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Submitted electronically to: policy@climateactionreserve.org

RE: Comments on Climate Action Reserve White Papers on the Forest Project Protocol

Dear Mr. Broekoff:

I am submitting these comments on behalf of the Center for Biological Diversity. I appreciate this opportunity to comment on the Climate Actions Reserve's forest protocol white papers. Overall, I believe this was a beneficial exercise for the Climate Action Reserve. The papers raise many of the same issues that forest conservation organizations and others have been bringing to CAR over the past two years, and identify many of the same concerns.

The papers report that soil carbon accounts for 50-75% of all carbon on forest site, and lying dead wood makes up as much as 12% of total forest carbon on average for some forest types. Obviously, these are large pools that can have significant effects on the overall carbon accounting for the project. The papers on lying dead wood and soil carbon indicate that these carbon pools may eventually recover from harvest activities, given enough time between disturbances. However, even if this can be quantified by project type, it is obviously not acceptable to issue credits in the near term for presumed carbon benefits in the long term. To do so would undermine the intention of the protocol to issue credits for only the net sequestration above baseline achieved in any given time period.

Ultimately, the papers find that the current forest protocol runs a high risk of significantly underestimating the carbon emissions associated with forest projects that disturb soil or disrupt dead wood processes over a significant portion of the project area; as a result, the current forest protocol runs a high risk of over-counting carbon benefits from some forest project types. In particular, forest projects that include even-age management may appear to be a carbon benefit in many situations only if one ignores the impacts to soil, lying dead wood, litter and other carbon pools, and only under a number of highly uncertain assumptions about the business-as-usual harvest levels and replanting, and the persistence of wood products.

Unfortunately, the Climate Action Reserve missed an opportunity to solicit independent and unbiased opinions through all of these papers. For the paper on even-age management, CAR chose to contract with a member of the CAR work group that drafted the current protocol, and who represents the interests of the California Department of Forestry and Fire Protection. For

the paper on forest certification, CAR chose to contract with a firm that has a strong business interest in one particular certification system. The result is that those papers were defensive of the current protocol rather than offering an unbiased analysis of the topics.

The following sections offer comments specific to the individual papers.

I. Carbon Accounting and Management of Lying Dead Wood

A. The paper on lying dead wood and the paper on soil carbon both identify the substantial carbon emissions associated with these carbon pools, but together fail to identify the full size of the potential emissions associated with activities that alter dead wood cycling. One paper considers only lying dead wood, as defined in the forest protocol as greater than 5 inches in diameter and 8 feet in length, and the other paper considers only soil horizons A and lower. However, neither paper acknowledges the complex carbon pool that spans between lying dead wood and soil—the large array of fine woody debris, litter, humus, and soil O horizon. That is, while both the lying dead wood and soil papers indicate the importance of accounting for portions of the dead wood cycle, together they fail to identify the full size of the carbon pool and potential emissions associated with dead wood cycling. In addition, the fine woody debris, litter, humus, and soil O horizon are highly influenced by harvest technique and post-harvest management, but the current protocol accounts for none of these components.

B. The CAR workshop presentation included the following question: "If standing dead wood provides a good surrogate for future levels of LDW, can the measurement of standing dead wood continue to be used instead of measuring LDW with some level of statistical confidence?" The paper on lying dead wood raises important points that indicate that standing dead wood is not a good surrogate for future levels of LDW in all project types. On page 22 of the workshop presentation, CAR presents the following statement from page 4 of the lying dead wood paper: "Forest projects designed to increase carbon storage under Climate Action Reserve's Forest Project Protocol are unlikely to have a negative impact on long-term LDW." However, this quote leaves out the very next sentence from the paper, which states: "Forest Projects usually employ uneven-aged silvicultural practices, and the main eligible management activities fore these projects are, on balance, likely to increase LDW." That is, the authors were not considering the potential impacts of even-age management, which often involves extensive removal of snags and lying dead wood, and which eliminates natural snag recruitment by periodically removing the standing live trees.

C. The CAR workshop presentation included the following question: "Are the [snag] recruitment/retention goals stated in Table 3.2 of the FPP (1 to 4 Metric Tons of Carbon per acres in standing dead wood) appropriate?" The conclusions of the lying dead wood paper indicate that recruitment goals are beside the point when it comes to accurately accounting for the carbon impacts of the lying dead wood component. The carbon loss associated with impacts to lying dead wood—not to mention litter and the dead wood cycle as a whole—can be substantial and must be accounted for any time period in which carbon credits are assigned. Otherwise, the Forest Protocol runs a high risk of assigning credits to a forest project that is

actually a source of emissions from this carbon pool in the near term. An assumption of future recruitment of lying dead wood does not preclude the need for determining a project's immediate impacts to this pool.

