SUMMARY OF COMMENTS & RESPONSES
DRAFT RICE CULTIVATION PROJECT PROTOCOL VERSION 1.0

10 sets of comments were received during the public comment period for the Climate Action Reserve (Reserve) draft Rice Cultivation Project Protocol Version 1.0. 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/agriculture/rice-cultivation/

COMMENTS RECEIVED BY:

1. California Climate & Agriculture Network (CalCAN)
2. California Rice Commission (CalRice)
3. Christina Tonitto, Cornell University (Tonitto)
4. Climate Wedge Ltd. (ClimateWedge)
5. Debbie Reed, Coalition on Agricultural Greenhouse Gases, C-AGG (Reed)
6. Deloitte Consulting LLP (Deloitte)
7. Michael Wara, Stanford Law School (Wara)
8. Shook, Hardy & Bacon L.L.P. on behalf of California Agriboard, LLC (Cal-Ag)
9. The Climate Trust (TCT)
10. United States Environmental Protection Agency (EPA)

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General Comments

1. We offer some general principles that should guide offset protocol development:
   1. We support The Reserve's intention to develop protocols that result in real, verifiable GHG emissions that do not unintentionally result in greater GHG emissions elsewhere and that reward producers for providing climate benefits.
   2. Public health and environmental benefits should be considered in the design of the offset protocols and should be maximized to benefit Californians.
   3. Protocol design should not create a disadvantage for small and mid-size producers or create perverse incentives to reverse agricultural conservation practices.
   4. The California carbon market and the actions of its participants should be transparent and accountable to minimize the potential for gaming.
   5. Lastly, market mechanisms should be designed to maximize the financial incentive accrued to producers rather than brokers, verifiers and aggregators, and should minimize the bureaucratic burden on producers. **(CalCAN)**

   RESPONSE: We agree with the above principles and believe they are consistent with our general principles for protocol development. Throughout the protocol development process we evaluated and attempted to minimize potential unintended impacts of rice cultivation project activities, for example, adverse impacts on wildlife habitat. The Reserve also requires projects of all types in our program be in material compliance with all applicable laws related to the project activity including, for example, public health and safety laws. To address principles 3 and 5, the Reserve has devoted considerable attention to development of an aggregation framework that is intended to minimize project development, verification, and reporting burden for participating growers while maintaining a high degree of integrity for credits issued. Finally, while the Reserve does not oversee every dimension of the California carbon market, we do hope that the rules we are establishing with this protocol, along with our publicly reviewable registry system, will provide sufficient transparency and accountability with respect to how GHG reductions are quantified and verified.

2. *Transaction Costs and Data Requirements*: We are concerned that the technical and data requirements to support participation by farmers is too extensive given the quite modest offset potential from the eligible practices. In short, we are concerned that farmers will decide that the economic benefits are not adequate to justify the efforts required to participate. We suggest that more simplification be considered throughout the protocol. **(CalRice)**

   RESPONSE: The Reserve has worked to develop monitoring, reporting, and verification guidelines that minimize burdens to the greatest extent possible while also maintaining a high degree of integrity. However, the Reserve recognizes that the use of a biogeochemical process model for quantifying GHG reductions requires some expertise and comes with rigorous technical and data requirements. The Reserve chose this approach because, at this time, the DNDC model is widely viewed as the best available quantification tool for rice cultivation methane reduction projects. One option allowed under the protocol is for an aggregator to facilitate farmers' participation by addressing the technical requirements on behalf of multiple farmers. The Reserve will continue to monitor how well the protocol works in practice and if necessary will seek ways to make

it easier to use in future versions.

3. *Essential Role of Early Adopters*: The practices proposed in this protocol are currently being implemented by only a small percentage of operators in the rice industry. Those who have adopted these practices are very few and are generally the same group of individuals year over year. With offset revenue potential from the practices being quite modest, these early adopters will become important "salespersons" for demonstrating that participation in the program is a worthwhile investment of time and resources. We believe that developing a strategy for allowing them to participate will be essential to the ultimate success of this protocol. **(CalRice)**

   RESPONSE: The Reserve is striving to strike the right balance between enabling participation by farmers and maintaining the basic requirement that carbon offsets be additional. In further reviewing this balance in light of your comment, we have adjusted the start date requirements to be more flexible for producers who have historically adopted eligible rice cultivation management practices on a trial or experimental basis. Specifically, the final protocol will allow producers to identify an appropriate start date for a particular field at any time after September 1st, 2009. Producers who have historically used dry seeding or baling on their fields will not be excluded from eligibility. However as is the case for all participants, they will be required to use a five year look-back period (five years prior to the start date) to characterize baseline management practices. For example, if a grower has dry seeded his/her field four of the five years prior to the start date, the grower would model dry seeding as their baseline management practice four of the five years of the crediting period. In other words, any grower may receive credit for expanding their use of eligible practices relative to historical levels.

4. *General question about information sources*: Example: footnotes 3, 4, 5, and 20, all of which support important assumptions/assertions about baseline conditions. Personal communication seems like a rather weak basis. Is stronger documentation available? **(Tonitto)**

   RESPONSE: The above mentioned footnotes are presented as references for general background information describing common practice rice cultivation techniques in the California rice industry. While expert opinion did partially inform development of performance standards, the Reserve substantiated expert feedback through a combination of research and data analysis. Specifically, the rice straw baling adoption rate estimate was developed using a combination of expert feedback and estimates obtained from University of California Agricultural Issues Center publications. The dry seeding adoption rate estimate was developed using a combination of expert feedback and USDA ERS data. Please refer to Appendix D for a complete summary of the performance standard assessment. For emission reduction quantification purposes, a baseline scenario must be determined for each field based on field-level data and records.

2.2 Project Definition

5. *Assessment of crop rotation as an approved project activity:* One potential promising area of reducing GHG emissions in rice production that offers important co-benefits is the use of crop rotations. Crop rotations can improve soil quality and carbon sequestration potential as well as reduce methane emissions associated with rice production. We recommend that rotating rice

production with other crops, such as safflower, cover crops or wheat, be studied and modeled using a full life cycle analysis to determine the GHG emissions reduction potential. The potential for leakage of rice production to other regions would also need to be assessed. [See further information in CalCAN public comment submission.] **(CalCAN)**

RESPONSE: This activity was not included in our initial assessment of potential practice changes for minimizing methane emissions from rice cultivation. This is an interesting option, however, and the Reserve will continue to examine practice changes, including crop rotation, for adoption in later versions of the RCPP and/or other future Reserve agricultural project protocols.

6. The eligible project activity criteria (Table 2.1) are clearly written from perspective of the emission reduction or carbon credit being generated at the field level. This emphasis requires an excessive level of precision in data collection and emission reduction modeling, and makes it unnecessarily difficult to apply in the context of a rice baling operation. **(Cal-Ag, ClimateWedge):**

   RESPONSE: In order to accurately quantify changes to field-level methane emissions, it is necessary to require field-level data collection and modeling. Ultimately, it is the decision of the grower (field manager or owner) to bale, incorporate, or burn rice straw (within the legal bounds imposed by the CA Rice Straw Burning Act). Therefore, the Reserve developed this protocol from the perspective of the emission reductions being generated at the field level. The Reserve will continue to assess potential barriers to project development on an on-going basis and consider revising future versions of the RCPP as appropriate to minimize barriers from the perspective of rice bailing operations.

7. Table 2.1: Add definition for "non-puddled." **(EPA)**

   RESPONSE: Agreed. The Reserve has added a definition of "non-puddled' to improve clarity.

2.2.1 Defining Field Boundaries

8. We believe that the definition of field size used in the protocol should be revised to follow the already widely-accepted numerical system used field ID Protocol adopted by the Farm Service Agency (FSA) within the USDA. **(Cal-Ag, ClimateWedge)**

   RESPONSE: The Reserve believes that the refined field boundary definition (see the response to comment # 9) will, in most instances, be compatible with a field as defined using the FSA field ID protocol. However, to ensure consistent field tracking, the Reserve will continue to use the field serial number tracking system as described in Section 6.1 of the Public Draft RCPP.

9. There are serious flaws in the way individual rice fields are defined in Section 2.2.1. With respect to criteria number 3 in the definition, we do not disagree that water management within a field boundary should be reasonably homogenous. However, defining homogeneity in terms of flood durations of less than 96 hours across the board is unrealistic – many field sizes are such that the time to flood them for planting requires more than 96 hours. And with modern "pin-point" fertilizer application equipment on the increase, fertilizer rates may vary more than +-15% on

any given day. **(Cal-Ag, ClimateWedge)**

RESPONSE: The Reserve reviewed the definition of homogeneous water management and has determined that it is conservative to remove the maximum flood-up duration criteria and define flood-up date as the date when the entire field is flooded. Regarding fertilizer application, the selection of the criteria for defining individual rice fields was in part done by examining the impact on modeled GHG emissions. The feedback we received from farm advisors is that it is unlikely that the rates will vary by more than +/- 15%. If this is not the case, then the field must be broken up into sub-fields that meet these criteria and are modeled separately.

2.3 Project Aggregates

10. It would be good to see more explanation on the rationale for the project aggregate approach. Maybe an appendix? **(EPA)**

RESPONSE: The Reserve included a clear role for aggregation in the RCPP with the ultimate aim of facilitating participation by farmers. Recognizing the technical complexities of the methodology and other potential barriers to adopting practice changes, and taking into account input from stakeholders and research on innovation adoption trends in agriculture, the Reserve concluded that an aggregator with the appropriate technical expertise could help overcome such barriers by fulfilling protocol requirements on behalf of farmers and providing other technical consulting services. In addition, aggregation allows for "economies of scale" within the methodology, in terms of streamlined requirements for individual farmers, while upholding rigorous standards at the level of the aggregate. This is primarily accomplished through pooling and sampling fields for verification activities. In addition, aggregation can help to increase the accuracy of GHG reduction estimates at a program level, by encouraging greater participation. This rationale is included and expanded on in the final protocol. In addition, the public comment version of the RCPP included a requirement that at least five fields participate in a project. To increase flexibility, the Reserve has decided to remove that requirement allowing participation of a single field, such that aggregation is no longer a required component of the protocol. (See comments #15 and #19 below for information on this change.)

