



CLIMATE
ACTION
RESERVE

Handbook for Nitrogen Management Project Development Protocol Requirements and Options for Compliance

Version 2.0a

Notes on this document and its use:

*This Handbook is meant to be a companion document to assist users of the **Nitrogen Management Project Protocol V2.0**. It should be viewed as advice, rather than official guidance of the Climate Action Reserve. In situations where this document contradicts the Protocol, the Protocol always takes precedence. This document will be updated periodically, and the Reserve welcomes feedback and suggestions to assist with those updates. If you have comments, please send an email to policy@climateactionreserve.org.*

This material is based upon work supported by the Natural Resources Conservation Service, U.S. Department of Agriculture, under number 69-3A75-17-20.

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Last Updated March 2019

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Abbreviations and Acronyms

ac	Acre or Acres
CO ₂	Carbon dioxide
CO ₂ e	Carbon dioxide equivalent
CP	Crediting period
CRT	Climate Reserve Tonne
CY	Cultivation year
EEF	Enhanced efficiency fertilizer
EPA	United States Environmental Protection Agency
GHG	Greenhouse gas
GIS	Geographic Information System
HEL	Highly erodible land
lb	Pound
LVRO	Leaching, volatilization, and runoff
MRV	Monitoring, reporting, and verification
N ₂ O	Nitrous oxide
N	Nitrogen
NASS	USDA National Agricultural Statistics Service
NI	Nitrification inhibitor
NMPP	Nitrogen Management Project Protocol Version 2.0
NMP	Nutrient or Nitrogen Management Plan
NRCS	Natural Resource Conservation Service of the USDA
NUE	Nitrogen use efficiency
PFP	Partial Factor Productivity
Reserve	Climate Action Reserve
RP	Reporting period
SRF	Slow release fertilizer
SSR	Source, sink, and reservoir
USDA	United States Department of Agriculture
VP	Verification period

1 The Basics

1.1 Purpose

What is the purpose of this document?

This Handbook has been developed to assist users of the Climate Action Reserve (Reserve) Nitrogen Management Project Protocol Version 2.0 (NMPP V2.0). Where the protocol is a technical standard laying out the specific requirements for the issuance of Climate Reserve Tonnes (CRTs), i.e., offset credits, from nitrogen management projects, this document is meant as a plain-language companion, providing unofficial guidance and advice to assist with project development and verification. It is intended to assist anyone interested in obtaining a better understanding of the protocol and its requirements. Examples are provided to conceptualize certain requirements and demonstrate options for compliance, however, such examples are not exhaustive of all possible scenarios.

Please note, the Handbook does not override or provide additional requirements than those set forth in the protocol. If any incongruities arise during project development or verification due to guidance outlined in this document, please contact Reserve staff directly.

1.2 Project Definition

What is a nitrogen management project?

A nitrogen management project consists of the adoption and maintenance of one or more eligible project activities during the cultivation year of an eligible crop, on one or more fields in an eligible project area, that reduce nitrous oxide (N₂O) emissions. The activities, crops and regions eligible for CRTs are summarized in Table 1.1, while a breakdown of the eligible activities and crops by state are provided in Table 1.2. Multiple fields, each employing a different combination of activities and crops, may be managed together under a single project, across multiple owners and multiple regions. Multiple projects may also be managed together as a “project cooperative” or “cooperative” (Section 4).

1.3 Eligibility Checklist

I want to develop a project – where do I start?

All prospective project developers should begin by reviewing the protocol’s eligibility requirements to ensure their field(s) would be eligible for crediting. For ease of reference, the eligibility criteria for *each field* in a nitrogen management project are summarized in Table 1.1. The table should function as a checklist for tracking and confirming that eligibility requirements have been met, as well as to provide a high-level overview of said requirements. Further information on the specific criteria can be found in the NMPP V2.0 and the cited sections of the Handbook.

Eligibility Item	Eligibility Criteria	Met?
<i>Notes on Location (Optional):</i>		
Region-Crop-Activity Combination	Identify and confirm the eligibility of the field's combinations of region-crop-activities using the Eligibility Lookup Tool (Section 1.5)	<input type="checkbox"/>
<i>Notes on Region-Crop-Activity Combo (Optional):</i>		
Project Start Date	<p>Select one field who's start date, i.e., the first day of its cultivation year, will constitute the first day of the overall project (Section 2.3.5, Table 2.1, Figure 2.3)</p> <p>Submit the project for listing with the Reserve before harvest is completed on the selected field, i.e., within ~12 months of its field start date</p>	<input type="checkbox"/>
<i>Notes on Start Date (Optional):</i>		
Performance Standard Test – Synthetic N Rate Reductions (Required)	Meet or exceed the applicable county-and crop-specific county average for nitrogen use efficiency at the end of the cultivation year (Section 2.2, Figure 2.5)	<input type="checkbox"/>
<i>Optional Notes on Performance Standard Test – Synthetic N Rate Reductions:</i>		
Performance Standard Test – EEFs (Optional)	Apply an EEF without having done so historically during the baseline look-back period (Section 3.2)	<input type="checkbox"/>
<i>Optional Notes on Performance Standard Test – EEFs:</i>		
Legal Requirement Test	Implement eligible activities not required by or beyond what is required by any law(s)	<input type="checkbox"/>
<i>Notes on Legal Requirement Test (Optional):</i>		
Ecosystem Credit/Payment Stacking	Do not receive ecosystem credits or payments for the adoption and/or continued use of eligible activities	<input type="checkbox"/>

