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SUMMARY OF COMMENTS & RESPONSES DRAFT FOREST PROJECT PROTOCOL VERSION 3.3

7 sets of comments were received during the public comment period for the Climate Action Reserve (Reserve) draft Forest Project Protocol Version 3.3. Staff from the Reserve summarize and provide responses to these comments below.

The comment letters can be viewed in their entirety on Reserve's website at <http://www.climateactionreserve.org/how/protocols/forest/revisions/>

COMMENTS RECEIVED BY:

1. Blue Source LLC (**Blue Source**)
2. Center for Biological Diversity (**CBD**)
3. National Alliance of Forest Owners (**NAFO**)
4. Placer County Air Pollution Control District (**PCAPCD**)
5. Sustainable Forestry Initiative (**SFI**)
6. The Nature Conservancy (**TNC**)
7. Weyerhaeuser Company (**Weyerhaeuser**)

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General Comments

1. As we understand the Reserve Forest Project Protocol V3.3, it appears designed to encourage custodial forest management, or conservation forests, designed to preserve the maximum amount of land in forest. The Reserve should recognize that this results in a Protocol version 3.3 providing very limited, if any, opportunities for working forests which are accountable for a financial return to their owners. While we recognize that it may not be prudent for the Protocol to reward forest owners with offsets for “business-as-usual” commercial forestry, the preference for conservation forests in the Protocol can create unintended carbon consequences. We bring your attention to the recent report by Lippke et al. (2011).¹ This report demonstrates the important contribution of sustainably managed forests when considering the ongoing life cycle accumulation of carbon in both onsite and offsite carbon pools. (A subsequent report by a Society of American Foresters task force² corroborates the Lippke study.) To the extent that the Protocol incentivizes a shift from active forestry to custodial forestry, a very real carbon impact can occur as a result of awarding carbon offsets. We recommend that the Reserve carefully consider how future versions of the Protocol might avoid these consequences by removing the bias that favors conservation forests and also mobilizes the carbon benefits of active sustainable forestry. A beginning point might be to seek a reduction of prohibitive transaction costs and to remove non-carbon related objectives, such as seeking a return to pre-settlement species compositions. **(NAFO)**

RESPONSE: The Reserve’s Forest Project Protocol recognizes the direct benefits associated with project activities. The direct benefits address both onsite forest carbon as well as offsite harvested wood products. The protocol does not provide benefits for substitution effects or other indirect benefits that cannot be directly measured as a project activity.

The Protocol provides opportunities to Forest Owners to increase removals of CO₂ from the atmosphere, or reduce or prevent emissions of CO₂ to the atmosphere through Reforestation, Improved Forest Management, and Avoided Conversion. The activities that generate said removals and reductions for Improved Forest Management projects in particular can result in increased carbon stocks and increased harvest volumes. Maintaining land in forest cover certainly has immediate and long-term climate benefits by avoiding emissions associated with forest conversion and removing CO₂ from the atmosphere. Working forests, as stated, are recognized in the forest protocol for the climate benefits they provide to the extent these forests can increase their onsite carbon pools as well as their offsite carbon pools (harvested wood products) compared to the project’s baseline case. Carbon revenues provide a financial incentive to increase harvest ages, manage stocking for optimal/healthy growth, and increase retention during harvest in selectively managed forests. Essentially any forest management activity that enables working forests to be managed incrementally closer to the project site’s carrying capacity is recognized as providing climate benefits. Landowners must make their own financial decisions how to manage the interrelationship of carbon and timber revenues.

2. The protocol needs to include a module which directly values the carbon benefits of thinning and fuel hazardous reduction projects - that occur through avoided wildfire emissions and reduced tree mortality by reducing fire intensity and size. Under the conditions of high fuel loads

¹ See NAFO public comment submission, page 1.

² See NAFO public comment submission, page 1.

and high fire risk probability that currently exist through the semi-arid mixed conifer forests of the Sierra Nevada, certain thinning prescriptions are being shown to have important carbon benefits through on-going research being sponsored by the Placer County Air Pollution District. These research results will be supplied to the Reserve in the upcoming months when our work is completed. We are in the process of finalizing a procedure to accurately quantify the carbon benefits accrued from thinning prescriptions. This will be included in the above mentioned report.

The protocol needs to account for the carbon value of the commercial lumber products from such thinning activities in terms of their use in lieu of alternative products like steel and concrete that have a much higher carbon footprint. Lumber products are not only excellent carbon banks, but are renewable and highly sustainable. As opposed to steel (requires non-renewable iron ore) and cement (requires non-renewable minerals). **(PCAPCD)**

RESPONSE: The Reserve is aware of the developments in fuel management science as it pertains to carbon. The Reserve will explore the opportunity to include fuel management in carbon accounting for Forest Projects as improvements in the science of fuels management and climate benefits become more clear and predictable.