11. The concept of imposing a maximum acreage for a single field is a valid measure, but the percentage applications listed in Table 2.2 could impede the size of aggregation pools with no clear benefit to the quality of the project. Take, for example, a project aggregate consisting of 10 fields with an aggregate size of 9,800 acres and the largest field size of 1,200 acres. Under this scenario, the project aggregate conforms to the guidance in Table 2.2 for aggregates in the 5,001 to 10,000 acre range, since the largest field is 12% of the total aggregate size, which is below the 15% single field maximum.

However, a project aggregator may find it a challenge to enroll more fields and adhere to the maximum acreage of a single field requirement. The aggregator would be unable to enroll two more fields of 1,100 acres each in her project aggregate. The number of fields would increase to 12 and the aggregate size would grow to 12,000 acres which would put the project in a new category that has a 7.5% maximum single field acreage ceiling. Unfortunately, the largest single field would be 10% of the total aggregate size and above the specified ceiling in Table 2.2. It is

unclear why such an aggregate is disallowed. It has a greater sample size and the largest single field declines so the statistical certainty of the modeling results should increase.

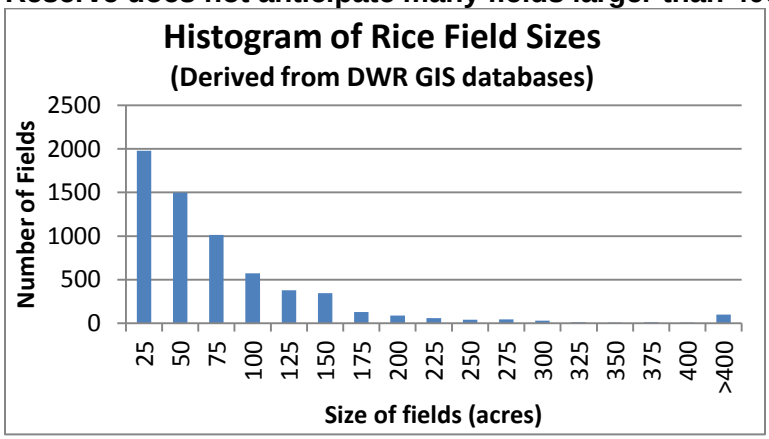
The Climate Trust recommends the Reserve set a percentage range or establish a hard acreage ceiling range to ensure project aggregates are not artificially constrained from growing. **(TCT)**

RESPONSE: The Reserve agrees that the maximum acreage percentage, as outlined in Table 2.2 of the public comment version of the RCPP, could impede the growth of an aggregate, particularly when the aggregate moves from one percentage threshold to another. As such, the Reserve has updated Table 2.2 in the final RCPP (see below), to reflect percentage maximum thresholds based on the number of fields enrolled in an aggregate, as opposed to aggregate acreage, with guidelines similar to those the Reserve uses for aggregated Forestry projects.

Revised Table 2.2

Number of Fields in Aggregate	Maximum Acreage of a Single Field (% of Aggregate Acreage)
2	70%
3	50%
4	33%
5 or more	25%

According to Reserve analysis, however, rice fields in California are less than 100 acres on average and are infrequently larger than 400 acres. Further, the Reserve believes that when fields are defined according to RCPP field boundary guidelines (Section 2.2.1), the incidence of fields larger than 400 acres implementing a RC project may be even lower. As such, the Reserve does not believe a hard acreage maximum is necessary, as the Reserve does not anticipate many fields larger than 400 acres.



2.3.1 The Project Developer/Aggregator and Project Participants

12. *Accessibility to producers*: We believe it is essential that producers have access to information that clearly and explicitly describes the implications of complying with the protocol for their management practices. Merely describing sources, sinks and reservoirs will be insufficient for

growers to make informed decisions about the feasibility of participation and economic tradeoffs involved. The complexity, technical nature and length of the protocol as written seems likely to require involvement by a third-party expert, which will drive up administrative costs and present a barrier (see comment 13). It seems to us that it is important to develop tools for growers that overcome these barriers as they initially contemplate participating. For example, a producer handbook may be useful, as well as some scenarios using sample data or pilot project. On a related note, some evidence of "ground truthing" of the protocol will be helpful in shoring up confidence in the rice producer community of its value to their operations. **(CalCAN)**

RESPONSE: The Reserve recognizes the potential challenges for producers to use the protocol and intends for the protocol to be accessible to the producer community. To this end, the Reserve will be issuing a DNDC User's Guide with RCPP version 1.0 that provides step-by-step instructions for using the DNDC model to quantify emissions according to the protocol. In addition, the Reserve is aware of at least one effort underway, funded by the USDA Conservation Innovation Grants program, to road-test rice carbon offset protocols such as the RCPP and develop supporting technologies that will allow farmers to efficiently obtain information and expertise. We will continue to engage with this and other pilot efforts and monitor progress with the aim of ensuring the findings and tools from these efforts help us improve the usability of the RCPP.

13. *Limits to meaningful levels of producer participation:* Several aspects of the protocol appear to limit participation by producers at meaningful levels.
    a. The requirement to provide such extensive data inputs for the DNDC model — while necessary for more accurately assessing emissions reductions — is likely to present a barrier to participation, particularly for small and mid-size operations who do not have the capacity to comply with the bureaucratic burden. Aggregation of fields under the protocol does not solve this problem because the individual producer is still required to provide significant amounts of data to participate and/or pay high transaction costs to third-party aggregators to participate.
    b. The dearth of markets for rice straw will likely present an economic barrier to the rice removal practice since the price of carbon credits may not be sufficient to cover the costs of baling.
    c. The requirement for climate parameter inputs may present a barrier to growers who are not located within 20 miles of a CIMIS weather station. **(CalCAN))**

    RESPONSE: a.) Please see responses to comments # 2 and #12. The Reserve will continue to seek ways to improve the protocol's usability. b.) You are correct that the market for rice straw is presently insufficient to support a large adoption of rice straw baling in California, and the carbon revenue will not entirely offset costs to bale. However, we expect that the carbon revenue will alleviate some of the cost burden for growers to bale, thereby increasing the supply of rice straw for existing and new end-uses for the material. c.) Agreed, the protocol has been revised to allow for use of the 'closest' CIMIS weather station for weather input data.

14. Project participants are defined to include only rice growers who elect to enroll in a project aggregate. This definition inappropriately tilts the protocol in favor of one party among many in the chain of production. Emissions reductions occur only if the entire lifecycle (from planting/flooding to baling/straw end-use) is accounted for. **(Cal-Ag, ClimateWedge)**

    RESPONSE: We recognize that other participants in the production chain may have an important role to play in developing projects under the RCPP and want to encourage

their involvement. The RCPP allows for any number of entities (e.g., farmers, project developers, balers, rice straw product developers, associations, and governmental organizations) to participate in projects as aggregators. Rice growers are required to participate as project participants (or an aggregator and project participant) because the primary GHG effect of the RCPP occurs on soils in rice fields and is driven by management decisions for growing rice. As in all Reserve protocols, significant secondary GHG effects must be accounted for in the RCPP, but entities that have control over those sources, sinks and reservoirs are not required to engage directly in projects. Because the protocol does not preclude participation of other participants in the chain of production, at this time we have not made any changes to the RCPP in response to this comment. However, we will monitor the barriers to participation of other entities in the supply chain and if it appears to be limiting the development of RCPP projects, we will consider ways to address this in the future.

15. How do these two statements below fit together?

    "The project developer is an entity that has an active account in good standing on the Reserve."

    "An individual rice grower may serve as his/her own Aggregator or as an Aggregator for a group of fields."

    How difficult is it – and how much does it cost – to establish and maintain an account with the Reserve? How realistic is it for most growers to do this? To what extent do growers become beholden – not just legally but in terms of routines they adopt – to a middle-man for this process to work? **(Tonitto)**

    RESPONSE: The purpose of the aggregation requirements is to encourage participation by reducing costs through streamlined monitoring and verification requirements for individual fields, while also improving overall accuracy of GHG reduction estimates at the program scale. However, the public comment draft RCPP allowed for an individual farmer to enroll his/her own fields as a single-participant aggregate, with a minimum requirement of enrolling five fields. In this case, the farmer is his/her own aggregator as well as the sole project participant and will need to sign up for an account with the Reserve. Also, as noted in response # 10, the final RCPP version 1.0 has been revised to further expand the options for individual grower participation by removing the minimum field number requirement and allowing for single-field projects.

    Current program fees are posted here on the Reserve's website:
    http://www.climateactionreserve.org/how/program/program-fees/
    The fees include $500 to establish an account, a $500 annual maintenance fee, and $500 per project submitted to the Reserve under the account. In addition, there are CRT issuance and transfer fees of $0.20/CRT and $0.03/CRT, respectively. The costs are the same costs for all account holders with the Reserve.

    Having the option to participate in an aggregate as one of many project participants or to enroll their own fields directly allows farmers to choose the best economical option for their circumstances.

16. "Project participants must have authority to make cultivation management decisions on their fields that are enrolled in the project aggregate."

    What happens if a project participant loses that authority? Are there ways they could lose that authority involuntarily? **(Tonitto)**

    RESPONSE: When a field changes ownership, tenant occupancy, or management control during the crediting period, the project activities may be voluntarily terminated by the new owner/manager, or the new owner/manager may choose to continue participating in the same aggregate or enroll in a new aggregate and continue with the project activities. The intent of the protocol is to ensure maximum flexibility in the event of ownership/management changes that are likely to occur independently of RCPP project activities, regardless of whether those changes are voluntary or involuntary.

17. This section also requires that Aggregators must notify the land owner with a letter of notification regarding intent to implement a GHG project, even if the grower is a lessee. We would strongly urge the Reserve to delete this requirement. Notification of the land owner is an unnecessarily burdensome requirement with no clear benefits or advantages to the integrity of the protocol. **(Cal-Ag, ClimateWedge)**

    RESPONSE: The Reserve requires that all project developers have clear title to GHG emission reductions for which the Reserve issues credits. To this end, the Aggregator must sign an Aggregator's Attestation of Title. In addition, a "Letter of Notification of the Intent to Implement a GHG Mitigation Project" is required to ensure all parties who may potentially claim ownership of GHG reductions occurring on rice fields have, at a minimum, been notified of the existence of the GHG offset project. The notification letter will help to avoid disagreements about ownership between the various parties that could be involved in RCPP projects. Based on the feedback we have received from stakeholders, we expect project aggregators will willingly undertake this measure to minimize their risk of ownership disputes. (Note that the Reserve does not specify how land owners, tenants, and aggregators legally clarify ownership.) Because the letter may be a form letter sent by email, we do not believe it will be particularly burdensome and feel that it does help to uphold the Reserve's principle of unambiguous ownership of CRTs. We also believe this is good practice and should be done consistently by all aggregators. Other stakeholders have commented that this provision is not strong enough (please see comment # 19). Taking multiple views into account and the Reserve's principles we feel this provision as written in the RCPP strikes a good balance.