Eligibility Item	Eligibility Criteria	Met?
<i>Notes on Ecosystem Credit/Payment Stacking (Optional):</i>		
Regulatory Compliance	Do not violate any laws during project implementation and management	<input type="checkbox"/>
<i>Notes on Regulatory Compliance (Optional):</i>		

1.4 Location

Where can I develop a project?

All eligible project activities may be implemented on any eligible crop field in any eligible region within the intercontinental United States (U.S.). Not all crops are eligible in each eligible location. For simplicity, Table 1.2 provides a quick overview of the eligible activities and crops per region at the state level, while Figure 1.1 showcases the number of possible crops eligible within each county. A complete listing of eligible counties and their applicable crop systems can be found in the Nitrogen Management Project Eligibility Lookup Tool, which is discussed further in Section 1.5.

Table 1.2. Eligible Activities, Crops, and Regions by State

Activities	Crop	State
N Rate Reductions EEFs	Barley	AZ, CA, CO, ID, MN, MT, ND, OR, PA, VA, WA, WY
N Rate Reductions EEFs	Corn (Grain)	CO, GA, IL, IN, IA, KS, KY, MI, MN, MO, NE, NY, NC, ND, OH, PA, SD, TX, WI
N Rate Reductions EEFs	Corn (Silage)	IA, MN, NY, ND, PA, WI
N Rate Reductions EEFs	Cotton	AR, GA, MS, MO, NC, TN, TX
N Rate Reductions EEFs	Oats	IL, IA, KS, MI, MN, NE, NY, ND, OH, PA, SD, TX, WI
N Rate Reductions EEFs	Sorghum (Grain)	CO, KS, NE, OK, SD, TX
N Rate Reductions EEFs	Spring Wheat (Durum)	MT, ND
N Rate Reductions EEFs	Spring Wheat (excluding Durum)	MN, MT, ND, SD
N Rate Reductions EEFs	Tomatoes (Processing)	CA
N Rate Reductions EEFs	Winter Wheat	CO, ID, IL, KS, MO, MT, NE, OH, OK, OR, SD, TX, WA