D. Even if snag recruitment goals in the protocol were developed to provide a level of dead wood cycling that ensures a minimum level of carbon sequestration in the lying dead wood and soil carbon pools, this would do little to ensure the values of lying dead wood as wildlife habitat, erosion control, water storage and nutrient cycling.

II. Accounting For Carbon in Soils

A. Overall, the paper on soil carbon finds the following: soil contains a large portion of the carbon at the forest site; soil carbon can be mobilized and emitted due to soil disturbance and intensive harvesting methods; and methodologies exist that would make accounting effective and affordable. Together these findings indicate that an accurate accounting of carbon emissions must include soil carbon for forest projects that include management activities that cause significant soil disturbance. The most obvious actions causing soil disturbance are even-age management, soil ripping and tilling, and road-building. Even in cases where soils are not ripped, forest clearcutting removes the entire forest canopy, increasing the soil temperature and increasing soil erosion risk, and the extensive use of mechanized harvesting leads to soil compaction and increased soil erosion across the entirety of the harvest area.

B. The paper on soil carbon identifies "a high amount of uncertainty regarding soil carbon dynamics in response to forest management." Page 2. The word "uncertainty" is imprecise in this context, as the paper describes a high level of heterogeneity and complexity, as the carbon dynamics are dependent on the specific activities implemented on different soil types with different forest structures and site histories. This is very different from uncertainty. In fact, the paper itself makes a very good case that management activities are quite certain to impact soil carbon, but the specific impacts are dependent on the site characteristics.

It is clear from the paper that it is very difficult, if not impossible, to assign a meaningful value to the carbon impacts of a management action without knowing the specifics of the activities and the soil and site characteristics. However, that is a very strong argument for including a more in-depth accounting of the soil carbon impacts, not an argument for dismissing the soil carbon impacts as too uncertain. The paper on soil carbon states, on page 8, that achieving the level of certainty required for Reserve's Forest protocol is difficult. This is precisely the point, of course. Considering the potential significance of emissions from this pool, CAR must choose between either accurately accounting for impacts to this carbon pool or conservatively assuming maximum emissions from the soil carbon pool.

C. The paper on soil carbon indicates that some management activities like forest thinning can result in increases in carbon stocks, but only when the harvest residue is left on site. This is obviously not what occurs when harvest residue is burned on-site or removed for biomass combustion, as is often the case with timber harvesting, and with even-age management in

particular. In addition, the paper repeatedly states that treatment of post-logging debris may be the most critical variable in post-harvest management, with regard to soil carbon. "Multiple researchers note that when post-logging debris remains onsite, soil carbon increases in the short term after harvesting." Page 29. However, the current Forest Protocol fails to account for the treatment of harvest debris.

D. The CAR workshop presentation included the question: "What timescale should be applied to determine impacts on soil carbon?" In order to ensure that emissions in the near term are not being given credits for sequestration in the medium or long term, it is critical to account for soil carbon at whatever timescale the credits are being assigned. The paper notes that soil carbon pools recover in some systems within 50 years after harvest events. It is obviously not acceptable for CAR to issue credits to a forest project that fails to account for emissions that may not be mitigated by sequestration and soil processes for 50 years or more. Furthermore, since soil carbon generally increases with time in an undisturbed forest, the baseline is an increasing soil carbon pool, not a static value. Therefore, the business-as-usual baseline is an increasing value for forest projects that choose even-age management and soil ripping over other harvest regimes that result in lower soil disturbance.

III. Carbon Dynamics Associated with Even-Aged Forest Management

A. The Climate Action Reserve appears to have missed an opportunity to solicit an independent and unbiased opinion through this paper. For the paper on even-age management, CAR chose to contract with a group that includes a member of the CAR work group that drafted the current protocol, and who also represents the position of the California Department of Forestry and Fire Protection. As such, the paper adhered closely to the assumptions and biases that underlie CAR's decision to invite even-age management as a forest project; as a result, the paper is often defensive of the current protocol rather than offering an unbiased analysis of the carbon impacts of even-age management.

B. The findings of the paper indicate that even-age management can be most easily be calculated as a carbon benefit if the accounting ignores carbon associate with soil, snags, and down wood. Accounting for these carbon impacts may in many cases—particularly where highly disruptive harvest methods are used—change the carbon balance of a project from a benefit to a negative for some period of years following harvest activities.

C. The CAR workshop presentation included the following statement: "Even-aged forest can disturb the forest floor, which results in reduction of litter and duff through increased decomposition. However, this can be offset by contributions from logging and slash." This seems clear from the paper, but it is important to note that the paper offers no strategy for estimating the extent to which logging slash will offset the carbon losses from the other pools. These carbon impacts must be measured to determine their relative influences on the overall carbon balance. Also, as noted elsewhere in these comments, the protocol does not account for impacts to carbon associated with the wood cycling, despite the fact that this carbon dynamic is a

critical and large component of forest carbon, and can be substantially altered and emitted as a result of management actions, as found in the papers on soils carbon and lying dead wood.