18. "Aggregators… responsible for submitting all required forms and complying with the terms of this protocol."

    Seems to emphasize a paperwork function. Is that how you view the main responsibilities of aggregators? Do the forms, by themselves, ensure integrity to the technical analyses and results? **(Tonitto)**

    RESPONSE: The protocol specifies the minimum required role for aggregators, but does not constrain the role to a project management function. The aggregator, if it makes sense for their business model, may also provide other technical assistance services to participating farmers if, for example, this will help to increase participation in their aggregate. The RCPP requires rigorous third-party verification of project activities by

trained and accrediting verification bodies. The verification process includes review and affirmation of the integrity of the technical analysis.

19. "The scope of aggregator services is negotiated between the project participant and the aggregator."

    What happens if this scope in the end falls short of what the reserve requires – but the contract between participant and aggregator has been signed? What happens to the participant? **(Tonitto)**

    RESPONSE: The Reserve has attempted to make clear what the minimum obligations of an aggregator are with respect to the protocol, and we expect that these minimum requirements would be reflected in contracts between participants and aggregators. Unfortunately, the Reserve itself is not in a position to police these contracts and ensure they conform to protocol requirements. Participants and aggregators will need to take care that any contract terms are sufficient. If questions arise during contract negotiations, Reserve staff can provide clarifications about protocol requirements to both prospective participants and aggregators.

20. "Aggregators also have the discretion to exclude individual fields enrolled in their aggregate from participating in verification activities for any given reporting period; however, in such cases there can be no CRTs claimed by those fields in the aggregate total."

    So in the case below, you could in effect have 3 fields in an aggregate – technically 5 but 2 excluded from verification for some time (maybe several years)? **(Tonitto)**

    RESPONSE: This was potentially an issue in the public draft RCPP, which could have caused ambiguity about project eligibility if that scenario were to arise. However, we believe that revisions that have been made to the final draft in response to staff review and general stakeholder input, and as noted above in comments #10 and 15, largely address the concern. The requirement that a minimum of five fields participate in an aggregate has been removed to allow for greater flexibility and enable single fields to participate if desired. However, it is important to note that the verification requirements are still based the number of fields participating in an aggregate, with larger aggregates having less intensive site visit and desk audit requirement than smaller aggregates (verification sampling requirements for single-field projects has been added as well). The RCPP requires aggregators report the number of fields they excluded from verification and specifies that excluded fields shall be removed from the field numbers used to determine verification sampling.

21. "In the case of project activities taking place on leased fields (e.g. the project participant is not the land owner, but rather a lessee), the Aggregator must notify the land owner with a Letter of Notification of the Intent to Implement a GHG Mitigation Project on the respective field."

    This strikes me as a good legal backstop but also as not entirely sufficient. The volume of junk mail is just too great; it's too easy for an unexpected piece of mail to fall through the cracks and not receive careful attention. Maybe mail and also a phone call to follow up and make sure the landowner got and read the letter? That would at least be an improvement. Maybe the lessee needs to attest that s/he has discussed the matter with the landowner? I don't have a strong recommendation exactly what this process should look like, but a letter alone seems like a

recipe for problems. **(Tonitto)**

RESPONSE: While the comment raises some good points, we believe it may be overly prescriptive to have the protocol itself specify how an aggregator will be assured that the letter is received and reviewed. Since it is in the aggregator's best interest to have some assurance that the landowner is aware of the project, to protect themselves against the liability of ownership disputes, we expect aggregators will develop their own mechanisms for tracking the notifications. Also, verifiers will affirm that notification letters were in fact sent in accordance with the protocol requirements. (Please also see the response to Comment # 15)

22. I think this is a beneficial approach to enhance potential participation, providing flexibility to both allow for multiple producers, but also, allowing for multiple individual fields. In particular, having crediting periods apply to individual fields rather than project aggregates will also allow maximum flexibility to aggregators, allowing them to bring in additional producers even after the start of a project date. I also think having aggregators responsible for verification reporting (page 53, Verification Guidance) makes sense, and will provide for continuity of planning and operations. **(Reed)**

    RESPONSE: Noted.

23. "Aggregators have the authority to develop their own internal monitoring, reporting, and other participation requirements for individual fields as they deem necessary." (page 9).

    Perhaps add text that clarifies "as long as these are above and beyond and/or do not conflict with Reserve requirements described in this protocol." **(EPA)**

    RESPONSE: Agreed. The suggested language is an improvement and was added.

2.3.2 Entering and Leaving an Aggregate

24. This section imposes restrictions on entering and leaving an aggregate that unnecessarily prevent fields from changing ownership/tenancy/control during crediting period (5 years). It is a commercial reality that changes in field ownership/tenancy/control occur frequently, often as much as every cultivation cycle. Restricting the ability for such fields to participate in an Aggregate and carbon finance overall will strongly hinder the viability of the protocol. **(Cal-Ag, ClimateWedge)**

    RESPONSE: Language in Section 2.3.2 regarding ownership, tenancy, and management changes was confusing and has been revised. The intent was not to disallow such changes altogether, rather it was to clarify what a field needs to do if they wish to maintain their participation in a project after such a change occurs.

3 Eligibility Rules

25. Eligibility Rules IV and V: Is it possible to 'exceed regulatory requirements' without complying with all applicable laws? Does Rule V add something new? **(Tonitto)**

RESPONSE: For a GHG mitigation project to be additional, it must exceed regulatory requirements related expressly to the project activity. In the RCPP, this refers to exceeding any existing regulations that would require a farmer to dry seed or bale rice straw on a particular field. The regulatory compliance requirement is broader in that it requires a project be in material compliance will all applicable laws that may be relevant to the project activities, but that do not necessary require the implementation of the project activities. The purpose of the regulatory compliance requirement is to ensure that the existence of the GHG mitigation project does not in some way incidentally affect a project's ability to comply with other laws. Therefore, yes, it is possible to exceed regulatory requirements for project activities while at the same time not complying with other laws (e.g., air or water quality regulations, Endangered Species Act requirements, etc.).

3.1 Location

26. *Protocol limitation to specific geographic regions currently validated for DNDC use:* Rather than periodically updating the protocol when DNDC has been validated for additional geographic regions of the US, would it not make sense to allow the protocol to be used in additional regions once they have been shown to have been properly calibrated and validated? (Unless it is because a performance standard will not have been established for that region, in which case, I understand the limitation.) **(Reed)**

    RESPONSE: This is a good suggestion. The Reserve is exploring such options for inclusion in a subsequent version of the RCPP. You are correct that each new region and/or project activity would need a complete performance standard assessment before becoming eligible for crediting. This is a limitation that would have to be addressed, as suggested.

27. "Projects must be located in approved rice growing regions for which the DNDC model has been validated."

    This needs to be more specific. You can validate DNDC against yield, for example, but that does not mean it will provide sound estimates of methane emissions. I recommend rewriting to say: "validated with field data on methane fluxes collected over at least 3 field seasons and showing strong fits between measured and modeled peak emissions in both timing and magnitude." **(Tonitto)**

    RESPONSE: We agree that the statement should be more specific. We have adjusted the statement to make clear that the model must be validated against field measured methane emissions. The uncertainty deduction is designed to capture and account for the fit between the magnitude of measured and modeled emissions. We are also developing a more standardized definition of how to demonstrate that the model is sufficiently validated in order to be used for quantification in other rice growing regions. With regards to the timing and magnitude of modeled vs. observed peak emissions, we will reassess model performance on shorter (i.e. daily and weekly) timescales to determine whether timing effects are significant and whether they differ across practice changes. Results of this assessment will be factored into the structural uncertainty assessment prior to adoption of the RCPP. Also, note that California field data used for

the current model validation were collected over 3 different years.

28. "High Carbon Content Soils: Because nitrous oxide (N_2O) emissions are potentially more variable with increased soil carbon content, fields that have soil with organic carbon content greater than 3% in the top 30cm of soil are not eligible at this time. The organic carbon content of the field shall be determined by soil sampling or SSURGO data in accordance with Section 6.2.1."

    Where does the "3%" SOC threshold come from? Why not 2%? 4%? Is there a table? A review paper? What is the basis for this choice of threshold?

    There is a big difference between soil samples and SSURGO data. What is the reliability of SSURGO data at different spatial scales, and how does it compare to the size of relatively small fields eligible to participate in this protocol? **(Tonitto)**

    RESPONSE: The 3% SOC ("soil organic carbon") threshold is based on the general range of SOC values used in validation work. The 3% value is a general threshold for SOC values above which we have not done DNDC validation. Since DNDC has not been validated on soils with higher SOC content, the Reserve determined that to be conservative, the RCPP should restrict projects to sites with mineral soils with SOC below 3% at this time.

    You are correct that there are potentially larger input uncertainties if using SSURGO data. We capture this uncertainty by requiring users to run the Monte Carlo analyses to derive an input uncertainty deduction for each field. We expect the SSURGO input data will result in larger uncertainty deductions compared to soil measurements, which are also an option to use in the protocol.

3.2 Project Start Date

29. The project start date eligibility rule states 6 months prior to submission to the Reserve. However, later in page 12, under Section 3.2, it is stated that for 12 months from the Effective Date of the protocol, eligible start date is after September 1, 2009. This is confusing. Page 11, needs to be revised to state the eligibility requirement for the first 12 months and then after that. **(Deloitte)**

    RESPONSE: This language was adapted from general Reserve policy language regarding start dates and the limited eligibility of pre-existing projects. The protocol has been edited to improve clarity.

30. "For a period of 12 months from the Effective Date of this protocol (Version 1.0), fields with start dates on or after September 1, 2009 are eligible to register with the Reserve if submitted by December 14, 2012."

    Have adoption rates of any of the approved practices accelerated in the 2009-2011 time frame, compared to, say the 2005-09 period? **(Tonitto)**

    RESPONSE: The adoption rates for both dry seeding and rice straw baling appear to be quite static over the last decade. Evidence suggests that the trend may even be slightly

negative for both practices over that timeframe. See Appendix C for more information.