The Reserve's Forest Project Protocol recognizes the direct benefits associated with project activities. The direct benefits address both onsite forest carbon as well as offsite harvested wood products. The protocol does not provide benefits for substitution effects, such as the potential benefits of wood products compared to steel or cement, or any other indirect benefits that cannot be directly measured as a project activity

3. The protocol needs to include a module to value the carbon benefits from the use of excess waste biomass from forest thinning projects for renewable energy as an alternative to the common disposal practice of open burning. We have developed a comprehensive protocol for this type of project [see **PCAPCD public comment submission for Biomass Waste for Energy Project Reporting Protocol**]. The protocol has been peer reviewed and supported by numerous public and private stakeholders [see **letters attached to PCAPCD public comment submission**]. **(PCAPCD)**

RESPONSE: Under California's regulatory program, the energy sector is considered a "capped" sector. Power generators can reduce their emissions associated with fossil fuels by using biomass energy as a strategy of complying with AB32. The benefit cannot go both to the power generator and the forest landowner. To the extent the use of biomass energy becomes an effective strategy for power generators, a market may arise for biomass material. Activities that would reduce the emissions figure for entities within a capped sector cannot be credited for activities that reduce their emissions.

2 Forest Project Definitions and Requirements

4. We recommend removing the ban against broadcast fertilization under project eligibility and appropriately accounting for it in the calculation of the project baseline.

The protocol states that a project is only eligible if it "does not employ broadcast fertilization." There is no carbon or environmental rationale for this requirement. In fact, in the forest protocol

white paper, Accounting for Carbon in Soils, the authors convey that many studies show that fertilization can increase soil carbon. In addition to the studies mentioned in the Soil Carbon white paper, there are numerous other studies that support the finding that increased N-availability actually causes more litter deposition and larger forest floor accumulations.³ Forest floors have been found to decompose proportionally at the same rate, whether big or small,⁴ so if one conducts activities such as fertilization, then over multiple rotations there should be more soil organic matter built up in the ecosystem, which should result in increased productivity resulting in a beneficial positive feedback.

A recent analysis also found that fertilization of southern pine plantations has a substantial carbon benefit due to enhanced productivity and carbon sequestration in biomass. In fact, the benefit is roughly 20:1 relative to carbon emissions associated with the manufacturing, transport, and application of the fertilizer.⁵

Any nitrous oxide emissions that result from N fertilization can be accounted for in the carbon accounting. Nitrous oxide emissions from N fertilizer application can be estimated using the method recognized by the IPCC. This should be included in both the baseline calculations (if fertilizer is used) and the project.⁶ **(NAFO, Weyerhaeuser)**

RESPONSE: Currently, the Reserve has not developed a methodology for accounting for nitrous oxide emissions. In order to consider removing the prohibition of broadcast fertilization on Forest Projects, the Reserve needs further understanding of the emissions from fertilization. Additionally, it is not clear how the allowance of fertilization would affect the Forest Project Protocol's Natural Forest Management requirements, as fertilization has an unknown and complex impact on ecology. The Reserve will evaluate the pros and cons of broadcast fertilization in future versions of the protocol.

2.1.3 Avoided Conversion

The edit to the avoided conversion project definition, which adds modifying language to dedicate the land to forest cover at "existing or increased stocking levels," is too rigid and will be problematic for conservation easements.

The effect of this new language could lead to conservation easements requiring the maintenance or increase of a specific number of carbon stocks. The primary purpose of the easement should be to remove the baseline condition threat of the conversion of forest to another use, not necessarily to also then require a specific amount of carbon stocks. Embedding specific numbers in a perpetual conservation easement will not provide for natural fluctuations in carbon that could lead to some decline in carbon stocks or allow for restorative activities that could result in the loss of some carbon stocks in the near term but lead to greater carbon stocks and healthier forests over the longer term. We recommend removing this new language and consider alternative language that would promote maintenance or restoration of forest cover. **(TNC)**

RESPONSE: Noted. The Reserve agrees that this additional language is unnecessary, as

³ See NAFO public comment submission, page 2.

⁴ See NAFO public comment submission, page 2.

⁵ See NAFO public comment submission, page 2.

⁶ See NAFO public comment submission, page 3.

the Forest Project Protocol already contains language requiring carbon stocks to be maintained or increased over the project's lifetime.

2.2 Forest Owners and Project Operators

Review all protocol language to ensure that adjustments to forest owner/operator definition does not create unintended consequences.

