



CLIMATE  
ACTION  
RESERVE

# Climate Action Reserve Forest Project Protocol Proposed Guidelines for Aggregation

---

## Table of Contents

|   |   |
|---|---|
| Introduction .....  | 2 |
| Proposed Aggregation Guidelines.....                          | 3 |
| Eligible Project Types .....                                  | 3 |
| Number of Landowners .....                                    | 3 |
| Acreage Limitations.....                                      | 4 |
| Qualifications and Role of Aggregators .....                  | 4 |
| Forming an Aggregate.....                                     | 4 |
| Joining and Leaving an Aggregate.....                         | 5 |
| Accounts on the Reserve, Transfers and Sales of CRTs.....     | 5 |
| Inventory Standards for Participating Projects.....           | 6 |
| Monitoring and Verification.....                              | 8 |
| Appendix A – Rationale for Reduced Sampling Requirements..... | 9 |

## Introduction

As part of its efforts to encourage greater participation by forest landowners in the Climate Action Reserve's carbon offset program, the Reserve has been working to develop rules and procedures under which smaller forest projects may be aggregated. The goal of aggregation is to alleviate transaction costs for individual landowners, while upholding the Reserve's standards for quantification certainty and integrity. Allowing smaller projects to register as part of a group, or "aggregate," can help reduce costs by enabling economies of scale and supporting the marketing of offset credits at volume. By allowing aggregation, the Reserve will help make the Reserve's Forest Project Protocol (FPP) more accessible to a large percentage of the nation's forestland owners.

This document represents the recommendations of a stakeholder workgroup convened to develop a set of proposed FPP aggregation rules. The Reserve has reviewed and revised these recommendations where appropriate, and is presenting them below for public review and comment. The Reserve invites comments on all aspects of this proposal; however, specific input is requested on the questions highlighted in boxes throughout the document (indicated with the heading "Need for Input"). Note that this document assumes some familiarity with the Reserve's Forest Project Protocol Version 3.1.

The proposed approach to aggregation would work as follows:

- Only projects of less than 5,000 acres may enroll in an aggregate. No Forest Owner<sup>1</sup> may enroll more than 5,000 acres in aggregates (single or multiple).
- Each project must register with the Reserve individually. Each Forest Owner participating in an aggregate must maintain a separate account on the Reserve's registry system.
- Individual Forest Owners must each sign a Project Implementation Agreement (PIA)<sup>2</sup> with the Reserve, as required by the FPP Version 3.1. Liability for reversals lies with each individual Forest Owner.
- Aggregators will play a coordinating role by assisting Forest Owners to submit and register projects, and helping them to manage monitoring, verification, and submittal of documents. Aggregators may also manage transaction of CRTs<sup>3</sup> on behalf of Forest Owners using an aggregate account on the Reserve. Fees for transfer of CRTs between Forest Owner accounts and the aggregate account will be waived.
- By enrolling in an aggregate, a project will:
  - Require fewer sample plots to generate a forest carbon inventory. Greater statistical uncertainty associated with individual project areas will be compensated through

---

<sup>1</sup> A Forest Owner is a corporation or other legally constituted entity, city, county, state agency, individual(s), or a combination thereof, that executes a Project Implementation Agreement with the Reserve, as described in Section 2.2 of the FPP.

<sup>2</sup> The PIA is a legal contract between the Forest Owner and the Reserve that specifies the terms and conditions required for a project and remedies associated with project termination or reversal of verified GHG reductions.

<sup>3</sup> A CRT ("Climate Reserve Tonne") is a credit issued by the Reserve for verified GHG reductions. One CRT represents one metric ton (tonne) of carbon dioxide equivalent (CO<sub>2</sub>e) reductions or removals.

- aggregation with other projects. Allowable standard errors for individual projects are established based on the total number of participating projects in the aggregate.
- Have a less frequent verification schedule than is required for standalone projects.
  - Projects may enter and leave aggregates as long as overall participation requirements (needed to ensure statistical accuracy) are met.