31. The definition of cultivation cycle may be OK for rice, but we should be careful not to count this in any way as a precedent for other agriculture protocols, as with other crops rotations – which have many advantages and confer a variety of ecosystem services – do not always conform to an annual schedule. **(Tonitto)**

    RESPONSE: We agree. The Reserve does not intend for this definition to be precedent-setting for other agriculture protocols. It was designed exclusively for use in the RCPP based on common crop- and water-management schedules for rice cultivation in California. We will be careful to consider the unique circumstances of the agriculture management systems relevant to other agriculture offset protocols under development at the Reserve.

3.3 Crediting Period

32. Do performance standards change between crediting periods? One would hope that common practice 15 years from now is different from common practice today, so the threshold for additionality should change. For a field to be granted a new 5-year crediting period, do the obligations for the manager of that field change or are they grandfathered? **(Tonitto)**

    RESPONSE: The Reserve regularly monitors industry trends after a protocol is adopted and may choose to update the protocol in the event that the common practice assumptions become outdated. As such, a newer version of the RCPP could have different, perhaps more stringent, performance standard thresholds. Fields are "grandfathered" into the rules of a single version of the RCPP protocol for one crediting period. However, fields must meet the requirements of the latest version of the RCPP to be eligible for a second, third, or fourth crediting period. Therefore, when a field goes through the crediting period renewal process, there is a chance that they will have to meet different requirements under a newer version of the RCPP.

3.4 Anaerobic Baseline Conditions

33. Data reporting requirements in this section are burdensome and may undermine the applicability of the entire protocol, diminishing the incentives for growers and other project participants to implement a rice cultivation GHG reduction project under the Reserve protocol at all. **(Cal-Ag, ClimateWedge)**

    RESPONSE: The data requirements in this section are intended to ensure that the basic data necessary to substantiate the quantification of emission reductions are available for each field participating in our program. The Reserve will assess barriers to project development as projects use the protocol, and will make improvements as necessary to ensure maximum participation and environmental integrity. Such improvements may include revisions to reporting requirements if they are appropriate.

34. The management record requirements for this are reasonable. **(Reed)**

RESPONSE: Noted.

35. Requirement 2 (page 12): This applies to beginning of project, not to beginning of each crediting period. May want to split out this list by factors for the start of the project versus factors for the beginning of each crediting period. **(EPA)**

RESPONSE: Agreed. The protocol has been edited for clarity.

3.5 Additionality

36. Has the concept of positive or negative additionality (aka leakage) ever been discussed – for instance, as it relates to addressing barriers to implementation in the context of 'negative additionality'? The current proposal has 2 additionality requirements – 1 being a performance standard, and 2 being a legal requirement test. I propose a third that would address the opposite, in some ways, of a legal requirement test – and that could perhaps be described or thought of as a negative additionality test.

    Let's say, for example, that positive additionality refers to additionality tests such as 1 and 2 that can be met to show additionality; and negative additionality refers to showing or proving the existence of significant barriers to adoption – perhaps even a legal barrier that has led to a certain practice now in common use, that increases or has led to increases in methane emissions as an unintended consequence.

    In the case of this particular protocol, for instance, dry seeding is an accepted practice change, but significant financial barriers exist that may be termed as 'negative financial additionality' – though I do not wish to re-open the issue of financial additionality. However, negative financial additionality constitutes a significant barrier to producer participation in these projects/protocols if a producer must change equipment (and practices) to convert to dry seeding.

    Perhaps a fairly straightforward negative additionality test that does not add significant transaction costs could calculate some ratio of the return on investment (ROI) from participation in the protocol/carbon market to the cost of the new equipment and/or new service to dry-seed rice – such that any ratio over/under XX (the negative additionality threshold) would make the practice change additional. (Though, based on current market conditions, it is plausible that the ROI will be negative, in any event.) And, if borrowing is necessary to purchase equipment, some calculation to allow the interest rates over the 5 year project period to be included in the investment side of the equation would be more equitable for producers – even if the equipment was purchased prior to the project start date, but interest payments proceed throughout the project period.

    The concept could perhaps be extended to show that the 1991 Rice Straw Burning Reduction Act, for instance, created a barrier to an alternative management practice for rice (burning rice straw) that has led to the particular practice of leaving/incorporating rice straw into soils, that has in effect added to methane emissions from rice producers (assuming CO_2 emissions from burning rice straw is smaller than the CH_4 emissions created by the decomposition of the straw).

    By the same measure, the lack of markets for rice straw, which creates an economic disincentive to collect and bale the rice straw, might be a third potential negative additionality test. Particularly given that there are instances where the straw is collected and baled and then

not utilized due to a lack of sales – which creates decomposition emissions. I am not terribly familiar with rice production practices, but it may be that there are additional instances of barriers that could provide negative additionality tests, that, if overcome, can increase adoption rates. **(Reed)**

RESPONSE: The concepts outlined above are in many ways already embedded in the Reserve's approach to developing top-down, standardized approaches to additionality. The Reserve researches trends in current and historical practice ("common practice") and considers these trends as proxy indicators of the incentives and barriers facing new alternatives. In addition to looking at common practice trends, the Reserve considers financial, economic, social, and technological drivers that may affect decisions to undertake a particular project activity. The final performance standards adopted into the protocol are specified such that the large majority of projects that meet the performance standard are unlikely to have been implemented due to these other drivers. Performance standard tests developed in this way do not require individual project assessments of financial returns and implementation barriers, as they are designed to reflect these factors at a broad scale. Projects that pass a performance standard test should be those that – in the absence of a carbon offset market – would have insufficient financial returns or would face other types of insurmountable implementation barriers.

3.5.1 The Performance Standard Test

37. Table 3.1 indicates that individual fields that have employed baling after harvest for 2 or more times of the last 5 years prior to the project start date would be ineligible to meet the performance standard for post-harvest rice straw removal and baling. It is very difficult to accurately determine which fields may have to meet this criterion. Moreover, the stated penetration rate of rice straw removal is well below a typical performance standard or common practice penetration threshold in most other performance-standard based GHG/carbon offset protocols (both under the Climate Action Reserve and other standards like the Verified Carbon Standard). We think this is an unnecessarily restrictive condition and unfairly penalizes those rice growers who may have experimented occasionally with baling at some point in the past few years but not committed fully to the practice. **(Cal-Ag, ClimateWedge)**

RESPONSE: Recognizing the low penetration rates for the project activities in the RCPP, the Reserve has decided to remove the performance standard restrictions in Table 3.1 on individual fields' historical dry seeding and baling practices. Therefore, any field that adopts dry seeding or baling practices in accordance with the definitions for those practices and the start date requirements of the protocol are eligible (please see Response to Comment # 3 for a summary of changes to the Start Date requirements). However, it should be noted that five consecutive years of data on field management practices immediately prior to the project start date are still required by the protocol for determining baseline scenario inputs (per section 5.1.1.1). Table 5.1 in Section 5.1.1.1 specifies what management data are required for the historical five-year period. These inputs are used to take into account historical use of dry seeding or baling practices in the modeled baseline GHG emissions.

38. Table 3.1: If rice straw does not have a developed market, is this a viable project activity? Have other activities been considered like mid-season drainage, which is associated with methane reductions? Are leakage emissions considered from baling including new equipment use,

transport and processing of the straw? **(Deloitte)**

RESPONSE: While rice straw does not currently have a consistent end-use market, the Reserve hopes that the carbon revenues will incentivize greater demand for rice straw because it can be supplied at a cheaper net cost. Increased emissions from fossil fuel use and decomposition are included in the accounting boundary for rice straw end-uses. Other activities were considered (including mid-season drainage) for California. The consensus from the workgroup and California rice experts was that mid-season drainage would not be adopted by California rice growers, as it creates a significant risk of crop loss due to the relatively cold night time temperatures in California. Mid-season drainage may be a viable project activity for other U.S. rice growing regions, and the Reserve will continue to consider this activity as we look to include more rice regions in subsequent versions of the protocol. Additionally, two other potential project types were explored for California: reduced winter flooding, and early pre-harvest drainage. Both were excluded pending further research. Please see Appendix C of the protocol for more information.

39. "…each field must separately pass the Performance Standard Test in order to be eligible."

    This seems like it should help ensure the integrity of the credits. Nicely done. **(Tonitto)**

    RESPONSE: Agreed, thank you.

3.5.2 The Legal Requirement Test

40. "…the field will be eligible to earn CRTs from project activity for the remainder of the five year crediting period, regardless of changes in legal requirements." (page 14)

    This is inconsistent with other project types and will call into question the additionality of credits from this project type. **(EPA)**

    RESPONSE: Although it is true that this policy could raise additionality concerns, the Reserve believes the risk is minimal due to the very low likelihood that eligible project activities will be legally required in the foreseeable future. Furthermore, in the unlikely event that they do become legally required, the relatively short crediting period will minimize the number of non-additional credits issued. Providing this type of guarantee against future changes in legal requirements provides investment stability and certainty for project participants, and is in line with the State of California's policies on legal requirements related to compliance offsets.

41. "If any of the approved project activities of an eligible project later become legally required, emission reductions may be reported to the Reserve up until the date that the management practice is required by law to be adopted." (page 15)

    This seems to be inconsistent with previous page. **(EPA)**

    RESPONSE: Agreed. The language has been revised in the final version of the RCPP.

3.5.3 Ecosystem Services Payment Stacking

42. If CSP funds are utilized for rice straw baling, this should not preclude the project qualifying to participate in a protocol/project, but rather perhaps the funds received for the CSP payment could be added to the ratio calculation suggested in comment 36[1] (ROI:financial barrier costs). This approach would allow for consistency over time, even as carbon market offset prices might increase, such that the financial barrier ratio is reduced as the ROI increases with increased offset costs. **(Reed)**

    RESPONSE: We believe the comment is raising the issue that financial barriers can be dynamic over time and assumptions about financial barriers at the start of a project may not necessarily apply in the future. Although we are not implementing the specific proposal outlined in the comment, we have made revisions to this section of the protocol that we think address the underlying concern. The draft RCPP originally restricted eligibility to projects that received EQIP payments in conjunction with the start-up of a project. We have revised the protocol to allow a project to receive CSP and other NRCS payments, as long as the NRCS contract for a project field was put in place either in conjunction with or after the project was implemented. However, in cases where NRCS contracts were established prior to a project start date, we feel the project cannot be considered additional as it was initiated entirely by non-carbon market incentives. As this is an area where we expect to continue refining Reserve policy, the RCPP will require disclosure at verification of the existence of NRCS contract payments or any other type of ecosystem service payment or credit received for activities on a project field for informational purposes only.