The adjustments to the forest owner definition to include the forest project operator do provide greater clarity regarding the ownership of carbon and associated liability. However, the adjustment does also raise questions regarding the correct party that should be responsible for demonstrating sustainability in Section 3.11. In certain cases, it may not be the project operator that should demonstrate and meet the sustainability criteria; rather, it may be the fee owner. We therefore recommend clarifying the circumstances where the fee owner may still need to demonstrate sustainability when the fee owner is not also the project operator. For example, a fee owner may need to demonstrate sustainability outside the project area if, at the time of initiating the project, the fee owner had control of timber rights. **(TNC)**

RESPONSE: For purposes of forest carbon, the Reserve considers forest ownership to mean an entity that maintains the sole and final ability (right) to affect forest carbon stocks in the Project Area. This ability to manage forest carbon stocks is not exclusive to fee owners, as entities other than the fee owner may have this right through a deeded encumbrance. A project, therefore, may have multiple ownership claims to discreet portions of the forest carbon within the Project Area. The Sustainable Harvesting requirement of the Forest Project Protocol applies to the Forest Project Operator regardless of the ownership structure, so long as the Operator has the exclusive right to manage forest carbon stocks in the Project Area.

3.4 Minimum Time Commitment

The protocol requires that registered CRTs are kept out of the atmosphere for 100 years with a penalty for voluntary early termination. 100 years is a time frame that is impractical for landowners and a penalty for early termination up to 50 years is enough of a barrier to prevent landowner participation. NAFO recommends an approach that allows recognition for meaningful carbon storage contributions that can be made on a shorter time frame.

Chapter 2 of the IPCC Special Report on Climate Change, Land Use, Land-Use Change and Forestry⁷ explains an alternative approach to comparing activities that sequester carbon for different lengths of time by using an equivalency factor based on a policy determined length of time considered to be "permanent." The basic argument is that there is a benefit of temporary sequestration and it is based on the decay rate of CO₂ in the atmosphere. This accounting method is most commonly referred to as ton-year accounting and has been discussed at length in the literature (Fearnside et al 2000; Lashof and Hare 1999; Moura-Costa and Wilson 2000; Maclaren 2000).⁸ The IPCC method provides a calculation that requires payback of CRTs depending on the point of termination. The earlier the termination, the more CRTs must be paid

⁷ See NAFO public comment submission, page 3.

⁸ See NAFO public comment submission, page 3.

back.

For example, if a project keeps a ton of CO₂ (one CRT) out of the atmosphere for 40 years, the net impact in CO₂ reductions would be the integrated difference between a pulse of CO₂ at year 1 minus a pulse at year 40, which would be, over a 100 year basis, 12.8 or 31.8% of full credit. Hence, if a Project Operator decides to terminate a project after 40 years, they would be required to pay back 68.8 CRTs for every 100 CRTs that were registered. If the Project Operator waits until 80 years or 100 years they would have less or no CRTs to pay back. Thus there is an incentive, matched by actual benefit to the atmosphere, to keep carbon out of the atmosphere. **[See table in NAFO public comment submission for the different percentage of credits on a 100 year basis.]**

This method was discussed and endorsed by the ANSI Forest Carbon Standards Committee though there was disagreement on the length of time required for full credit.⁹ The Reserve should replace Table 3.1 with the atmospherically relevant partial credit scale shown above. **(NAFO, Weyerhaeuser)**

RESPONSE: Noted. The Reserve is aware of this approach to addressing permanence of Forest Projects, which allows for partial crediting if projects are terminated early. The determination of permanence is a policy decision. Agency, landowner, and NGO stakeholders agreed on the current policy to require a biological (forest) offset to be maintained out of the atmosphere for an entire period of 100 years to meet a permanency threshold. Any reconsideration of this policy would require substantial research and discussion prior to any changes being made.

3.11 Sustainable Harvesting and Natural Forest Management Practices

5. We support the requirement that forest carbon projects must “employ sustainable long-term harvesting practices” and are pleased that the FPP Version 3.3 continues to recognize certification to the SFI Standard as a vehicle to demonstrate adherence to this requirement. By recognizing all third-party forest certification standards in use in the U.S. – SFI, the American Tree Farm System, and the Forest Stewardship Council – the Climate Action Reserve is taking an inclusive approach that considers the dynamics and needs of U.S. landowners and managers. **(SFI)**

RESPONSE: Noted. In the Reserve’s review of certification standards, all of the standards under consideration were found to adequately address the sustainable harvesting criteria. The extent of the use of these certification standards is limited to sustainable harvest, and does not address social or environmental impacts.

6. We support the continued recognition of all three third-party forest certification standards in use in the U.S. – the Sustainable Forestry Initiative, the American Tree Farm System, and the Forest Stewardship Council – as a vehicle to demonstrate adherence to the requirement to employ sustainable long-term harvesting practices under Section 3.11.1. **(Weyerhaeuser)**

⁹ See NAFO public comment submission, page 4.

