncertain. This should not come as a surprise to the ARB and NRA. On repeated occasions, we have provided scientific studies that confirm that in the best of cases statistical estimations of land carbon can have a margin of error of +/-30%. In the Workshop presentation, it was stated plainly that the uncertainty in estimating carbon density in California wildlands is as much as 60%.

***This uncertainty in statistical estimation of land carbon is fundamental to why biocarbon and geocarbon are simply not fungible in climate change mitigation strategies.***

Some background information is in order to explain why understanding the difference between biocarbon and geocarbon are fundamental to developing effective climate change mitigation policy.

Carbon reservoirs in the geosphere are known as *geocarbon*. Primary reservoirs of geocarbon are stored in highly stable sedimentary rocks and deep ocean sediments, as well as the highly stable deposits of coal, oil, and gas that human industry extracts and mobilizes for many uses, including burning as fossil fuels. The cause of mobilization of geocarbon is almost entirely due to human activities, remaining highly stable until subject to human extraction, and requiring zero cost to maintain in place. Geocarbon has been stabilized for hundreds of millions of years, and once stabilized has remained in specific deposit locations.

Carbon reservoirs in the biosphere are known as *biocarbon*. Primary reservoirs of biocarbon are the world's marine and terrestrial ecosystems, and include the original old growth forest of the world, of which more than 50% has been lost. California, because of high intensity industrial human economic activity, has lost up to 95% of original old growth forest cover. Biocarbon is located across the entire landscape and requires extensive investment for funding ongoing ecosystem management. The CALANDs Model is a biocarbon modelling tool. Permanence in storage of sequestered biocarbon is elusive, and in some instances, such as with disturbance regimes, permanence can even be contrary to ecological succession processes. Forests and ecosystems are dynamic and even volatile carbon stores by their very nature. They are not static and linear repositories of carbon. Biocarbon stocks vary temporally and spatially and are subject to numerous natural processes that further mobilize biocarbon stocks, complicating accounting and making statistically reliable estimation difficult. The best available science suggests that a firewall is needed between accounting for geocarbon and biocarbon. An increasingly substantial body of evidence shows that they are not interchangeable for climate change mitigation purposes.

Distinguishing between geocarbon and biocarbon is essential to developing climate change mitigation policy that will assist in averting the worst impacts of climate change.

We encourage the ARB and NRA to recognize these scientific fundamentals and decouple policy regarding management of biocarbon from policy regarding geocarbon. This would include insuring that the members of the legislature have access to the best available land carbon science, and that efforts are made to debunk flawed scientific assumptions regarding how humans are disturbing global carbon cycles and what can be done to compensate for greenhouse gas emissions.

The CALANDs model is an important tool, and much needs to be and can be done to maximize the climate change mitigation potential of land based ecosystems. This line of work will be best accompanied by a recognition of the scientific fact that the emissions from the burning of fossil fuels is essentially irreversible. To reduce risk of global temperature rise every effort must be made to reduce those emissions dramatically as soon as possible, and not to continue those emissions under the erroneous assumption that they can be offset in the long term by the uptake of CO2 in land systems.

***Prioritizing Forests Is an Imperative***

On repeated occasions the ARB, the NRA and other relevant California natural resource management agencies have spoken of the importance of forests in understanding, mitigating and responding to climate change. As we have said before, and even if the state is not explicit in saying so, we strongly support establishing measurable and aggressive goals in reducing emissions from deforestation and forest degradation in the forests of California. To that end we believe that there exists an imperative that a frank and science-based assessment of the climate impacts of industrial forestry and timber harvest in California is provided as soon as possible. We are steadfast in our support for the ARB and NRA taking a key role in forging a just and equitable transition to a low emissions economic development path here at home in California. Having accurate data that informs a robust science-based evaluation of the climate impacts of forest management in California should be seen as crucial to California providing the global climate leadership that ARB is so eager to promote. The model should be sure to provide a transparent means for the public to easily assess the carbon density loss that is directly attributable to industrial forestry activities (i.e. silviculture, also known as logging) in California's forests.

