PACIFIC FOREST TRUST

March 25, 2011

RE: Comments on Climate Action Reserve White Papers regarding Soil Carbon, Lying Dead Wood, Even-Age Management, and Forest Certification Systems

The Pacific Forest Trust would like to thank the Climate Action Reserve for putting together the current series of papers on soil carbon, lying dead wood, even-aged management, and certification. We also appreciate the opportunity to provide public input. Our comments address the implications that these white papers have for the forest protocol and future revisions thereof.

In general, the white paper on soil carbon highlights that **soil carbon is a far more significant pool than is generally understood – 50-75% of all forest carbon in temperate forests – and that management activities can have a very significant impact on this pool, with losses of up to 60%** from high disturbance site prep activities and certain types of timber harvest activities. The significance of this carbon pool, and the degree to which it can be affected by management, clearly warrants modification to the current soil carbon accounting approach in the forest protocol.

The white papers for lying dead wood, even-age management and forest certification systems also highlight important issues related to carbon flux and ecological sustainability. For reasons explained in our comments, **we believe that many of these issues can best be addressed by updating the approach to Natural Forest Management, making it more regionally and forest-type specific.** Such an approach will generally be more cost effective for project developers, while also better reflecting appropriate ecological standards.

Soil Carbon

The white paper provided a thorough review of existing literature on forest soil carbon dynamics and the effects of different management techniques on the forest soil carbon pool. PFT draws the following conclusions from the white paper which are relevant to the existing protocol.

1) **Treatment of the soil carbon pool as essentially stable is no longer consistent with current science.**
2) Given that the soil carbon pool is a large proportion of total forest ecosystem carbon (50-75%) and that management techniques can create losses of soil carbon up to 60% compared to un-harvested or undisturbed conditions, and gains of up to 40% compared to different management approaches, CAR needs to refine its soil accounting procedures. **Currently, very significant potential CO_2 emissions are not being accounted for, undermining the accuracy of the protocol.** Further, the ability to properly incentivize gains in this pool is lacking. **The protocol must be amended to fix this significant accounting weakness.**
3) The effects of site preparation techniques that directly disturb the soil result in significant losses of soil carbon that can take long periods of time to be replenished making the

existing soil carbon accounting requirement (only when 25% of the project area is disturbed) inadequate.

4) The current status of science on forest soil carbon can provide some guidance for accounting procedures when management techniques are employed that affect soil carbon but variability in both soils themselves and the results of existing studies make site specific accounting with high levels of accuracy difficult.
5) Some management activities may need to be prohibited to prevent long-term loss of soil carbon.
6) Further development of soil carbon models can provide the basis for discount factors to be applied to net CRT calculations when some management techniques are used within project areas.
7) Requiring direct sampling of soil carbon as part of project monitoring and verification would be too expensive and ecologically destructive to be practical or desirable.

We make the following recommendations based on these conclusions.

Recommendation 1: Require that discount factors be applied in projects that employ management techniques which result in immediate loss of soil carbon. The list of such techniques should at least include deep ripping, plowing, furrowing, whole tree harvest, and removal of slash. Discount factors should be weighted based on the proportion of the project area disturbed or on which such techniques are applied in the year or years in which they are applied.

Rationale: Because these techniques cause material losses of soil carbon, and are likely to be employed on a scale in any project that produces measurable carbon emissions, there should be no minimum area threshold. Because soil disturbing techniques or management practices that remove soil inputs have a relatively immediate effect on soil carbon, the discounts should be applied in the year that the activity occurs.

Recommendation 2: CAR should commission the development of soil carbon models as described in Section 6 of the white paper to guide the development of discount factors to be applied for situations described in Recommendation 1. This should be done as soon as possible.

Rationale: Requiring project proponents to directly sample soil carbon is impractical so models are likely the best option. The sooner CAR has such models completed, the better given the large implications for forest carbon accounting that this white paper has illustrated.

Recommendation 3: After CAR has developed the model described in 1, it should determine whether appropriate discounts can be applied to vegetation management and thinning activities, or the effects of these activities are too variable depending on forest and soil type. If the latter is concluded, CAR should consider issuing guidelines about the use of these techniques in forest carbon projects, for example, prohibiting thinning entries more frequently than x years in certain forest and soil types.

Rationale: The literature review on the effects of these techniques found impacts in some forest types but not others, and the impacts were variable. Therefore it may be difficult to establish quantitative discount factors at this time. However, where competing vegetation

control or frequent thinning are known to cause losses of soil carbon (e.g., in southern pine forests), guidelines could be developed to prevent losses of soil carbon.