RESPONSE: Noted. Please see response to Comment #5.

7. The sustainable harvesting practices requirement would no longer apply to the entire landholdings of project operators, but would instead apply only to the project operator's landholdings within the assessment area (pg. 21). This substantially weakens the requirement and greatly undermines assurances of environmental integrity of the overall forest management of the project operator.

The Forest Protocol does not require forest projects to account for changes in stocking levels, carbon stocks, and carbon emissions from the project operator's forest landholdings outside of the project area, and does not account for harvest leakage within the same land ownership. (Instead, the Forest Protocol applies a standardized 20% leakage discount to all forest projects.) Therefore, the project operator can increase harvest rates outside the project area, resulting in 100% leakage within the same ownership. With the most recent change in the sustainable harvesting practices provision, the project operator can accomplish the increased harvest rates by increasing the use of forest clearcutting, so long as the clearcutting occurs outside the assessment area.

Sustainable harvesting practices requirements must apply to the project operator's entire ownership. Otherwise, the Forest Protocol will create a tremendous opportunity for project operators to game the system and effect 100% leakage by increasing harvesting within the same landholdings. **(CBD)**

RESPONSE: The intent of reducing the scope of assessment for leakage was to limit the evaluation to geographic areas where changes in forest management within the project area would affect similar products and markets. Attempting to quantify leakage at the ownership level is problematic due to limitations in verification of carbon stocks across large geographic as well as market boundaries. The final draft of Version 3.3 has established the limit for this assessment at the Supersection/Ecosection boundary. Supersections/Ecosections often consist of multiple assessment areas.

The decision for a Forest Owner to harvest on different ownership parcels is independent from forest tract to another forest tract. Carbon revenue from reducing harvest on one piece of land should not impact the economically optimal harvest regime on any other parcel within the same ownership. If a landowner were to increase harvest levels on one parcel after reducing harvests on another due to the implementation of a carbon project, it is not activity shifting leakage and rather an independent analysis of market conditions that drives that shift in harvest levels.

8. The sustainable harvesting practices provision includes three options, none of which include specific standards to protect ecosystem values other than stocking levels of trees (pg. 21). The first option finds a forest project to demonstrate sustainable harvesting practices if it is certified under the Forest Stewardship Council, Sustainable Forestry Initiative, or Tree Farm System certification programs. However, these three programs have very different environmental criteria, and the Sustainable Forestry Initiative, which focuses entirely on forest stocking levels, contains virtually no environmental criteria. In this regard, SFI certification is essentially redundant with the Forest Protocol's requirements to maintain and increase carbon stocks and confers no protection for forest ecosystem and habitat values.

Similarly, the second option finds a forest project to demonstrate sustainable harvesting

practices if it shows “adherence to a renewable long-term (50 years minimum) management plan that demonstrates harvest levels which can be permanently sustained over time and that is sanctioned and monitored by a state or federal agency.” Presumably, in California, this is intended to apply to a timber operator that has filed a plan intended to demonstrate compliance with statutory requirements for maximum sustained production of timber products (a legal prerequisite for approval of timber harvest plans). However, such plans in California are concerned primarily with projected forest stocking levels and are not required to contain specific environmental protections. **(CBD)**

RESPONSE: The use of forest certification to demonstrate sustainable harvest practices is applied to all of the Forest Owner’s forest holdings within the Supersection/Ecosection where the Forest Project is located. The requirement to maintain and increase carbon stocks is limited to the Forest Project where adherence to the criteria can be verified through inventory monitoring. The intended use of forest certification is to address limited sustainability aspects of timber management. Natural Forest Management policies address the environmental criteria required for all Forest Projects.

9. We recommend that an additional exception be added to part 3 in Section 3.11.1. The Reserve should allow for granting an exception for acreages over 5,000 acres in instances where the terms of perpetual conservation easements effectively secure the sustainable management provisions identified in this section. **(TNC)**

RESPONSE: Agreed. The Reserve will include abidance by a conservation easement which has explicit terms that result in sustainable timber levels as a fourth option for meeting the Sustainable Harvest requirements of the Forest Project Protocol.

10. **Table 3.2, Evaluation Criteria to Test if a Forest Project Meets the Requirements for the Establishment and Maintenance of Native Species and Natural Forest Management:** The native species diversity provision requires that “*no single species’ prevalence, measured as the percent of the basal area of all live trees in the Project Area, exceeds the percentage value of standing live carbon shown under the heading ‘Composition of Native Species; in the Assessment Area data file maintained on the Reserve’s website’*” (pg. 23). This provision is evidently intended to prohibit a situation in which a single commercial tree species would comprise an inordinate and overwhelming proportion of the live tree biomass in the project area. However, the requirement does not apply at the stand level, and consequently would permit the project area to contain a high proportion of single-species plantations. As such, this provision provides little protection of existing ecological values in the project area, and allows projects to create and maintain substantial proportions of forest with low biological and habitat values.