***Continue to Question Assumptions Regarding Carbon Sequestration in Wood Products***

We were encouraged that the values assigned to carbon sequestration in harvested wood products appear to be rather minimal. This would be in keeping with the best available carbon science. Note that harvested wood products are not actually in any sense forest carbon nor should they be included in calculations intended to estimate remaining carbon density on the land. Carbon stored in wood products is NOT a biocarbon stock of carbon, it is appropriately classified as an Anthropogenic Carbon Stock. Harvested wood by definition is a removal of carbon from the land stock (i.e. a decrease in biocarbon). Anthropogenic Carbon Stocks are notoriously elusive, short-lived and lacking in any significant permanence, at least in terms of global climate change.

Related to this issue is that of industrial logging methods and forest management. In particular, the issue of short-rotation industrial forestry in which young immature trees with inferior wood quality are harvested for making wood products. We insist that there be much stronger challenges to assumptions about carbon sequestration in wood products. While we concur that there is evidence that wood products can provide some of the most environmentally sustainable building materials, incorporating carbon science into the evaluation of the climate benefits of wood products requires that the benefits of carbon sequestration in wood products not be exaggerated. We encourage an aggressive questioning of the assumptions regarding carbon sequestration in wood products.

***Avoid Landscape Amnesia – Estimate The Original Pre-Industrial Carbon Density in California***

We found the selection of 2010 as a carbon density baseline to be arbitrary. It is the view of our organization that to be considered an accurate representation of the potential future changes in carbon density in California's ecosystems that the model must include an accurate reference to the history of deforestation in California's forests. California's forests in particular are severely carbon depleted. In all seriousness, we can say with accuracy that "those hills were not always nude or covered in a short mass of spindly trees." Fight landscape amnesia by making accurate reference in the model to the condition of the landscape before massive deforestation across the state began to take place.

***Understanding the role of past deforestation in carbon sequestration by forests is crucial to providing an accurate model of what is possible in the future***

CO2 removal by the land sector is essentially recapturing past emissions due to land use or land-use change. In California we can imagine this by conceptualizing the liquidation of the original ancient redwood temperate rainforest ecosystem, widely recognized as one of the most carbon dense forest ecosystems on the planet, and understanding exactly how much of the original carbon stock was lost. As such, carbon sequestration in the redwoods of California, as an important aspect of forest restoration for California landscapes and human communities is simply restoring severely degraded carbon stocks that were lost to indiscriminate logging practices and the loss of 97% of the original ancient redwood forest.

Forest based carbon sequestration is inherently limited by the carbon carrying capacities of different forest ecosystems, many of which have already been severely degraded. Coming to terms with the degraded condition of a great deal of California's "natural and working lands" is critical to evaluating what must happen with land management in response to climate change. In particular, because of the role in the State in sanctioning forest loss over the decades, the State has a responsibility for facilitating a transparent and factually accurate accounting for the loss of carbon density (i.e. biomass) due to the historical liquidation of the original forest cover. An accurate understanding of what has been lost and how that relates to what is currently being lost and how much time is going to be required to recover biomass is fundamental to developing policy that will be effective in restoring our forests and natural lands.

This includes a full recognition of the long-term downward trajectory of carbon stock losses in California's ecosystems, which the selection of the 2010 baseline does not provide, but to which the work of Gonzalez and Battles (2015) as mentioned in the presentation most certainly does allude.

We believe that there is a lot that can be done to address climate change through the appropriate conservation focused stewardship of California's forests, wildlands, and agricultural lands. This modeling tool has tremendous potential for helping guide the decision-making and policy development that will make that stewardship possible.

In closing, we are emphatic in our support for developing strategies that will protect existing land carbon (biocarbon) stocks and that will allow depleted ecosystems to rebuild themselves and remove CO2 from the atmosphere. Avoiding emissions by protecting ecosystems from land-use change that depletes their carbon stocks is an important part of an effective climate change mitigation effort.

Note however that the most effective form of climate change mitigation is to avoid carbon emissions from all sources. This means that there is no choice but to cut fossil fuel emissions deeply, and not to obfuscate this imperative with scientifically flawed misrepresentations of how land based ecosystems can compensate for human destruction of the atmosphere with the ongoing emissions from burning fossil fuels.

Thank you for your attention to this letter. Our organization will remain engaged with and attentive to ARB and NRA leadership in developing climate policy in our state that provides global and national leadership.

Respectfully,

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**SELECT REFERENCES:**

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