## **Proposed Aggregation Guidelines**

The model of aggregation proposed here will enable small projects to participate in the Reserve by allowing the forest inventory and verification requirements of Version 3.1 of the FPP to be applied at an aggregate level, rather than at the level of individual projects. Project development, reporting, and verification will be managed by an Aggregator on behalf of a number of aggregated Forest Owners. However, each Forest Owner must still retain a Reserve account and a separate Project Implementation Agreement (PIA) with the Reserve, determine a baseline specific to its project area, submit annual monitoring reports, and meet sustainable harvesting and natural forest management requirements. Tasks associated with these requirements may be managed by the Aggregator. Detailed requirements for aggregating projects (also referred to as enrolling projects in an “aggregate”) are described below.

### **Eligible Project Types**

Aggregates may be comprised of any of the three project types defined in Version 3.1 (Avoided Conversion, Improved Forest Management, and Reforestation) from any geographic location within the United States.

### **Need for Input**

The Reserve is seeking input on the following options for specific eligibility rules:

1. All three forest project types can be enrolled under a single aggregate.
2. Only one type of project can be enrolled under a single aggregate.
3. In addition to the above, projects could be required to be from the same geographic region as defined by the ecoregions or assessment areas in Appendix F of the FPP.

### **Number of Landowners**

An aggregate must consist of at least two individual forest projects. The forest inventory sampling and project verification requirements for individual projects within an aggregate vary depending on the total number of participants in the aggregate (as described below in sections on “Inventory Standards for Participating Projects” and “Monitoring and Verification”).

## Need for Input

Should there be a limit on the number of participants in an aggregate?

### Acreage Limitations

Forest owners may enroll up to 5,000 acres in aggregates, as either a single project or multiple projects. The 5,000-acre limit is applied to the total acreage enrolled by the Forest Owner instead of the amount of acreage in any one project or aggregate. Additional projects registered by Forest Owners in excess of the 5,000-acre limit may not be enrolled in an aggregate.<sup>4</sup>

No single project may comprise more than 50 percent of the total combined acreage in an aggregate. This is to prevent any one project from disproportionately affecting the inventory statistics and having excessive influence on the composite sampling error.

### Qualifications and Role of Aggregators

An Aggregator may be any individual, municipality, or validly incorporated business entity. Aggregators may act as service providers for Forest Owners, and must act as agents in conducting CRT transactions. The scope of aggregator services would be up to negotiation between Forest Owners and the Aggregator.

Aggregators will not act as official agents to the Reserve on behalf of Forest Owners; Forest Owners would be ultimately responsible for submitting all required forms and complying with the terms of the FPP. Aggregators may, however, manage the flow of ongoing monitoring and verification reports to the Reserve as a service to Forest Owners. Aggregators may also engage in project development, provide inventory services, and assist in facilitating verification activities on behalf of the Forest Owner depending on the agreement between the Forest Owner and the Aggregator.

Finally, an Aggregator must manage the transaction of participating project CRTs on behalf of the Forest Owners through an aggregate account.

### Forming an Aggregate

In order to form an aggregate, Aggregators will be required to establish a “Broker, Retailer, Trader” account on the Reserve (see <http://www.climateactionreserve.org/open-an-account/>).

Aggregators must also submit an “Aggregator Document” that includes the following information:

- The name, description and contact information of Aggregator.
- Proof of incorporation and good standing of corporate entity.

---

<sup>4</sup> The 5,000 acre limit was chosen based on preliminary analysis suggesting that most projects below this threshold would not be viable as standalone projects, due to high fixed costs for sampling, monitoring, and verification. Most projects greater than 5,000 acres are expected to be viable on a standalone basis because of economies of scale.

- A list of initial Forest Owner participants.

The Aggregator Document will be available to the public on the Reserve's website, and will require approval by Reserve staff. It must be modified any time a participant joins or leaves an aggregate (triggered by the submission of an "Aggregate Entry" or "Aggregate Exit" forms as described below).

### **Joining and Leaving an Aggregate**

To join an aggregate, Forest Owners will be required to submit an "Aggregate Entry" form. This form may be submitted at the time of project registration, or at any time thereafter. This form will require Reserve staff's approval and will include:

- Statement that the Forest Owner wishes to join a specific aggregate with a specific Aggregator.
- A description of services the Aggregator will perform on behalf of the Forest Owner.
- Copies of any contract(s) between Forest Owner and Aggregator.