43. I'm not sure I understand the concept behind allowing stacking with EQIP only in instances of simultaneous application? It would seem to me that it should not matter when or whether EQIP funds are applied for or utilized if they are not for the same specific activity. If double-payment for the same practice or outcome is the issue, I would suggest the proposal in comment 42[2] be utilized to account for the payments and avoid double-dipping. Although, based on NRCS' recent statements that USDA policy is to allow for both, I'm not sure why the Reserve would not utilize the same approach. The last sentence in this section (top of page 21) in particular, is puzzling – and I would suggest this restriction be omitted. **(Reed)**

    RESPONSE: We have clarified that NRCS payments for any activity *other than* baling do not affect field eligibility. We have also removed the restriction on receiving other types of ecosystem payments and credits and replaced it with an informational disclosure requirement to inform the Reserve's research in this policy area.

44. Did you look at Conservation Stewardship Program payments? If so, do any of them apply to the dry seeding or residue management? Also, CSP and EQIP may well be merged, possibly with other conservation programs, over the next year or so. How will changes in naming and/or administration of the USDA conservation programs be handled? **(Tonitto)**

    RESPONSE: We have revised the protocol to refer to the Natural Resources Conservation Service (NRCS) programs more broadly, instead of specifically to EQIP or

[1] Comment number refers to original submission, not numbering in this document
[2] Comment number refers to original submission, not numbering in this document

CSP, as farmers could be paid for dry seeding or baling under either EQIP or CSP. We have also added guidance to address stacking with NRCS payments for dry seeding. The Reserve plans to monitor any changes to the NRCS programs and will issue clarifications to address any changes in these programs that could affect guidance included in the protocol.

3.6 Regulatory Compliance

45. The requirement that Aggregators attest that all fields are in material compliance with all applicable laws relevant to the project activities (air, water quality, water discharge, nutrient management, safety, labor, endangered species protection, etc.) is impractical and unnecessarily onerous. Aggregators may have no control over the conduct of cultivation operations in the field, and forcing an Aggregator to attest to the regulatory compliance of another party would undermine the viability of the entire protocol. **(Cal-Ag, ClimateWedge)**

    RESPONSE: The Reserve recognizes that this appears to be an ambitious requirement, especially in the context of aggregated projects. However, we believe this is important in order to uphold the Reserve's program-wide principle to "do no harm" (please see page 12 of the Reserve Program Manual). While aggregators may not control the operations of rice fields, they can adopt administrative procedures that enable them to assess to the best of their knowledge whether fields enrolled in the aggregate are in material compliance with all applicable laws (e.g., by requiring project participants submit to them attestations and supporting documentation). The verifier may review such procedures as part of the verification activities. In the event that an aggregator suspects a field will not meet this condition of being in material compliance with all applicable laws, the aggregator is explicitly allowed the discretion to exclude the field from participating in verification activities, which will eliminate the risk to the entire aggregate of not passing verification. However, when individual fields are excluded from verification by the aggregator, they are not eligible to earn CRTs for that reporting period.

46. Regarding the sentiment that "supporting documentation should be made available to the verifier if requested," I would suggest that a caveat be added that, if there is cause to believe an act or instance of non-compliance is present (and that this be documented by the verifier), then documentation should be made available – otherwise this could become a routine request that could prove burdensome, without any notable benefits. **(Reed)**

    RESPONSE: The Reserve expects that aggregators will have routine procedures that will enable them, to the best of their knowledge, to determine whether fields enrolled in the aggregate are in material compliance with all applicable laws (please see comment #45). Verifiers may review these internal procedures and, as stated in Section 8.7.1, Table 8.2,"verify that the project activities at all verified fields comply with applicable laws by reviewing any instances of non-compliance provided by the aggregator and performing a risk-based assessment to confirm the statements made by the project developer in the Attestation of Regulatory Compliance form." The aggregator may not need to provide information to verifiers on individual fields if their internal procedures are effective and do not suggest any potential instances of non-compliance. However, we expect verifiers will need to regularly receive some form of documentation from the aggregator in order to make that high-level determination. Clarifying language was added to Section 3.6.

3.6.2 Regulations on Special-Status Species

47. Consider clarifying this last sentence – what should the verifier do other than consider the HCP/SHA? **(EPA)**

RESPONSE: The following sentence was added in place of the somewhat vague guidance originally provided to verifiers: "Aggregators should disclose to the verifier any instances of which they are aware when a field is not in compliance with HCP or SHA requirements." Please also see responses to comments #45 and #46 for more information and further refinements to section 3.6 to better clarify how aggregators may uphold the requirement to ensure regulatory compliance on all fields.

4 The GHG Assessment Boundary

48. *Post-harvest rice straw removal:* Appendix A states that transportation of bales was not included as a secondary source of CO_2 emissions because the assumption is that "rice straw replaces other straw products transported from a comparable distance." This begs the question about what will be done with the straw products that rice will presumably displace, and whether there will be emissions associated with the new use/disposal of those products. Also, it is acknowledged that there are currently inadequate markets for rice straw bales — which will be a limitation of the feasibility of producers participating in this protocol — and it seems that a best-case scenario is that new markets will be developed. In that case, CO_2 emissions associated with transportation should not be ignored. **(CalCAN)**

RESPONSE: Agreed. The final protocol will include transportation emissions for relevant baling end-uses. This is conservative until we can further evaluate the assumptions.

49. *Dry seeding with delayed flood:* Since flooding prior to seeding is used for weed control, presumably conventional producers will increase their herbicide applications to compensate for the loss of this weed control tool, and the emissions required to produce and apply those herbicides, as well as on-farm direct emissions connected to using them, should be accounted for just as other sources of secondary emissions are quantified. Does the model include expected increased herbicide use that will accompany dry seeding? **(CalCAN)**

RESPONSE: The Reserve has confirmed the possibility that herbicide use could increase with a dry seeding approach (however, this may not always be the case as shifting to an alternative herbicide registered for dry-seeded rice is also a way to control weeds that are resistant to herbicides registered for water-seeded rice). The DNDC model does not calculate GHG emissions from increased herbicide application because herbicide use in itself is not known to increase GHG emissions from soil processes. The methodology does, however, require calculating GHG emissions associated with on-farm equipment use, so any increases in equipment use related to applying more herbicide will be captured by the methodology. The methodology does not require calculation of upstream energy-related GHG emissions associated with the production of herbicides because we assume that herbicide production is relatively inelastic to the potentially very slight changes in demand resulting from implementation of dry seeding projects in California.

50. There may be unintended environmental impacts with this protocol. For example, producers may increase herbicide use to address increased weed pressures that they did not experience when they used flood seeding. As for the straw bale removal protocol, UC Davis research finds that synthetic nitrogen fertilizer rates can be decreased by at least 25 pounds per acre after five years of straw incorporation. **[See public comment submission for reference.]** We would expect conventional producers will increase their applications of synthetic fertilizer to compensate for this loss in fertility and subsequent yield losses. In both cases, the environmental impacts on water and air quality must be assessed in addition to potentially increased GHG emissions from herbicide use or increased fertilizer use. **(CalCAN).**

    RESPONSE: The Reserve requires that all projects continue to meet all relevant air and water quality legal requirements. In addition, the Reserve will monitor the unintended impacts on fertilizer and/or herbicide use. Information on fertilizer application rates were already part of project monitoring as the GHG quantification methodology in the public comment version of the RCPP accounts for changes in direct N_2O emissions as a result of changes in fertilizer application. Baseline and project direct N_2O emissions from soils are estimated using DNDC; therefore, increases in direct N_2O emissions resulting from increases in fertilizer use will be accounted for in the methodology. However, this comment made staff aware that (a) indirect N_2O emission increases as a result of increased nitrogen application leading to more nitrogen leaching, volatilization, and run-off are not accounted for in the public comment draft; and (b) clarification was needed that only N_2O emission increases should be included in the GHG accounting boundary for conservativeness. In response, a methodology was added to estimate indirect N_2O emissions from soils based on the Intergovernmental Panel on Climate Change methodology and the final RCPP clarifies that reductions in direct and indirect N_2O emissions will not be credited; however, increases will be accounted for to ensure conservativeness. See response to comment # 49 regarding herbicide.

51. For GHG Boundaries, N_2O emissions from nitrification (aerobic) as well as denitrification need to be assessed. How well does DNDC simulate N_2O emissions when oxic and anoxic conditions alternate (leading to coupled nitrification and denitrification)? Has DNDC been calibrated for different sequences of flooding and drying on CA rice fields? If not, does the protocol restrict credits to those sequences that have been well-studied and for which DNDC has been well-calibrated? **(Tonitto)**

    RESPONSE: The DNDC model has been validated for all the current flooding systems in use in California. The dominant practice is to have continuous flooding from seeding through final drain prior to harvest. The protocol only credits methane reductions from changes in water management associated with shifts from continuous flood to delayed flood, and DNDC has been validated for methane emissions for these two water management systems in California. Currently, there are no data available on N_2O from rice systems that can be used for model validation. For conservativeness, the protocol does not credit reductions in N_2O emissions, while increased emissions must be accounted for. Additionally, the difference in modeled N_2O emissions between wet-seeded (baseline) vs. dry-seeded (project) conditions is expected to be quite low due to the fact that N_2O emissions primarily occur after fertilizer application, prior to flooding. In California, fertilizer is typically applied immediately prior to flood-up in both wet and dry seeding systems.

52. SSR 1: How many validation data sets exist in which CO_2, CH_4, and N_2O were simultaneously measure? More specifically, what are the data sets used to validate DNDC for these CA rice systems? Does the model validation include comparison against observations for the modified practice of dry seeding?

    For example, in Qui et al. (2009 Global Biogeochemical Cycles vol 23), seasonal simulation of N_2O and CH_4 tracked the rough pattern of observations, but the timing of N_2O and CH_4 simulated release did not accurately match observations and the magnitude of gas release was also not always modeled. Similarly, in Babu et al. (2006 Nutrient Cycling in Agroecosystems 74:157-174), DNDC application to rice systems in India demonstrated variable ability to simulate observed CH_4 flux; in some cases the simulations track seasonal observations, in other applications peak events are not simulated. In this Indian rice system, large peaks of observed N_2O flux were not simulated. [Also see comment 84.] **(Tonitto)**

    RESPONSE: Nine data sets were used for the California validation (Fitzgerald et al. 2000 and three data sets that are preliminary and unpublished from Dr. Will Horwath), and the model has been validated against field observations for dry seeded rice in California. Please see response to comment # 51 and # 27.