Forest projects are allowed to maintain as much as 40 percent of the forested acres in ages less than 20 years (pg. 24). Under such a scenario, the basal area of the primary commercial tree species would be significantly suppressed by clearcutting, making it easier to comply with the species diversity requirements. That is, increasing the intensity of harvest—which will adversely affect diversity and wildlife habitat—could perversely improve the project’s compliance with the diversity requirements as they are defined in the Forest Protocol. **(CBD)**

RESPONSE: The scale for assessing project-related criteria is the Project Area due to the fact that the Project Area is the basis for sampling designs. To evaluate conformance to

the Protocol on the stand level would present inordinate challenges to Project Operators and Verifiers.

Additionally, the Composition of Native Species requirement must be evaluated as one requirement within a larger suite of requirements established in the Forest Project Protocol. The requirement of 40 percent of forested acres being in ages less than 20 years has the effect, when combined with the requirement for maintenance or increase of standing live carbon stocks, to increase rotation ages, for projects that practice even-age management, to at least 50 years. This is a substantial management change for many landowners in the United States and will result in improved biological and habitat values compared to baseline conditions.

11. The canopy cover limit requiring an average of 40% cover over any 20 acres (discussed in Section 3.11.1) is not appropriate and severely limits the ability to retain landscape diversity on larger ownerships. For some areas, particularly on the eastside of the Sierras, 30% canopy cover is both adequate and more reflective of natural canopy cover levels. We recommend that the requirement be modified to allow for more variable density/spacing thinning on a landscape/watershed basis with a requirement that the canopy average at least 30% over 10 acres. This allows for management that reflects natural canopy conditions to more closely mimic natural spacing/diversity across the landscape. **(PCAPCD)**

RESPONSE: Noted. The 40% canopy cover requirement is only one of several options for meeting the Forest Project Protocol's Sustainable Harvest requirement.

The Reserve will include guidance in Version 3.3 that will allow the canopy cover option to be adjusted based on the written testimony of an independent and reliable authority or government agency familiar with the typical canopy conditions of forests in the Project's locale.

3.11.4 Balancing Age and Habitat Classes

12. The protocol requires a limitation on harvesting stands no greater than 40 acres in size. This arbitrary requirement would significantly undermine participation in the Reserve protocol by most landowners due to the fact that this size limitation is inconsistent both with standard environmental mitigation measures restriction has no impact in how carbon in forests is accounted for in forestry operations.

From an environmental perspective, a 40 acre clearcut limitation requires more road use than larger clearcut units. Fewer entries over a period of time will result in less soil disturbance helping to minimize sedimentation to streams and lessen risks of soil compaction.

We recognize that appropriate limits to clearcut size do provide environmental benefits as recognized by the leading certification programs. Presumably this is one of the reasons that the Reserve protocol requires participation in a forest certification program in Section 3.11.1. As part of their criteria, these programs all provide reasonable limits on clearcut size based on sound silvicultural and sustainability principles. There is little likelihood of a landowner engaging in the added expense of certification and then compounding that expense with this artificial limit on clearcut size.

In addition, clearcutting as a harvest and regeneration method has sound silvicultural and ecological bases:

- It allows sunlight to reach the ground so newly planted seedlings quickly take root and regenerate the forest. As such, it's the system best suited to commercially important shade-intolerant species, including Douglas-fir in the western United States and loblolly pine in the southern United States. These tree species reach their full growth and yield potential only when grown in full sunlight.
- It provides habitat for animal species, some of which are of high conservation priority, that are associated with early successional plant communities.¹⁰ Some plant species in these communities also are of high priority.
- It results in stands of even-aged trees that produce wood products with more uniform qualities.
- As noted above, it requires fewer roads and entries into the stand than partial harvesting systems, thus reducing the risk of sedimentation in streams.
- It is often more efficient, cost-effective and safer than partial harvesting systems. Overall, the smaller the allowable clearcut size, the more roads need to be built and the more costly the silvicultural operation becomes. This arbitrary limitation discourages landowner participation, offers no additional environmental benefit, and adds nothing to the proper accounting of carbon stored as part of the protocol. **(NAFO, Weyerhaeuser)**

RESPONSE: The maximum even aged management unit is a policy decision. The maximum even aged management unit was focal point during stakeholder discussions that struggled to define conservative environmental safeguards in defining 'Natural Forest Management'. These discussions led up to the development of the Forest Project Protocol Version 3.0. The stakeholders involved in the discussion included public agencies, public and private landowners, and non-government organizations (NGOs). The development of Forest Project Protocol Version 3.0 was thoroughly documented, and further information can be found on the Reserve's webpage. The current requirement is the result of stakeholder engagement in defining the terms of the Natural Forest Management requirements of the Protocol.