Once the Aggregate Entry form is submitted, projects must undergo an on-site verification before they will be allowed to join the aggregate.

To leave an aggregate, the Forest Owner for a project will be required to submit an "Aggregate Exit" form, which would require Reserve staff approval. This form would include:

- Statement that the Forest Owner intends to withdraw a project from a specific aggregate and Aggregator.
- If Forest Owner intends to retain a standalone project, a statement that the Forest Owner understands that they will be required to meet the standalone project inventory standards and that they will not be issued further credits until they have met those inventory standards and their new inventory has been verified.

Projects may only leave an aggregate if there have been a sufficient number of new entrants to maintain the overall targeted standard error for the aggregate (see "Inventory Standards for Participating Projects," below) at the level used during the aggregate's most recent verification. For example, at the time of its last verification an aggregate with 10 projects had a targeted standard error (TSE) of 15 percent (Table 1, below). One of the projects in the aggregate applies to leave. The application will only be accepted if one or more projects have recently joined the aggregate, such that the TSE for next year's verification will remain at or below 15 percent.

### **Accounts on the Reserve, Transfers and Sales of CRTs**

Each Forest Owner with projects in an aggregate must have a separate account with the Reserve to maintain transparency at the level of the individual Forest Owner. For each participating project, the Forest Owner must sign a PIA with the Reserve and meet all applicable sustainable harvesting and natural forest management criteria, submit annual monitoring reports (the transmission of these documents may be managed by the Aggregator), and determine a baseline specific to that project. Each project will be required to contribute to the Reserve's buffer pool and compensate for

reversals similar to standalone projects as described in Section 7 of the FPP. Each project is responsible to meet independently all reporting requirements described in Section 9 of the FPP.

Aggregators must maintain a Reserve account to which CRTs can be transferred from the accounts of participating Forest Owners, and from which CRTs can be transacted. Transfers from individual Forest Owner accounts to the aggregate account will not be subject to Reserve CRT transfer fees. Forest Owners will maintain control of the timing of any transfer to the Aggregator account, but will only be able to transfer CRTs issued to participating projects to the Aggregator account, not directly to other Reserve accounts.

### **Need for Input**

The Reserve welcomes any feedback on the feasibility of this type of arrangement, as well as any administrative or contractual issues that might arise.

All participating projects will be identified in the Reserve's software as a part of a named aggregate along with the contact information of the Aggregator. The total credits issued to that aggregate's projects and current total credit holdings of that aggregate's projects will be available by query in the Reserve's software. In addition, the software will track the verification history of projects within an aggregate to ensure transparency and disclosure of compliance to verification standards over time.

### **Inventory Standards for Participating Projects**

The target sampling error for inventory samples in the Reserve's FPP version 3.1 is +/-5% of the mean at the 90% confidence level. Projects that cannot meet this target level are still eligible, but may have to take a "confidence deduction" that reduces their reported carbon stocks. To achieve +/-5% of the mean at the 90% confidence level can be prohibitive for smaller projects because it requires a large number of plots relative to the total area of the project. Under the aggregation model proposed here, Forest Owners enrolled in an aggregate may submit project inventories with reduced sampling requirements based on the statistical principle that the targeted standard error (+/-5% of the mean at the 90% confidence level) will still be achieved across the entire aggregate.

For aggregated projects, the sampling error allowed for inventory data associated with individual forest projects will vary on a sliding scale based on the number of participating projects. This sliding scale was determined through consultation with statisticians and affirmed by a model exercise described later. The target sampling error for the participant Forest Owner ranges between 7%-20% of the mean at the 90% confidence level based on the total number of projects in the aggregate as shown in Table 1 below.