D. The CAR workshop presentation included the following question: "Can historical natural disturbances provide guidelines to incorporate the following factors in the Forest Project Protocol? • Harvest retention of live trees, snags, and LDW. • Targets for maintaining large diameter trees. • Rotation limitations. • Spatial limitations for disturbance." It is very likely that a consideration of the impacts and dynamics of natural disturbances would identify options for improving the natural forest management definition in the Forest Protocol. However, this is very different from saying that timber harvesting mimics natural disturbance regimes. Even-age management in particular is not consistent with the impacts of natural disturbances because clearcutting eliminates the forest structure, removes the vast majority of the large trees, and greatly reduces woody debris through on-site burning or collection for biomass combustion. In contrast, natural disturbances generally leave many large trees standing, retain structural characteristics important to wildlife even when the trees have been killed, and retain and recycle woody debris.

Franklin et al (1997)[1] concluded that "research has [] made clear the dramatic impacts that clearcutting and other management activities can have on biological diversity and ecosystem function." That is because clearcutting fails to retain the high levels of structural, functional and compositional diversity necessary to a healthy forest. Scientists studying forest systems have found that natural patterns of diversity "contrast sharply with low levels of biological legacies associated with even-aged regeneration harvest practices, particularly clearcutting"[2] As discussed in Franklin et al (2002):[3] "Traditional clearcutting leaves little or no above-ground structural legacy in contrast to most natural disturbances."

Swanson et al (2010)[4] found that "Clearcutting has been proposed as a technique to create ESFEs [early successional forest ecosystems], but this can provide only highly abridged and simplified ESFE conditions. First, traditional clearcuts leave few biological legacies (eg Lindenmayer and McCarthy 2002), limiting habitat and biodiversity potential. Second, clearcuts are often quickly and densely reforested, and often involve the use of herbicides to limit competition with desired tree species. Clearcuts can provide some early-successional functionality (eg serving as nurseries or post-breeding habitat for many bird species in the southern US; Faaborg 2002), but this service is often truncated by prompt reforestation."

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[1] Franklin, J. F., Berg, D. R., Thornburgh, D. A., and Tappeiner, J. C. 1997. Alternative silvicultural approaches to timber harvesting: Variable retention harvest systems. In: Kohm, K. A. and Franklin, J. F. (eds.) Creating a forestry for the 21st century: The Science of ecosystem management. Island Press.

[2] *Id*.

[3] Franklin, Jerry F., et al. 2002. Disturbances and structural development of natural forest ecosystems with silvicultural implications, using Douglas-fir forests as an example. *Forest Ecology and Management* 155:399–423

[4] Swanson. Mark E, et al., 2010. The forgotten stage of forest succession: early-successional ecosystems on forest sites. *Front Ecol Environ* 2010; doi:10.1890/090157.

Franklin and Fites-Kaufmann (1996)[5] noted that "Severe disturbances, such as wildfire, windstorm, insect outbreaks, or timber harvest, can disrupt the gradual, internally-driven successional changes in ecosystems; the level of disruption depends upon the type, intensity, and frequency of the disturbance. Most disturbances leave behind large numbers of surviving organisms and organic materials, which are sometimes referred to as biological legacies; most disturbances do not kill all organisms present, let alone sterilize the site. Such legacies can be very important because it means that much of the recovery will be based on organisms and materials already in place rather than requiring recolonization of the site from outside. Since most forest disturbances kill trees but consume little of the wood, legacies of particular significance to forest ecosystems are dead trees in the form of snags and down logs. The numerous legacies, including living trees as well as snags and logs, are a primary reason why clear-cutting is not like most natural disturbances."

In addition to the critical ecological distinctions between logging regimes and natural disturbances, it is important to account for geographic and temporal scales. Perhaps most important for the purposes of comparing a forest project to a business-as-usual baseline is the fact that a harvest regime occurs with certainty on a particular forest area, whereas a natural disturbance is a relatively low probability event occurring at various geographic scales and distributions, often at a scale of centuries.

I appreciate the opportunity to offer these comments. Please contact me if you have any questions.

Sincerely,

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[5] Franklin, Jerry F., and Jo Ann Fites-Kaufman. 1996. Sierra Nevada Ecosystem Project: Final report to Congress, vol. II, Assessments and scientific basis for management options. Davis: University of California, Centers for Water and Wildland Resources, 1996. Available at http://ceres.ca.gov/snep/pubs/v2s3.html