The Reserve is considering further development of the even aged management policy based on the results of the recent white paper "Carbon Dynamics Associated with Even-Aged Management", also available on the Reserve's webpage.

5 GHG Assessment Boundary

13. **Lying Deadwood – all project types:** Given the cost of lying deadwood sampling and analysis, landowners choosing to include this pool in the inventory (i.e. Option I under Natural Forest Management Criteria) should be credited or debited for changes to this carbon stock. This will enable a higher number of smaller carbon projects to be economically implementable, leading to increased climate benefits and carbon credit supply. **(Blue Source)**

RESPONSE: The Reserve believes that it is inappropriate to allow the lying dead wood pool as a creditable pool due to its high variability, which results in substantial challenges to accurately account for the marginal benefits of a forest carbon project to

¹⁰ See NAFO public comment submission, page 5.

this particular pool. For the Reserve to approve a pool for crediting, the measurements of that pool must reach statistical confidence levels required for crediting and the pool must be free from subjective metrics that render challenges to verification. The end result of the measurement challenges is that it is difficult to determine the difference between lying dead wood as a result of project activities and lying dead wood resulting from the baseline. Disallowing this carbon pool improves the overall conservativeness of the credits generated from carbon projects.

14. The inclusion of accounting for soil carbon where there is activity that typically causes soil carbon emissions enhances the integrity of accounting in GHG reduction calculations. As currently written, the required soil carbon accounting is a debit when activities causing such emissions occur. This is an improvement. However, if possible, it would be more consistent with the accounting approach of the other carbon pools if a stock change approach were used. Such an approach would also allow for a clearer picture of total forest carbon stocks and overall decreases and increases over time. If it's not feasible to develop such an approach at this time, we encourage the Reserve to work toward such an approach in the future. **(TNC)**

RESPONSE: Noted. Currently, measuring soil carbon is expensive and the pool is highly variable. Flux in the pool due to forest management is difficult to detect and measure. The Reserve has chosen to account for the soil carbon pool only when project activities have extreme effects on the stocks (i.e. conversion). If economically feasible, reliable, and accurate methods of soil carbon measurement develop in the future, the Reserve will consider changing our approach.

15. **Table 5.1, GHG Assessment Boundary – Reforestation Projects, and Table 5.2, GHG Assessment Boundary – Improved Forest Management Projects:** Given the cost of soil carbon sampling and analysis, landowners should be credited for avoided soil emissions in the baseline scenario of IFM and Reforestation projects (rather than only being debited for soil emissions in the project scenario). This will enable a higher number of smaller carbon projects to be economically implementable, and leverage of the significant and important efforts the Reserve has put into determining the effects of various management practices on soil carbon. **(Blue Source)**

RESPONSE: Please see the previous response. As described in the Reserve Program Manual, the Reserve follows GHG accounting principle of conservativeness, and accounting for soil carbon emissions only for project management activities ensures such conservativeness.

16. Improved Forest Management Projects and Avoided Conversion Projects are not required to account for the carbon impacts to shrubs and herbaceous plants, lying dead wood, or litter and duff carbon pools (pg. 37, pg. 43). It is not clear precisely why these carbon pools can be assumed to be negligible, or why it can be assumed that changes due to management actions “are unlikely to have a significant effect on total quantified GHG...” (pg. 37).

Table 5.2 (pg. 37) states: “Lying dead wood is highly variable and it is therefore difficult to achieve accurate estimates. It also constitutes a minor portion of forest carbon. With required retention for Natural Forest Management...it is a conservative programmatic measure not to include it. For Natural Forest Management criteria, the protocol requires recruitment and retention of dead material, including lying dead wood as a structural element. Minimum volume

thresholds are stated to meet Natural Forest Management criteria (See Section 3.11.2).” However, there is no source or justification provided for the statement that lying dead wood is a minor or negligible forest carbon pool. Also, there are no minimum volume thresholds in Section 3.11.2; the minimum thresholds have been eliminated in the current revision.

Furthermore, the statement that “the protocol requires recruitment and retention of dead material” is misleading, as it implies that projects are expected to recruit snags and down wood. In fact, the protocol requires only that “[t]he combination of standing dead and lying dead wood shall be retained at per acre values” (pg. 25). If snags and lying dead wood are reduced, three live trees must be retained for every missing dead tree. This is not recruitment of large snags and lying dead wood that are essential components of wildlife habitat. Instead, this is the identification of three live trees as eventual replacements when a snag or lying dead wood is removed. Lastly, the fact that the retention requirements are based on average per acre values for the Assessment Area means that if the project operator has greatly reduced snags and lying dead wood in harvests and site preparations in the adjacent forest areas, the project will be held to that lower standard. **(CBD)**

RESPONSE: The updated Forest Project Protocol maintains minimum thresholds for dead wood retention. The specified quantities have been moved from Table 3.2 of the Natural Forest Management section to the Assessment Area Data File.