Recommendation 4: Projects involving even-aged management should be required to employ rotation ages that allow full recovery of soil carbon. These rotation ages should be established specific to forest ecosystem type, but the minimum rotation age appears to be 50 years in temperate forests and 75 years in boreal and other low-productivity systems.

Rationale: Because losses of soil carbon can be cumulative and very long-lasting with repeated rotations shorter than soil carbon recovery time (see Figure 4 in white paper), projects with short rotations may not produce actual net gains in carbon over their lifetimes when soil carbon is taken into account and thus should not be eligible.

Recommendation 5: CAR should consider ways in which to credit management that re-builds soil carbon from baseline conditions. Such crediting should be conservative but create an incentive to add carbon back to depleted systems by, for example, switching from even-aged to selection management or significantly lengthening rotation ages.

Rationale: Forestlands that have been intensively managed in the past in ways known to decrease soil carbon can be restored. If project proponents are willing to adopt management approaches as part of new projects that significantly re-build soil carbon, accounting techniques should be developed that allow projects to accrue credits as soil carbon re-builds. Given the uncertainties involved in site-specific soil accounting however, care should be taken to use models to determine best estimates of both timing of soil carbon accrual and conservative estimates of gains.

Recommendation 6: CAR should carefully consider whether to include soil carbon accounting in avoided conversion projects. More information and analysis may be required to support such changes.

Rationale: The logic of taking into account carbon that would be lost in certain land-use conversion activities is the same as crediting the retention of above-ground carbon that would otherwise be lost. However, the measurement of soil carbon loss is less precise. The white paper did not specifically address studies that look at the soil carbon impacts of conversion from forest to real estate or agriculture, therefore more analysis is required to determine the best way forward. Because the soil carbon pool is so large, allowing crediting in avoided conversion situations could result in the generation of very large numbers of credits. Therefore, having as accurate an assessment of whether the conversion would have actually occurred and the magnitude of soil carbon loss being avoided is crucial to avoid over-crediting.

Lying Dead Wood

PFT drew the following conclusions from the white paper on lying dead wood:

1) Lying Dead Wood (LDW) plays critical ecological functions that should be maintained, or restored where lacking and that these functions cannot be replaced by other components of forest ecosystems.

2) LDW varies in its contribution to the proportion of total forest carbon, though it can represent a significant carbon pool in some forest types.
3) Sampling LDW to the level of accuracy required in the protocol can be costly over the life of a project and significant variability in sampling results can still exist with intensive measurement.
4) The best way to address lying dead wood is to develop regionally specific guidance – to be incorporated into the Natural Forest Management provisions of the Protocol – which articulate LDW retention standards that are appropriate to the region or ecosystem. This represents a cost-effective approach to protecting these critical ecological functions, and addresses the significant regional variation in LDW conditions.
5) In terms of LDW carbon accounting, LDW should be excluded from mandatory pools for now until better methods for accurate and cost-effective accounting are developed.

PFT makes the following recommendations based on these conclusions:

Recommendation 1: The protocol should require protection of existing large lying dead wood at the start of the project.

Rationale: The white paper identifies the ecological roles that lying dead wood play in forest ecosystems as more important than the carbon storage function and as irreplaceable by other components of the forest. While it is possible to replenish LDW that has been damaged or actively removed through recruitment from standing dead wood, this will take time, up to several decades. Given the ecological importance of LDW, the damage to these functions should be prevented, not just mitigated. Because it may be difficult to protect small pieces of LDW, and because large pieces take longer to be replaced, protection requirements should include size limits.

Recommendation 2: The standing dead pool requirements should be adjusted to match natural levels of LDW found in un-managed forests by forest type with goals tracking higher levels reached during stand maturation. If standing dead wood is to be used as a surrogate, rather than requiring actual measurement of LDW, forests that have starting stocks below natural levels of LDW should be assigned a timeline for reaching required levels.

Rationale: It is clear from the scientific literature that one size does not fit all. Tailoring the LDW requirements to forest ecosystem type should prevent build-up of LWD that are above levels typical of drier, more open forests and will bring up requirements where they are inadequate for wetter forest types.

Recommendation 3: The requirements for LDW should be expanded beyond using standing dead trees as the only input to include felling live trees to add to the LDW pool immediately when levels are below the required threshold. When salvage harvest has damaged existing down wood, half of the required amount could be met through input over time from standing dead while the other half could be met by intentionally felling live trees. When no active removal has taken place, but the amount of LDW is still significantly below naturally occurring levels, a smaller portion (e.g., 25% could be met with felling live trees.

Size of live and dead tree inputs should also be considered in the revision to the protocol because larger pieces of LDW tend to be lacking in managed forests and they resist decay and fire for longer periods of time.