53. SSR 2 and SSR 3: Why is fossil fuel reduction from reduced flooding excluded while farm equipment fossil fuel changes are assessed? In dry grain systems, irrigation accounts for about half of farm energy use, while farm equipment is less than 10%. What is the distribution of energy use in a flooded rice system? **(Tonitto)**

    RESPONSE: The Reserve acknowledges that CO_2 emissions are likely avoided due to a decrease in overall water use when switching from a wet-seeded to dry-seeded system. The farm energy-use distribution is currently unknown for flooded rice systems in California; however the Reserve will assess the potential magnitude of the avoided fossil fuel emissions from decreased water use and may adjust the GHG assessment boundary accordingly in subsequent versions of the protocol. In the meantime, excluding the SSR is conservative. It should be noted that all farm energy-use emissions in California may eventually be covered by California's GHG emissions cap, obviating the need to account for changes in these emissions at the California farm level.

54. SSR 6: What is the empirical basis for assuming small yield declines lead to increased planting elsewhere? Is it well-established that rice demand remains constant, or will demand shift to other grains if less rice is available? Some of the best gains we can make for agriculture in terms of GHG emissions and other ecosystem services involve growing less of some crops and more of others. To assume that demand for each individual crop is entirely inelastic is a very high bar. What is the best evidence you have seen to support the implicit claim that a 5% decline in rice production in CA will lead to a 5% increase in rice production elsewhere? **(Tonitto)**

    RESPONSE: It is true that demand for rice is unlikely to be completely inelastic, and that a decrease in rice production from a single producer will – on the margin – lead to a shift of consumption to other grains. However, rice has a relatively high GHG intensity compared to other crops due to the anaerobic conditions of flooded fields. Therefore it is conservative from a GHG perspective to assume that demand is inelastic, and therefore shifts in production will occur solely within rice. It is not the objective of the

protocol to incentivize reduced rice production in favor of other crop types.

55. SSR 6: It is understood that significant variability in yield exists in crops from one year to the next. In light of this fact, is it reasonable to ask project developers to quantify and deduct these emissions? **(Deloitte)**

    RESPONSE: Recognizing that yield is variable and can be affected by a number of factors, the production-shifting emissions section (Section 5.2.3) provides a methodology to determine whether yield loss across an aggregate is due to the project activity (i.e., not an artifact of the annual climate-driven variability in yields). In short, the change in annual yield for the fields within an aggregate, compared to historical yields for those fields, is compared to the change in yields for the entire county (or counties) within which those fields are located. By comparing changes in project yields to changes in average county yields, the methodology effectively removes natural variation from the assessment.

5 Quantifying GHG Emissions Reductions

56. The introduction to this section states that "for reporting purposes, the aggregate reporting period shall be define[d] as starting on October 1, and ending on September 31 of the next year" (see page 20, also page 47). These dates are set arbitrarily without any relationship to actual conditions in the field. A project's reporting period must include the complete cultivation cycle on all participant fields, regardless of when the cycle is begun or completed. **(Cal-Ag, ClimateWedge)**

    RESPONSE: We agree these dates are somewhat arbitrary; however we determined it was necessary to prescribe consistent reporting period dates for an entire aggregate of fields. We recognize that each individual field in the aggregate will have a cultivation cycle that begins and ends on dates other than the aggregate reporting date. For example, a field could start post-harvest management October 13th, 2012 (start of cultivation cycle) with the following harvest completed on October 20th, 2013 (end of cultivation cycle). If this field is part of a project aggregate, then the emission reductions from this cultivation cycle would be aggregated with those from the other fields and reported to the Reserve as October 1st 2012 through September 31st 2013. Language was added to clarify this in the protocol.

57. "…the aggregate reporting period shall be defines as starting on October 1, and ending on September 31 of the next year." (page 20)

    This may be inconsistent with pages 11 and 12. Does it make sense to have a fixed reporting period if the DNDC model is to be run at the end of each cultivation cycle, which won't align with the reporting period? **(EPA)**

    RESPONSE: See response to comment # 56.

58. The draft protocol's strategy of applying the DNDC model to each field is too cumbersome to yield acceptable levels of accuracy in estimating emissions reductions. Instead, the process should be simplified by using default factors which are discounted to reflect heterogeneity of fields or other variation in field data and growing situations, even if default factors result in lower

carbon yields. Possible approaches could include, e.g., using a set of average GHG emission reduction calculation factors for generalized classes of fields and subtypes and applying strong discounts for conservative assumptions, or developing standardized model runs of the DNDC model that can be applied to a more limited set of typical field and growing conditions.

We also believe that GHG emission factors should be employed on a regional or county-wide basis, as opposed to a focus on individual fields as the protocol currently proposes. **[See public comment submissions for detailed comments on use of the DNDC model.] (Cal-Ag, ClimateWedge)**

RESPONSE: At this point in time, the Reserve is using a field-level DNDC modeling approach for quantifying emission reductions from rice cultivation because it is widely viewed as the best available methodology for accurately performing this calculation. The emissions pathways for methane and other trace gases in rice cropping systems are so complex that process models are the most viable tool for capturing the effects of altering various cultivation management practices. The Reserve recognizes that the DNDC calculation methodology is complex and data intensive, and we will continue to explore mechanisms to simplify the calculation while maintaining a high degree of accuracy. The Reserve will assess the possibility of developing Tier 2 emission factor approaches for future versions of the protocol using standardized regional DNDC modeling runs, and/or standardizing and simplifying the model by hard-wiring defaults and building user-friendly sub-routines.

59. As a researcher experienced in DNDC development and application, I am concerned about the resources required to accurately apply the DNDC model. There are many points in the process where errors can enter the analysis. Will the individuals applying the DNDC model be sufficiently trained in model application? **(Tonitto)**

    RESPONSE: We envision that project developers, aggregators and verifiers will either develop the expertise to properly use DNDC or contract with DNDC experts. The user's guide does provide step-by-step instructions to walk users through the process of running the model. There is also currently no certification program for DNDC training. However, the Reserve is exploring options for training workshops and/or the development of tools to make DNDC easier to use.

60. The protocol states that "all approved versions of the DNDC model will be available on the Reserve's website." No such models appear to have been made available at this time. It therefore is not yet possible to assess this critical part of the protocol. **(Cal-Ag, ClimateWedge)**

    RESPONSE: The DNDC model and all documentation are available for public download at www.dndc.sr.unh.edu/. The Reserve did not post the DNDC model version on our website during the public comment period, but intends to use the most recent version of the model. The model will be available on our website upon adoption of the RCPP.

61. We believe that the reporting requirements of qualifying for credits should be more closely matched with end-uses of rice cultivation residuals. **(Cal-Ag)**

    RESPONSE: See response to comment # 33.

5.1.1.2 Static Input Parameters

62. The Reserve should collect and collate static climate input parameters and make them available as standardized inputs to streamline the implementation of the protocol, since standardized data is available from public weather station data feeds. **(Cal-Ag, ClimateWedge)**

    RESPONSE: The Reserve will explore the suggested option as a component of our continued work to simplify the DNDC calculation approach in future versions of the protocol.

63. *Soil Data*: What is the rational for the 10-year limitation on soil physical properties? A 10-year limit would be justifiable if soil measurement is required, but not if SSURGO is accepted as a source of soil information. Field measurement of clay content and soil texture will be more accurate than SSURGO estimates. Soil physical composition does not radically change over decadal time scales. The bulk density can change from compaction due to management. But a 10-year estimate would likely be more accurate than SSURGO as well. Even for soil chemical properties (such as pH and SOC) 10-year measurements would be preferable to SSURGO estimates. SOC and pH do change in response to management, but under a long-term management protocol a relative SOC steady state would be achieved based on cropping inputs and soil properties.

    Given the sensitivity of DNDC outcomes to soil properties, requiring a soil sample from each field would be preferable to SSURGO data. Soil samples can easily be processed for texture and C content by state USDA labs. A single composite sample of 10-20 cores would give a reasonable estimate of field soil properties. **(Tonitto)**

    RESPONSE: We recognize that management will impact SOC ("soil organic carbon"), bulk density and pH and it was determined that it was reasonable to limit soil measurements to be relatively recent, so 10 years was selected. In addition, the 10 year limit was chosen for ease of verification (it is harder to confirm that older data were collected and analyzed appropriately). You are correct that there are potentially larger input uncertainties if using SSURGO data. We capture this uncertainty by requiring users to run the Monte Carlo analyses to develop input uncertainty deductions which will be larger when using SSURGO in lieu of soil measurements. Providing flexibility to choose between two options (SSURGO and soil measurements) gives users the ability to balance costs with input uncertainty deductions.

5.1.2 Historical Modeling Run and Crop Yield Calibration

64. It is stated that the model must be run for 20 years prior to the start date of the project. It is unclear what is to be done with the results of these model runs. **(Deloitte)**

    RESPONSE: This step is necessary to initialize some of the soil condition parameters in the model in order to more accurately model the soil dynamics when running the model to determine baseline and project GHG emissions during the crediting period. The GHG results from the 20 year historical modeling run are not used for any subsequent purpose, and do not need to be retained. More detail is provided in the DNDC User's

Guide on this step. The protocol will be revised to improve clarity.

65. The requirements of Sections 5.1.2 (Crop Model Calibration), 5.1.3 (Monte Carlo Simulations), and 5.1.6 (Adjusting Field Model Results for Soil Input Uncertainty) are too complex. Aggregators cannot be expected to run these calibrations on behalf of potentially dozens of fields. This process must be standardized and be made available as a service from the Reserve or other service providers at the Reserve's direction if the final version of the protocol continues to rely on the DNDC model. **(Cal-Ag, ClimateWedge)**

    RESPONSE: The Reserve notes these concerns and is aware of the challenges the requirements present. Please see the response to comment # 58.

66. The "Biomass Fraction" and "C:N Ratio" (page 24 and 25) for the leaf+stems and roots are probably not something that a grower has measured. Therefore, we believe the protocol should probably provide these for common rice cultivars rather than having everyone refer to the "local university extension" (footnote 25). The Jenkins group at UC Davis has measured the leaf and stems yields over several seasons for common cultivars in the late-1990s. **(CalRice)**

    RESPONSE: Agreed. The Reserve is attempting to locate the suggested data necessary to build a look-up table, and will include such a table, if possible, together with the DNDC modeling materials on the Reserve website.