The recruitment of lying dead wood originates from snags or live trees through windthrow, ice events, landslides, or harvest activities. Since these pools have a limited life-expectancy as they are subject to decay, projects will be recruiting lying dead wood. Snags are destined to become lying dead wood if retained in the forest. Prediction for when a standing dead tree will fall over to become lying dead wood does not exist as of yet. Therefore, identifying and tagging currently live trees for lying dead wood recruitment is the only method of naturally increasing future stocks of lying dead wood.

17. **Table 5.3, GHG Assessment Boundary – Avoided Conversion Projects:** SSR AC-6 is confusingly worded as it states that baseline carbon stocks “are assumed to be static.” This contradicts other guidance provide in the protocol for accounting for baseline soil emissions in the case of avoided conversion projects. **(Blue Source)**

RESPONSE: Noted. The Quantification Method for SSR AC-6 has been adjusted to appropriately reflect the baseline accounting methodology for Avoided Conversion projects.

6.3 Avoided Conversion Projects

6.3.1 Estimating Baseline Onsite Carbon Stocks

18. **Table 6.4, Soil Carbon Emissions Estimators by Soil Order:** We understand the new default rate for loss of carbon from Histosol soils to be given at 0.8% per year over a 100 year time horizon (80% emitted, with 10% of total each 10 year period). This is a much slower loss rate in the early years following conversion to agriculture than is supported by soil science literature and IPCC guidance which states “for changes in land use or management that cause a decrease in soil C content, the rate of change is highest during the first few years, and

progressively declines with time.”¹¹

This is a highly critical issue, as such an artificially slow loss rate in the early years of project implementation means that landowners’ reward for the benefits of avoided conversion will be delayed for many years. This will make many projects, particularly those undertaken by smaller landowners (who represent the majority of avoided agricultural conversion opportunities), uneconomic given the high upfront costs associated with project development, inventory and verification. As a result, many lands that could otherwise be protected via incentives provided by carbon credits will instead be converted, leading to unnecessary harm to the climate and reduced supply of carbon credits. **(Blue Source)**

RESPONSE: The rate of soil carbon decay is based on a literature review conducted by Dr. Alex Gershenson, available for review on the Climate Action Reserve’s forest webpage. It is considered appropriate for use for a carbon protocol aimed to conservatively address climate benefits.

Quantification Guidance

19. The calculation of forest carbon impacts involves a number of assumptions and generalizations that have the effect of minimizing the differences among management scenarios and minimizing the reported impacts to soil carbon pools. **[See comments 22 to 26.]**

The values assigned in the Determination of Biomass Removal Index (Table 7) and Soil Disturbance Index (Table 8) appear to be somewhat arbitrary. For example, the removal of 10 – 50% of above-ground biomass is assigned a biomass removal index value of 0; the removal of 51 – 80% has an index value of 1. Less than 5% of mineral soil exposed during harvest is assigned a value of 0; 5 – 20% is assigned a 2; and 20 – 40% (twice as much) is assigned a 3.

When these values are summed to calculate the “Harvest Intensity Class” and then applied to Table 12 (Estimated Net Carbon Loss), the differences in net carbon losses among different harvest intensity classes are mostly small or non-existent, obscuring and negating the effects of more intensive harvesting. **(CBD)**

RESPONSE: The findings are based on a literature review conducted by Dr. Alex Gershenson of Ecoshift. The literature review indicates that harvest intensity has a less effect on soil carbon than does soil disturbance, hence the weighting of the values. The classification scheme is designed to standardize the approach to assessing soil carbon emissions based on interpretation of the available science. The design is intentionally conservative so as not to underestimate soil carbon emissions associated with project activities. Project activities are more likely than not to have fewer soil carbon-related emissions than baseline activities. Soil carbon emissions are not included in the baseline analysis which adds an added degree of conservativeness to the accounting.

20.

21. Step 2-2b (pg. 17): It is not clear how “an ocular inspection” of the amount of “mineral soil (below the organic layer, including litter and duff) exposed due to harvest activities” is an adequate estimate of soil disturbance. There can be a high level of soil disturbance and compaction without displacing the cover of litter and duff. In addition, those impacts may not be fully evident until the next rainy season when the compaction leads to increased runoff. **(CBD)**

¹¹ 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Chapter 2.