Rationale: If LDW is below natural levels, these levels can be increased more quickly than relying on natural recruitment of standing dead trees by requiring more active measures. Costs can be reduced by felling defective trees. Requiring that a higher proportion of the LDW requirement be met by felling live trees when active removal of LDW has occurred should serve as an incentive to protect existing stocks. It should be noted that down wood is recruited through natural disturbance processes in addition to falling dead trees.

Recommendation 4: The protocol should provide more quantitative guidance on the rate at which lying down wood should be expected to be recruited from the standing dead pool.

Rationale: The lack of quantitative guidance can result in disagreements between verifiers and project proponents and lead to unnecessary delays in verification of a project. In addition, given the lag time involved in recruiting lying dead wood, if a verifier has found that LDW has been actively removed, part of the requirement for increasing input should be met with more speed than waiting for natural processes to run their course.

Recommendation 5: Due to the cost and difficulty of accurately measuring LDW, exclude this pool. Instead, address the critical ecological functions by setting clear regionally specific criteria in the Natural Forest Management provisions. Note that it may be worth including LDW as a mandatory pool in certain ecosystems with substantial LDW, if survey methods improve in the future.

Rationale: If CRTs are to be calculated including the lying dead pool, field measurement to an appropriate level of accuracy is required. However, given the expense and issues involved in getting an accurate sample, and the fact that ecological functions of LDW other than carbon storage are very important, it seems more straightforward to deal with LDW in a prescriptive manner under the natural forest management provisions. If project proponents are required to protect existing levels of large LDW from project start, and/or build back to natural levels over time, impacts to LDW for both its carbon pool and ecological functions should be protected. Potential CRTs lost by not allowing crediting this pool would likely be compensated for by savings on inventory expenses. The ability to make up for lack of LDW by felling live trees should make it straightforward to comply with required input levels.

Even-aged Management

PFT drew the following conclusions from the white paper on even-aged management:

1) Harvest retention and rotation lengths impact overall carbon storage.
2) Even-age management is not inherently bad for carbon: with long rotations and in-unit retention of stand structure, carbon gains can be realized compared to starting conditions of projects in which shorter rotations and little retention have been used.
3) Most regions should have post-harvest structural retention in order to better mimic natural disturbances and protect ecosystem functions in managed forests. The Natural Forest Management provisions of the protocol should be clarified by

including regionally specific post-harvest retention requirements. Lack of retention within harvest units probably leads to a lack of critical habitat elements for native species requiring large live and standing dead trees.

4) A combination of minimum rotation-age requirements based on soil carbon impacts and better soil accounting in general (see above), clarification of the scale at which rotation requirements are applied, and existing quantification rules in the protocol which require increases in on-site carbon in order to generate a positive flow of CRTs, should result in increases in carbon in projects that employ even-aged management.
5) Poorly implemented uneven-age management can also degrade carbon stocks, such as though frequent entries disturbing and degrading soil carbon. This is another reminder of the importance of accounting for all of the significant carbon pools.

PFT makes the following recommendations based on these conclusions:

Recommendation 1: The protocol should be revised to require minimum retention levels within even-aged management units. Retention levels should take into account natural disturbance regimes in different forest types and the optimum level for carbon accumulation given the effects of retention on regeneration of shade intolerant species. Research indicates that retention levels should be at least 10 percent of pre-harvest basal area and leave trees should be distributed in the uplands and not just counted in riparian buffers in order to more closely resemble natural disturbance patterns

Rationale: The white paper demonstrated that retention combined with long rotations can be as effective at increasing carbon stocks as un-even aged management. In addition, natural disturbance regimes that serve as justification for even-aged management result in more retention post-disturbance than typical even-aged management systems.

Recommendation 2: Clarify the scale at which minimum rotation age applies within a project area and develop requirements for project proponents that employ even-aged management on projects less than 10,000 acres in size.

Rationale: Current protocol language applies the age-class distribution requirement at the scale of a watershed or 10,000 acre area. This leaves out the effects of shorter cutting cycles on projects that are smaller than 10,000 acres. Even though smaller ownerships may not achieve full area regulation, if they use even-aged management, they will have a predictable impact on overall disturbance of the project area over time depending on their chosen rotation age. The protocol should take this into account and apply minimum rotation ages to projects smaller than 10,000 acres.