**Table 1 - Target sampling error at the 90% confidence level for projects participating in an aggregate.**

| <b>Number of Participating Projects in the Aggregate</b> | <b>Target Sampling Error (TSE)</b> |
|--|------------------------------------|
| 2  | 7%                                 |
| 3  | 8%                                 |
| 4  | 9%                                 |
| 5  | 10%                                |
| 6  | 11%                                |
| 7  | 12%                                |
| 8  | 13%                                |
| 9  | 14%                                |
| 10   | 15%                                |
| 11   | 16%                                |
| 12   | 17%                                |
| 13   | 18%                                |
| 14   | 19%                                |
| 15+  | 20%                                |

For projects in an aggregate, confidence deductions will be determined according to Table 2 (using the appropriate TSE from Table 1), below, rather than Table A.5 in the FPP.

**Table 2 - Inventory confidence deductions for participating projects in an aggregate.**

| <b>Actual Sampling Error at 90% Confidence Level</b> | <b>Confidence Deduction</b>  |
|--|--|
| 0 - TSE%   | 0%   |
| TSE to 20%   | (Actual sampling error - TSE %) to the nearest 1/10 <sup>th</sup> per cent |
| Greater than 20%                                     | 100%   |

Using this approach, the Reserve’s inventory standard remains essentially the same for single large projects and aggregated groupings of smaller projects while allowing the smaller projects in an aggregate to benefit from reduced costs associated with the reduced number of plots required per project. The underlying statistical rationale for this approach is explained in Appendix A.

**Need for Input**

The Reserve welcomes any feedback or critiques of the statistical underpinning for this approach. Are any issues likely to arise from the use of different inventory designs among participating projects, for example?

### **Monitoring and Verification**

Each project is required to undergo an on-site verification at the project's initiation to confirm that the baseline and initial inventory have been established in conformance with the FPP and that the rules for inventory accuracy have been met as outlined in this document. Subsequent verifications may follow a schedule where only a representative sample of projects in an aggregate is verified each year, as described below. The Aggregator is responsible for selecting a single verifier for all enrolled projects. Verification bodies must pass a conflict-of-interest review against all enrolled Forest Owners and the Aggregator. Aggregators may assist the Forest Owner in preparing documents for verification and facilitate the verification process. The ultimate responsibility for monitoring reports and verification compliance is assigned to each participating Forest Owner.

On-site verifications must be conducted on a schedule that results in half of the projects being verified on-site by year 6 and all projects being verified on-site at least once every twelve years. The verifier must randomly select half of the projects for site verification in year six of the project; the other half would be verified in year 12. The on-site verifications may also be spread out randomly through the six year interval.

Between site-visit verification, each Forest Owner must submit annual project monitoring reports. Verifiers must annually audit a sample of the annual monitoring reports, equivalent to the square root of the total number of participating projects in the aggregate, or the total number of participating projects divided by 12, whichever is higher (when rounded to the next highest whole number). As an example, an aggregate with 16 projects must have 4 project monitoring reports verified in a given year. Audited projects must be selected randomly, and Forest Owners will not know when their annual monitoring reports will require verification. Since this is a random process, a Forest Owner may have the annual report verified in consecutive years or not until the project is verified with a required site visit.

Successful verification of a representative sample results in the crediting of all projects participating in the entire aggregate. If material issues arise during verification of a participant project, the Forest Owner will need to independently address the issues and required corrective actions using the same process taken with standalone projects. These are described in the Forest Project Verification Protocol (<http://www.climateactionreserve.org/how/protocols/adopted/forest/current/>) and the Reserve Verification Program Manual (<http://www.climateactionreserve.org/how/verification/verification-documents/>).

If in any year a participating project does not have successful verification (of either annual monitoring reports, or an on-site inspection), the verifier must verify additional participating projects until the total successful verifications reaches the audit requirement for that year (i.e., the square root of total participants for annual monitoring reports, and half the number of participant projects every six years for on-site verification). If any verification issues are not resolved within 12 months, crediting of the participant projects in the aggregate will be suspended until the required number of successful verifications has been achieved.



## Appendix A – Rationale for Reduced Sampling Requirements

The underlying theory supporting the target sampling errors was affirmed with the use of a model described below. The model assumes that an aggregate would contain from 2 to 25 projects, with each participating project in the aggregate comprised of four inventory strata. Hypothetical inventory data were generated for each stratum using random numbers within a range as shown in Table 3 below. This was assumed to encompass a significant range of potential variability at the stratum and project level.