5.1.3 Monte Carlo Simulations to Account for Soil Input Uncertainty

67. The discussion of the Monte Carlo statistical technique (page 27 to 29) seems overly technical and possibly confusing for those trying to get to the end result. We suggest that this can possibly be embedded in the model calculation of each parameter for field "i". Then the equations in 5.6 and 5.7 might be simplified to a single equation, summing the parameters computed by the model. The discussion can still be in an appendix. **(CalRice)**

    RESPONSE: The Monte Carlo simulations are a very important component of the DNDC model calculation of field-level GHG emission reductions, and we feel it is important for the discussion to remain in Section 5 in order to ensure that the requirements are clear. We will explore options for improving the modeling guidance for future versions of the RCPP.

5.1.4 Modeling Field Level Baseline Emissions

68. We think the SOC parameter (page 28 and Section 5.1.5, page 29) should have a minus sign. If SOC increases, that means less CO_2 emissions, right? Please double-check this. **(CalRice)**

    RESPONSE: Agreed. The parameter has been corrected.

5.1.6 Adjusting Field Model Results for Soil Input Uncertainty

69. This uncertainty calculation seems quite complicated. We are concerned that leaving the uncertainty calculations to the users could get confusing and time consuming. We wonder if this is something that could be simplified and automated by using a certain range of assumptions embedded in the model. If so, then this discussion could move to an appendix. **(CalRice)**

    RESPONSE: See response to comment # 67. Currently this is not something that can be automated readily, but we will continue to explore ways to simplify the calculation approach in future versions.

5.1.7 Calculation of GHG Emission Reductions for the Aggregate

70. Equation 5.2 should have MPER in the definitions as opposed to SDER. **(CalRice)**

    RESPONSE: Agreed. The protocol has been revised.

5.1.7.1 Structural Uncertainty Adjustments

71. The acknowledgement of structural uncertainties begs the question of why the Reserve's approach is applying a field-specific DNDC model run at all. Instead, the Reserve should strongly consider deriving a set of more general default emissions factors to apply to fields, and then apply a corresponding structural uncertainty factor. This approach would be simpler and far more robust and credible than the current approach of running the DNDC model numerous times on each individual field, adjusting for input uncertainties, and then requiring the application of an additional, structural uncertainty deduction factor. **(Cal-Ag, ClimateWedge)**

    RESPONSE: These concerns are noted. Please see our response to comment # 58.

72. Table 5.7, Figure 5.2: What is the justification for the structural uncertainty relationship? More generally, the notion of reducing outcome uncertainty by simulating a larger area addresses parameter uncertainty, not structural uncertainty. Structural uncertainty is generally addressed by comparing results across different modeling approaches. **(Tonitto)**

    RESPONSE: The definition of 'structural uncertainty' may commonly refer to comparison of results across different modeling approaches, however in the context of this protocol, model structural uncertainty refers to the accuracy of the modeled GHG emissions, assuming all inputs are known and free of error in relation to actual field emissions. The structural uncertainty is derived based on the model validation procedure using independent field measurements. The inputs are assumed to be free of error when deriving structural uncertainty because the modeling results take into account uncertainties in input parameters using Monte Carlo simulations.

5.2.2 Project Emissions from Rice Straw Residue Management/Use

73. Given the complexity of applying the protocol and the DNDC model to each field, the use of generalized default emissions factors for rice straw residue management is inappropriate. The draft protocol requires only rough default emissions factors for possible emissions from the use of rice straw residues in alternate applications. This is at variance with the overwhelming level of detail required in the field-specific DNDC model approach to calculating baseline emissions reductions above. **[See public comment submission for more detail.]**

    Furthermore, the precise derivation of these emissions factors (in Appendix A) is unclear; the protocol should justify much more rigorously how the numbers were arrived at and transparently specify what sources were used for the numbers provided and the assumptions used. **(Cal-Ag, ClimateWedge)**

    RESPONSE: A properly validated process model is the best available method at this time for quantifying the changes in soil GHG emissions that result from specific rice cultivation management changes. Regarding emission factors for estimating end-use emissions from alternative rice straw management, these are also the best available methods at this time for estimating these secondary emissions. The Reserve used conservative assumptions and best available information to derive these emission factors. We agree that the approach could be better explained in Appendix A, and the text describing how the emission factors were derived has been expanded accordingly.

74. The emission factor EF_{SWB} (page 35) seems very rough and Reference 31 does not appear particularly defensible. The Jenkins group did extensive time and motion studies on rice straw harvesting and has publications with better numbers. **(CalRice)**

    RESPONSE: Noted. The Reserve has reviewed time and motion studies from the Jenkins group, and upon re-calculation of the EF_{SWB} emission factor, came to a very similar final estimate (~ 6 kg CO_2 per MT rice straw). The Reserve notes that the factor published in the draft protocol was erroneously off by a factor of 10 due to a decimal error (listed as 100 kg instead of 10). The factor is rounded up to 10kg for conservativeness.

5.2.3 GHG Emissions from the Shift of Rice Production Outside of Project Boundaries

75. The SE_{PS} calculation (page 36) looks fairly complex and we suggest considering a strategy of automating this function within the model functions. **(CalRice)**

    RESPONSE: It is necessary to assess and quantify the potential GHG emissions from production shifting for the aggregate as a whole rather than for each individual field. Therefore, the SE_{PS} calculation cannot readily be automated into the modeling functions, which are done on an individual field basis. However, the Reserve has revised the calculation for clarity and to improve the accuracy of the assessment.

6 Project Monitoring

76. The requirements for data collection, reporting and historical records contained in Sections 6.2.2 and 6.2.3 are unnecessarily burdensome. The requirement for time-stamped digital photographs for field checks of the bailing process seems particularly onerous and unnecessary. **(Cal-Ag, ClimateWedge)**

    RESPONSE: Regarding the requirements for time-stamped digital photographs, the Reserve felt that there was a need for more verifiable evidence of whether and when a creditable project activity occurred on each field. The time-stamped photograph is a means to provide verifiable evidence in a relatively low-cost manner. The Reserve intends to monitor how burdensome this requirement appears to be in practice, and will periodically re-assess the monitoring requirements in light of their cost and necessity. For the present protocol, the Reserve is retaining the requirements for time-stamped photographs due to the absence of other potential verifiable evidence that could be used in their place.

77. Appears like a significant amount of data and recordkeeping is being required here (and Section 7). We suggest making sure that everything is absolutely required to defend the credit and that all data is readily available to the grower. If this is too burdensome, the cost of verification and chance of failure (from missing records during verification) will be high. **(CalRice)**

    RESPONSE: The concerns expressed here are noted. The Reserve has reviewed all data and record-keeping requirements and has identified some areas in need of clarification. Additionally, we revised and streamlined the Monitoring, Reporting and Verification Requirements sections (Sections 6,7, and 8) of the protocol, in an effort to clarify who is responsible for submitting the various reports and data, which data and documentation are required for verification or record-keeping purposes, and when these data and documents are required. In doing so, we removed redundant requirements (e.g. information that was originally listed under both the Aggregate and Field Monitoring Plans) and removed requirements that we did not think were necessary (e.g. documentation which must be retained to meet field-level record-keeping requirements will not need to be submitted to the Reserve along with the annual Aggregate Report.) We feel the remaining requirements are necessary, but the Reserve will continue to monitor how burdensome the Monitoring, Reporting and Verification Requirements appear to be in practice, and will periodically re-assess these requirements in light of their cost and necessity.

6.2.1.1 Soil Sampling Methodology

78. These are very rigorous expectations. Per my comments above (Section 4 and 5.1.1.2) if this level of soil description accuracy is desired, then field sampling should be required. **(Tonitto)**

    RESPONSE: We recognize that the soil sampling criteria are rigorous, however they are not required if one uses the SSURGO option. The intent is to provide flexibility in choosing between two options and give users the ability to balance costs with input uncertainty deductions.

8 Verification Guidance

79. Verification appears to be an extremely intensive approach compared to other GHG reduction projects both under the Reserve and in other GHG crediting schemes such as the Clean Development Mechanism and the Verified Carbon Standard. The Reserve should provide cost estimates and guidance on timelines for typical verification cycles before adopting a protocol with these criteria. **(Cal-Ag, ClimateWedge)**

    RESPONSE: The Reserve requires third-party verification of all projects registering CRTs in our program and recognizes that our requirements in this regard may be more prescriptive and rigorous than other programs. However, in at least some respects, the verification requirements for the RCPP are less strenuous than for other project types. Individual rice fields participating in an aggregate, for example, are not subject to site-visit verifications every year as other project types are. The Reserve will monitor verification costs associated with RC projects, and will revise requirements as necessary in future protocol versions. Please also see response to comment # 80.

80. In The Climate Trust's experience, verification is a significant cost item for many projects. Given the nature of aggregated agricultural projects and the Reserve's site and desk audit formulas, it is not unreasonable for an annual verification cost to be comparable to forestry verification cost, especially when factoring in verifier's time to travel between the fields in an aggregate. However, aggregated rice projects will likely produce a fraction of offsets in a given year compared to forestry projects. As such, the cost associated with conducting multiple site visits and desk audits could be cost prohibitive and discourage adoption of the Reserve rice protocol.

    The Climate Trust suggests the Reserve and the rice protocol working group engage potential verifiers in this sector to ensure potential costs of required verification procedures are taken into account. **(TCT)**

    RESPONSE: We agree that verification costs may be significant for many offset projects. However, it is somewhat difficult to estimate verification costs while the protocol is still under development. In light of this challenge, the Reserve solicited input on aggregation and verification sampling from project developers and aggregators who have experience with agriculture offset projects in the Alberta and Chicago Climate Exchange offset programs. Their input was central to developing requirements that balance the need for accuracy and practicality while minimizing verification costs. Their input was specifically incorporated into the protocol in several ways, including:

    - **Using random sampling for site visits and desk audits.**
    - **Developing three distinct sets of sampling guidelines tailored to the size of the aggregate and number of project participants with enrolled fields.**
    - **Stratifying sampling in a way that reduces time and travel costs for verifiers.**

    The Reserve will continue evaluating the cost of verification for rice projects and will continue to welcome feedback on ways to reduce verification costs, as the RCPP is implemented.