Certification

The white paper seeks to provide information on the role that independent forest management certification can play in providing a degree of assurance that forest carbon projects do not negatively impact sustainable harvest levels and ecological function and services. CAR's forest project protocol currently has two primary tests to satisfy this objective: 1) sustainable harvesting test and 2) Natural Forest Management criteria. PFT's recommendations are that:

1) The sustainable harvest test is important and should be maintained, but the more important question is how to improve the natural forest management criteria. Given that there are up to five different ways to satisfy the sustainability test we could easily get distracted with a lengthy debate on relative merits of one of three certifications vs the other two tests. Certification does offer many benefits and addresses some of the risks to sustainability and maintenance of ecosytem services and functions throughout all of a forest owner's landholdings, but this should be supplemented with universal natural forest management criteria that are strengthen in ways we describe below.

2) Certification should not be a substitute for natural forest management requirements in the protocol.

Rationale: Certification standards address some of the risks to sustainability and maintenance of ecosystem services and functions. Some do this more then others. Certification systems review sustainability of harvest levels throughout all forest owner's landholdings. Certification is more robust than other options in the Sustainable Harvest test at addressing ecological function and services, but there are limitations. Certification is focused at the broader forest management unit or ownership level and land on which forest carbon projects are active may be only a very small part of the scope of the certification. As a result, the ability to use certification reports to draw conclusions regarding project level conformance to ecological function and services indicators may be limited.

Therefore it is logical, necessary, effective and cost efficient to supplement certification with a small number of indicators to address Natural Forest Management at the project level which is the approach taken in the FPP. However PFT has specific recommendations for improving the NFM criteria.

3) Improve natural forest management requirements in order to protect ecological functions of managed forests in the project area, including refining lying dead wood and standing live tree retention requirements as described in sections on these topics above, and refine requirements on tree species diversity. These suggestions are enumerated at the end of this letter.

4) Forest Certification should not be mandatory. It offers clear benefits, but making it mandatory can create barriers for certain smaller landowners to participate in registering emission reduction projects. Certification is a market choice and confers market advantage to forest owners who choose to seek certification.
Rationale: The paper concludes that:

- Forest certification is well suited to address ownership level sustainable harvest tests established in the FPP.
- Certification is more robust then Option 2: State or Federal Agency Sanctioned Management Plan and option 3: Employ Uneven-Aged Management Plan.
- Certification has clearer and more consistent criteria for determining sustainable harvest levels.
- Certification has audit monitoring process in place.
- Certification criteria are applied to the full ownership.
- Certification utilizes a broader range of indicators to assess ecosystem function and services.

However, some land owners could be prohibited from participating. Therefore we recommend leaving the sustainable harvesting test as is, and strengthening the NFM criteria for all projects.

Conclusion

Based on the entirety of the white papers, Pacific Forest Trust recommends addressing the concerns with two main changes to the Forest Protocol:

1) **Improve soil carbon accounting to more accurately capture management impacts.** This will likely require development of a model to allow projects to be accurately quantified in a cost effective manner, and crediting or discounting specified activities accordingly. And;

2) **Update the Natural Forest Management provisions of the protocol to address maintenance of critical ecological functions in a consistent, cost effective, and regionally relevant manner.**

The Natural Forest Management requirements of the Improved Forest Management protocol (section 3.10) are intended to ensure that active management of stands within project areas maintain and establish forests native to the area in which the project takes place, and to maintain a distribution of habitats/ age classes, and structural elements that provide for native species of plants and animals. The white papers on lying dead wood, soil carbon, and even-aged management all provide scientific support for improving the natural forest management requirements. The findings point to a need for better protection and recruitment of lying dead wood, better protection of soil carbon[1], and establishment of retention requirements for live trees within even-aged harvest units. The certification paper indirectly touches on the need to make sure that natural forest management provisions are properly addressing native tree species diversity.

We summarize here our broad recommendations for improving the Natural Forest Management provisions in response to the findings of the white papers.

1) The Natural Forest Management provisions should be regionally specific, reflecting different targets in different ecosystems. In particular the NMF provision should include the following items of critical ecological importance:

    a. Require ecologically appropriate amounts of Lying Dead Wood be maintained or recruited. Meeting a set target will generally be more cost effective than attempting to quantify LDW given current methodologies.

    b. Require ecologically appropriate levels of post-harvest retention, established regionally by forest type. Based on the research summarized in the white paper, this will be a minimum of 10% retention, higher in some regions.

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[1] While the soil carbon white paper focuses on the important carbon accounting issues involved, loss of soil carbon can have direct affects on being able to support native biodiversity over the long-term.

c. Minimum rotation ages or re-entry periods likely need to vary regionally, and be long enough to allow soil carbon to recover between harvests.

Again, we appreciate CAR commissioning these white papers, and the opportunity to provide our perspective on how they should inform future changes to the Forest Project Protocol. We look forward to working with you on technical edits to the Protocol. Feel free to contact me at pswedeen@pacificforest.org, or contact my California colleague Paul Mason at pmason@pacificforest.org.

Yours truly,

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