**Table 3 - Parameters used to generate hypothetical inventory data.**

|  | Min value | Max value |
|--|-----------|-----------|
| Mean live-tree carbon density (MgC/acre) | 20        | 100       |
| Standard deviation (% of mean)           | 10%       | 100%      |
| Inventory stratum size (acres)           | 50        | 1,000     |

Using the hypothetical inventory data generated, the weighted-average mean and standard deviation were calculated for each individual project in the aggregate (where a project is comprised of four strata) and at the total level for the equivalent standalone project (i.e. all inventory strata from all projects were assumed to represent distinct inventory strata in a single large project). These data were then used to calculate the required sample size for each individual project belonging to an aggregate and for an equivalent standalone project of the same total size. The analysis was repeated 1,000 times to get an average result for many different hypothetical inventory samples. The total number of plots required will vary significantly depending on the actual mean and standard deviation of each of the projects in question, but it should be roughly the same number of plots that would be required if all of those projects were registered as a single (equivalent standalone) project.

Table 4 shows the total sample size requirements for projects in an aggregate that are (a) treated individually and (b) treated as an equivalent standalone project (i.e., made up of the combined individual projects) assuming +/-5% error at the 90% confidence level. Smaller individual projects will in general have a higher sampling requirement compared to larger individual projects. The results show that inventory costs would be 2 to 27 times higher (relative to an equivalent standalone project) if each individual project were required to meet the sampling error of +/-5% at the 90% confidence level.

**Table 4 - Number of inventory plots required for aggregate vs. equivalent standalone project for +/- 5% at 90% confidence.**

| Number of Projects in the Aggregate | Total number of plots required for all projects in the aggregate         |   | Difference in Total Number of Plots (and |
|-------------------------------------|--|---|--|
|                                     | Treating the entire geographic area as one equivalent standalone project | Requiring each component project to meet +/- 5% |  |
|                                     |  |   |  |

|    | that meets +/- 5% sampling error in aggregate | sampling error | Cost) |
|----|---|----------------|-------|
| 2  | 340   | 725            | 213%  |
| 3  | 338   | 1080           | 320%  |
| 4  | 337   | 1444           | 428%  |
| 5  | 337   | 1797           | 533%  |
| 6  | 336   | 2158           | 642%  |
| 7  | 335   | 2506           | 748%  |
| 8  | 334   | 2856           | 855%  |
| 9  | 333   | 3223           | 968%  |
| 10 | 333   | 3573           | 1073% |
| 11 | 331   | 3935           | 1189% |
| 12 | 331   | 4284           | 1294% |
| 13 | 331   | 4641           | 1402% |
| 14 | 331   | 4995           | 1509% |
| 15 | 330   | 5350           | 1621% |
| 16 | 329   | 5712           | 1736% |
| 17 | 329   | 6068           | 1844% |
| 18 | 329   | 6431           | 1955% |
| 19 | 330   | 6788           | 2057% |
| 20 | 330   | 7140           | 2164% |
| 21 | 330   | 7506           | 2275% |
| 22 | 330   | 7871           | 2385% |
| 23 | 330   | 8221           | 2491% |
| 24 | 330   | 8576           | 2599% |
| 25 | 330   | 8947           | 2711% |

The model was then used to affirm the target sampling error at 90% confidence level to apply at the individual project level for aggregates in Table 1. Table 5 shows the results of a Monte Carlo simulation of 1,000 iterations of the analysis using different random numbers to generate the initial inventory figures. It shows that using the target sampling errors suggested in the proposal for determining the required sample size of individual projects, the level of actual accuracy at the aggregate level is likely to be similar or better than the +/-5% currently required in the Forest Project Protocol and the number of total plots is not significantly higher than an equivalent standalone project.