8.1 Preparing for Verification

81. The requirement that the same verifier be used for six consecutive years is arbitrary and has no relation to the crediting period (5 years) or to natural growing patterns. **(Cal-Ag, ClimateWedge)**

    RESPONSE: The requirement to change verifiers at least every six year is standard for all Reserve projects and is necessary to minimize the potential for conflict of interest between the verifier and project aggregator. The six year time horizon does not have a direct relationship to the 5 year crediting period. For most aggregates, it is envisioned that participating fields will have varying start dates and be at different points in the crediting period cycle in any given year; therefore it is not necessary to tie the 6 year requirement to the field-level crediting period.

8.4 Monitoring Plan

82. We suggest more details regarding what exactly is required in the Monitoring Plan. **(CalRice)**

    RESPONSE: Agreed. In the final protocol we have made the requirements more specific.

Appendix A

83. We disagree with the erosion control factor (page 63). Rice straw is a replacement for other materials used for erosion control so it should probably be treated the same as animal bedding (i.e. "0"). **(CalRice)**

    RESPONSE: After further review based on this comment, the emission factors have been revised for both erosion control and for animal bedding.

Appendix C

84. In the discussion of model uncertainty in Appendix C, aggregated CH_4 outcomes are discussed. But the details of seasonal observation-simulation outcome comparisons are the data necessary to support model accuracy in system representation. Without the seasonal information it is not clear that all applications in Table C.1 are robust descriptions of the rice system. **[Also see comment 52.] (Tonitto)**

    RESPONSE: In the public draft RCPP, the calculation of the structural uncertainty is based on annual averages of measured CH_4 values. However, the raw measurement data are available on a more frequent bases. Therefore, using a dataset of more frequent CH_4 fluxes (daily to weekly, which would show seasonal variation in CH_4 emissions), the Reserve is further investigating the structural uncertainty with more detail and will verify whether a bias exists that is specific for a treatment or location. We expect to have this assessment completed for the Board meeting.

85. 'The DNDC model has been shown to predict greenhouse fluxes without bias, when correctly calibrated.' This is a very strong statement. The GHG records against which DNDC has been

calibrated are not long enough time series for rigorous calibration and validation. Most data-model comparison is against 1 or 2 growing seasons. From such a limited temporal series, it is difficult to robustly conclude that the model is definitively validated. It is possible that the model is over-fit to the limited calibration data.

GHG production is a highly non-linear process. Depending on the aerobic status of the soil, very different emissions are possible. Because management is directly affecting field moisture state, it is not reasonable to assume that there are only linear differences between the project and baseline GHG outcomes.

Similarly it is not reasonable to assume DNDC response to changes in input data is linear. Since soil properties drive soil moisture and aerobic state, mis-estimation of soil properties can lead to non-linear mis-estimation of GHG emissions. **(Tonitto)**

RESPONSE: See also the response to comment # 84. For the model validation assessment provided in the public draft RCPP, the degree of bias was assessed based on a global dataset of 99 independent validation data points. This allowed an assessment of the bias across a wide set of soil, management and environmental conditions. The average value of the observed flux (130.7 kg/ha/period) is very close to the average value of the predictions (135.3 kg/ha/yr). The standard error of the paired differences is only 5.5 kg/ha/period (or about 3.5%), so the typical *t*-test approach would lead us to conclude that the difference is not statistically significant (*t*=0.85, *p*>0.05). From this it was concluded that the model does not have significant bias. We also recognize that there are non-linear responses between input parameters and modeled GHG emissions. To account for non-linear response of uncertainty of soil inputs, the protocol requires the use of Monte Carlo simulations to calculate and input uncertainty deduction for each field.

86. The protocol's approach to model structural uncertainty is a good one provided that there is evidence that all assumption required for it to work are true (or approximately true) and there is sufficient data to calibrate the uncertainty model. **Given the importance of this model in quantification of credits under the protocol, it is important that, even in V1.0, both proof of underlying assumptions and calibration datasets be adequate.** I am concerned that they are not yet of sufficient quality to allow for quantification of reductions with a similar accuracy and precision as other CAR protocols.

Given the data included in Appendix C and in the underlying work by EDF **[see reference in comment submission]** I question whether there is sufficient evidence either to support the second and third assumptions necessary to apply the uncertainty approach or that the data is sufficient to allow for quantification. The fundamental problem at this point is that there is only 1 field measurement made from a field that employed dry seeding and it is not clear whether or not this field then adopted the recommended practice in the Protocol of delayed flooding.

Appendix C states that three assumptions must hold in order for the uncertainty quantification to produce accurate results. First, the model error must be multiplicative. I see no reason to question that this assumption is correct. Second, the model calibration technique must produce no bias and a log normal error distribution. I would simply ask what evidence we have that this is in fact the case? How sure can we be that the calibration process adopted in the protocol does not lead to bias and or some other error distribution? Given that EDF only measured one field adopting the practice most likely to be credited under the protocol, it's not clear to me how

this can be demonstrated with any confidence. **Please explain what other evidence the protocol development team has for the claim that assumption 2 is valid for the RCPP.**

The final assumption required in order for the uncertainty estimate to be valid, is that baseline and alternative treatment must be 100% linearly correlated. Given the complexities of redox chemistry, I would find it rather surprising if this were the case. Given that the evidence we have for the RCPP that it is the case involves comparison of several measurement-model pairs of the baseline treatment but only ONE measurement-model pair for the dry seeding treatment, we cannot be sure that this is the case. There is no way to establish a linear correlation of the type described in Appendix C with only one data point for the treatment. **Please explain what other evidence the protocol development team has for the claim that assumption 3 is valid for the RCPP.** Even if the assumptions presented in Appendix C turn out to be valid for rice cultivation in California with various treatments, the data presented in the Appendix are likely inadequate to characterize the response of fields to treatment. Again, I must repeat that there is only one measurement in a field employing the practice most likely to be adopted under the protocol. Given the variance in modeled emissions demonstrated for California rice fields in the EDF report, this seems inadequate. In order to calibrate a model, we need to know how a representative sample of fields that span the range of conditions relevant to CH_4 emissions will actually respond to the treatment of dry seeding and delayed flooding. **CAR, in cooperation with stakeholders, needs to generate a dataset from a representative set of fields employing the project activity that will allow for accurate and precise estimation of structural errors. Alternatively, CAR should explain why this is not necessary in order to calibrate the model and estimate its structural error rate. (Wara)**

RESPONSE: The Reserve recognizes the concerns expressed here and notes their significance. However, based on consultation with the Reserve's scientific technical contractor and with the technical experts on the work group, the Reserve is confident that there are sufficient data to ensure proper validation of the DNDC model for California. Based on the California data and the existence of the 99 independent global validation data sets (see comment 85), the Reserve is confident that the model has adequately been demonstrated to perform without bias across a wide range of soil, management and environmental conditions. This data set includes data from fields that employed various water management techniques, including variations on the duration and timing of field flooding. While there is only one data point for dry seeded rice cultivation in California, the Reserve is satisfied that the global set demonstrates that the model accurately captures the drivers for methane emissions related to the duration that a field is under flooded conditions (dry seeding is ultimately a means to decrease the duration that a field is flooded during the growing season). Nevertheless, the Reserve has determined that more examination is possible to evaluate the validity and conservativeness of the validation and uncertainty assessment. We note that the model validation assessment in the public draft RCPP uses seasonal and annual average emissions only; however the raw measurement data are available on a more frequent basis (daily and weekly). By using disaggregated data of more frequent fluxes (daily to weekly) for California field data (including dry seeding CH_4 measurement data), the Reserve is further investigating the structural uncertainty with more detail and will verify whether a bias exists for a specific treatment using the data available. In addition, more statistical analysis will be performed to verify the uncertainty deduction procedure and assumptions. The procedure will determine whether the current validation and uncertainty deduction methodology is sufficiently rigorous and conservative. We expect

to have this exercise completed for the Board meeting on December 14, 2011. See also response # 84).

87. The protocol mentions that as and if data becomes available, it will be incorporated into the assessment of structural uncertainty. **This updating is inadequate since credits will have already been issued (and potentially over-issued) from projects that use V1.0 if and when such data becomes available**. I would emphasize that I am not suggesting a massive field campaign is required. Merely that we have more than 1 data point per project activity. Even a handful of measurements of emissions from each treatment would go a long ways towards increasing confidence in assumptions and error estimates. We need to have better data before we credit, not after. This is particularly true if this protocol is intended to be incorporated into the AB-32 cap-and-trade program, which will expose the buyers of these credits to liability if structural uncertainty turns out to have been underestimated. **(Wara)**

    RESPONSE: The concerns expressed here are recognized and noted. In consultation with the Reserve's scientific technical contractor and technical experts on the work group, the Reserve feels confident that the validation approach used in the RCPP is robust, and the risk of over-crediting based on the DNDC modeling approach required by the protocol is minimal due to the conservative assumptions used throughout the calculation procedure. We anticipate that with each update, the structural uncertainty adjustment will be reduced so that over time we are relaxing the conservativeness of the discount. In other words, we will err on the side of under-issuing credits to be conservative. Nevertheless, the Reserve agrees that more examination is possible to evaluate the assumptions used in the uncertainty assessment. Prior to the Board meeting on December 14, 2011, the Reserve will have results from a series of statistical tests and higher resolution validation assessments designed to determine whether the current validation and structural uncertainty deduction methodology are sufficiently rigorous. The assessments will either affirm the current validation and structural uncertainty deduction factors, or they will be used to adjust the uncertainty factors to be more conservative. As mentioned in the comment, the structural uncertainty deduction factors will be dynamic and updated periodically on the Reserve's website. With each update, the uncertainty deductions will be effective immediately for all rice fields reporting to the Reserve. This approach is useful for improving upon the accuracy of the emission reduction calculation; however, we are confident that the deduction factors available upon protocol adoption are sufficiently conservative.

Appendix D

88. "…(6) increased nitrogen efficiency, when nitrogen is applied to dry soil before flooding." (page 69)

    Citation? **(EPA)**

    RESPONSE: Citation was added.

89. "The flood for dry seeded rice starts approximately 25-30 days after seeding. During the dry period, fields are periodically irrigated to promote germination and stand establishment." (page 69)

Page 73 states that dry flooding only delays flooding by a few days. **(EPA)**

RESPONSE: Dry seeding may delay the timing of the *winter* flood by a few days. The delay of the growing season flood would be delayed by 25-30 days. The protocol text was clarified.