RESPONSE: Compaction, by itself, was not identified as a principle mechanism that results in soil carbon loss. The verification of harvested areas will span more than one year, enabling an ocular inspection to detect if erosion has exposed mineral soil.

22. In most soil orders, frequency of disturbance appears to have little or no impact on the net carbon loss. In fact, in almost all cases, the estimates for net carbon losses are generally just 20%, even under the most intensive disturbance at the highest frequencies. This points to the fact that the studies on which these data are based occurred in plots where harvesting resulted in large amounts of harvest debris, which contributed, to various degrees and over different timeframes, to the woody debris, litter and duff, and soil carbon pools. The findings of those studies are not applicable in scenarios with whole tree harvesting or where understory trees, shrubs, down wood, and litter are removed for biomass power, and it appears that the Biomass Removal Index as a component of the Harvesting Intensity Class Index is not capturing the effect of that removal. **(CBD)**

RESPONSE: Frequency of disturbance is generally similar in all classes less than 45 years (Very Long). Dr. Gershenson's paper (available on the Reserve's website) revealed a range of soil carbon emissions associated with each disturbance frequency class. The guidance in the protocol always incorporated the highest end of the range in the quantification guidance to ensure soil carbon emission's accounting is not understated. The literature review did not yield substantial differences in soil carbon emissions based on frequency of disturbance for classes less than 45 years old.

Whole tree harvesting was reported by Dr. Gershenson as "Highest" Harvesting Intensity. The table included in the Quantification Guidance has been updated to include this category.

23. The greatest factor in determining net carbon loss appears to be site preparation classes. These are very coarse categories, in which the difference between medium ("25% to 59% surface area disturbance below litter and duff due to ripping, grading, and raking, etc") and heavy (60% to 100%) means a doubling of the soil carbon emissions in most soil orders. It is remarkable that the level of disturbance as estimated in the Site Preparation Index has such a substantial impact on the estimated soil emission, when the impact of the level of disturbance as estimated in the Soil Disturbance Index does not. **(CBD)**

RESPONSE: Site preparation is indeed an important variable in accounting for soil carbon emissions, due to the rapid exposure of soil carbon to oxygen which hastens the process of decomposition. The classes developed for site preparation are aligned from a granularity perspective with the data available in the literature. The classification scheme is designed to be conservative by including the greatest amount of soil carbon emissions from the literature in a broad class where site preparation exceeds 50%.

24. There is a counterintuitive trend that appears in a number of columns. In a number of cases (on a spodosol, for example), a high-intensity harvest with light treatment would result in 10% net carbon loss under short frequency rotation, 33% loss under medium frequency, 31% under long frequency, and 10% under very long frequency. **(CBD)**

RESPONSE: The soil carbon loss estimates are derived from the literature review. No effort was included to interpolate data in order to link findings directly to the literature review. The values are at times counterintuitive for cases where only a handful of

sources exist. Although sometimes yielding contradictory results, Dr. Gershenson's study chose to use only values published in the literature rather than estimate impacts. While literature values may have been contradictory, Dr. Gershenson chose to report the values as described rather than exclude data that did not fit the general pattern.

25. The supporting guidance document defines the emissions from the soil carbon pool as the outstanding net emissions at the point of the next harvest event. "Net carbon emissions are estimated as the difference between soil carbon stocks (CO₂e) in the soil prior to the management activity and the soil carbon stocks (CO₂e) in the soil immediately prior to the subsequent harvest event for each harvested stand." Quantification Guidance for Use with Forest Carbon Projects, Step 2-2 (pg. 16).

It is unclear how this calculation would work, since the project operator would obviously not know the timing or harvest levels of harvest actions decades in the future, and thus would be unable to provide the frequency of disturbance or site treatment factors necessary for the calculation. In any case, this approach fails to account for the temporal nature of soil carbon sequestration. In contrast to the Forest Protocol's treatment of tree growth, in which carbon credits are awarded only for growth that has occurred each year, the soil provision would essentially provide credit for potential sequestration and soil processes that may not occur for 50 years or more. Putting aside the fact that soil carbon sequestration decades in the future is highly speculative, this approach ignores the fact that the impacts depend on when and for how long carbon emissions contribute to atmospheric concentrations. **(CBD)**

RESPONSE: The protocol has a requirement that all projects must maintain or increase standing live carbon stocks. This is achieved where forest growth is equal to, or exceeds forest harvest. The protocol has a requirement that no more than 40% of the forest can be in age classes less than 20 years. The two related requirements result in a minimum rotation age eligible for the forest protocol being 50 years. Verifying return intervals is logically based on the level of retention remaining following harvest. Greater retention raises the probability that the return interval will be short. Less retention raises the probability that the return interval will be long. The Reserve has added guidance to the verification section to standardize verification of this issue.