**Table 5 - Number of inventory plots required and equivalent sampling error for aggregate vs. standalone project**

| Number of Projects in the Aggregate | Target Sampling Error (TSE) at 90% Confidence for each Project in an Aggregate (Based on the Number of Projects in the Aggregate) | Sum of Plots Required for all Projects in the Aggregate: (mean of 1,000 Iterations) |  | Percentage Increase of Plots Required for Aggregated Projects (Compared to Standalone Projects) (D-C) / C | Resulting Sampling Error if Plots from the Aggregate were Applied to a Single Standalone Project at 90% Confidence Interval* |
|-------------------------------------|---|---|--|---|--|
|                                     |   | with the Projects in the Aggregate Treated as One Project (+/-5% at 90%)            | with the Projects in the Aggregate Treated as Aggregated Projects (TSE % at 90%) |   |  |
| A                                   | B   | C   | D  | E   | F  |
| 2                                   | +/- 7%  | 351   | 365  | 4%  | +/- 4.9%   |
| 3                                   | +/- 8%  | 343   | 416  | 21%   | +/- 4.5%   |
| 4                                   | +/- 9%  | 339   | 439  | 29%   | +/- 4.3%   |
| 5                                   | +/- 10%   | 338   | 446  | 32%   | +/- 4.3%   |
| 6                                   | +/- 11%   | 338   | 440  | 30%   | +/- 4.3%   |
| 7                                   | +/- 12%   | 335   | 431  | 29%   | +/- 4.4%   |
| 8                                   | +/- 13%   | 335   | 420  | 25%   | +/- 4.4%   |
| 9                                   | +/- 14%   | 334   | 407  | 22%   | +/- 4.5%   |
| 10                                  | +/- 15%   | 333   | 393  | 18%   | +/- 4.6%   |
| 11                                  | +/- 16%   | 332   | 380  | 14%   | +/- 4.6%   |
| 12                                  | +/- 17%   | 332   | 368  | 11%   | +/- 4.7%   |
| 13                                  | +/- 18%   | 331   | 357  | 8%  | +/- 4.8%   |
| 14                                  | +/- 19%   | 331   | 345  | 4%  | +/- 4.9%   |
| 15                                  | +/- 20%   | 331   | 333  | 1%  | +/- 5.0%   |
| 16                                  | +/- 20%   | 331   | 355  | 7%  | +/- 4.8%   |
| 17                                  | +/- 20%   | 331   | 377  | 14%   | +/- 4.7%   |
| 18                                  | +/- 20%   | 331   | 399  | 21%   | +/- 4.5%   |
| 19                                  | +/- 20%   | 331   | 421  | 27%   | +/- 4.4%   |
| 20                                  | +/- 20%   | 332   | 443  | 33%   | +/- 4.3%   |
| 21                                  | +/- 20%   | 331   | 465  | 40%   | +/- 4.2%   |
| 22                                  | +/- 20%   | 331   | 487  | 47%   | +/- 4.1%   |
| 23                                  | +/- 20%   | 331   | 509  | 54%   | +/- 4.0%   |
| 24                                  | +/- 20%   | 330   | 532  | 61%   | +/- 3.9%   |
| 25                                  | +/- 20%   | 330   | 555  | 68%   | +/- 3.8%   |

\* This is the sampling error that would result if the total number of plots used for the equivalent standalone project were equal to the total number of plots listed in column D (i.e., the total number of plots required if each small project were treated individually, using the target sample error identified in column B).

**Example**

Using the data in Table 5, an aggregate involving 9 projects in total (column A) requires a sampling error of +/- 14% (column B) to be used in inventory design for each individual property. For the example shown in Table 5, this translates to just over 45 plots per property, or a total of 407 plots at the aggregate level (column D). Conversely, the number of plots required to achieve a +/-5% sampling error

**PUBLIC REVIEW DRAFT 04/22/10**

on an equivalent standalone project would be 334 for the same example (column C). The number of plots required at the aggregate level is therefore 22% greater than the equivalent standalone project (column D).

The simple graphic below illustrates the distribution of plots to the properties within the aggregate group of 9 projects and in the equivalent standalone project.

| Aggregate           |    |    | Standalone          |
|---------------------|----|----|---------------------|
| (Total = 407 plots) |    |    | (Total = 334 plots) |
| 45                  | 45 | 45 | 334                 |
| 45                  | 45 | 45 |                     |
| 45                  | 46 | 46 |                     |

The two project areas are identical at the aggregate level, but because the aggregated project requires more total plots, it will theoretically achieve a sampling error of +/-4.5% (column F) instead of +/-5% for the equivalent standalone project.