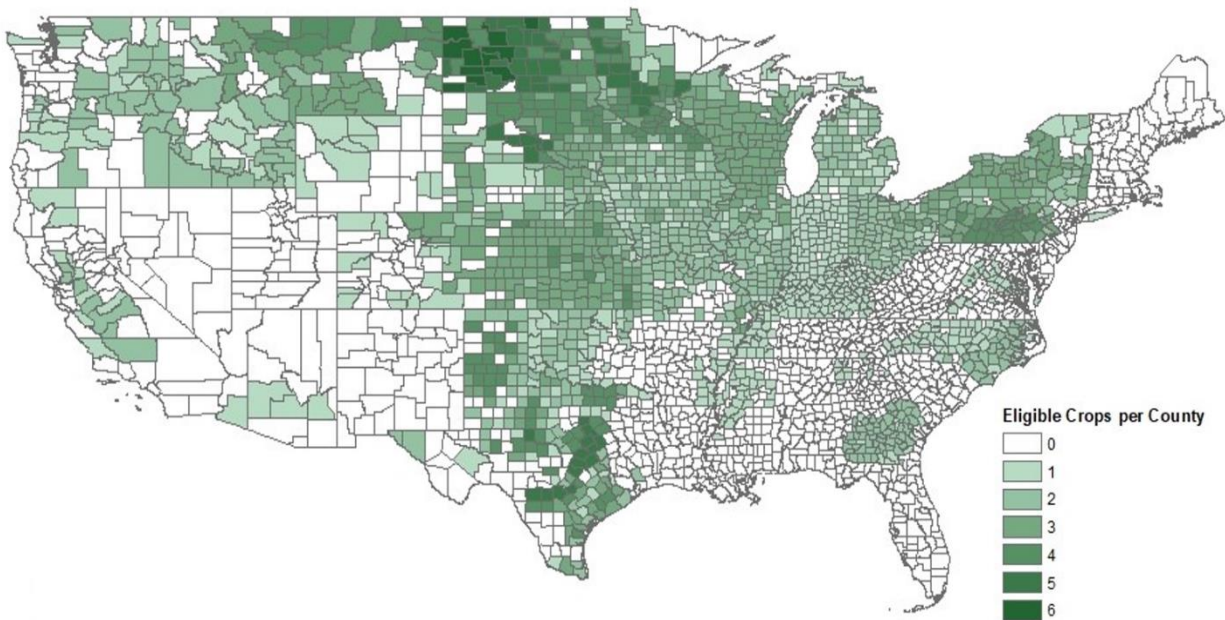


Figure 1.1. Number of Eligible Crops per Region (County)

1.5 Eligibility Lookup Tool

How do I use the Eligibility Lookup Tool?

Before getting started, it is critical for project developers to self-assess and confirm their prospective fields' combinations of county-crop-activities are eligible for crediting. For assistance in this initial screening, the Reserve has developed an easy-to-use Excel workbook called the Nitrogen Management Project Eligibility Lookup Tool. Use of this tool is mandatory for all fields seeking credits in a given reporting period (Table 2.1) and must be used to complete the eligibility screening. This tool can also be used before initiating a project to help identify fields likely to be eligible in the project.

Please note, before using the tool for the pre-project screening, project developers will need to estimate their anticipated synthetic N rate reductions. This must be done by comparing N rates for that field-crop combination in the baseline look-back period (Section 3.2) to the N rate for that specific field-crop combination for the current reporting period in the project, as exemplified in Equation 1.1 below. The reduction must be estimated as a percentage and rounded down to the nearest applicable value in the N Fertilizer Reduction (%) drop-down menu in the tool.

Equation 1.1. Percentage Reduction in Synthetic N Rate from Baseline to Project

$$\text{Synthetic N Rate Reduction (\%)} = \frac{(\text{Baseline Average Synthetic N Rate} - \text{Project Synthetic N Rate})}{\text{Baseline Average Synthetic N Rate}} \times 100$$

Once you have estimated synthetic N rate reductions for each field, you are ready to start using the tool. For each field in the project, project developers enter the Field ID and make a series of selections from drop-down menus for the following field conditions:

- State
- County
- Crop
- Synthetic Nitrogen Fertilizer Reduction (%) (rounding down)
- Irrigation Status (yes/no)
- Enhanced Efficiency Fertilizer Use (NI, SRF, None)
- Conversion to Short Term No Till (yes/no)

After making all selections from the series of drop-down menus in each row, an “ELIGIBLE” or “INELGIBLE” determination will automatically populate in the adjacent column. For all eligible scenarios, the average yields, N rates, and nitrogen use efficiencies (i.e., PFPs; Section 2.2) will proceed to automatically populate in the three neighboring columns. After confirming field scenario eligibility with this tool, projects must still meet all eligibility criteria in NMPP V2.0 Section 3, as summarized above in Table 1.1. Also, please note that this tool must be used before proceeding with the NMQuanTool (Section 3.3), which contains the same series of drop-down menus and selections for the combinations of county-crop-activities as the Eligibility Lookup Tool.

For detailed instructions, please see the first spreadsheet in the Eligibility Lookup Tool, which is available upon request by sending an email to policy@climateactionreserve.org.

Why is my field's scenario ineligible?

Potential reasons a select combination of county-crop-activities are ineligible include the following:

1. There are insufficient data to develop standardized thresholds for the performance standard test for additionality for synthetic N rate reductions for the given county-crop combination (Section 2.2);
2. There are insufficient data to calibrate and validate the quantification methodology for eligible activities for the given county-crop combination (Section 3.3); and/or
3. The select eligible activities for the given county-crop scenario in combination with a switch to and maintenance of no till in the short term (i.e., less than 10 years) results in an increase in N₂O emissions compared to baseline conditions (NMPP Section 2.2; NMPP Appendix F)

1.6 Documenting Protocol Requirements

What information do I need to collect?

Basic information about field location, crop, fertilizer management, and additional farming practices will need to be collected to meet protocol monitoring, reporting, and verification (MRV) requirements, as summarized in Table 1.3.

Table 1.3. Summary of Necessary Information

Category	Requirements	Acceptable Records
Legal/Ownership	Contact Info	Government issued ID
	Land Owner	Contracts
	Land Manager	Contracts
	GHG Owner	Contracts

Category	Requirements	Acceptable Records
Project Area/Location	State, County & Field ID	Government records
	Boundary (clearly delineated, continuous, no roads, waterways, etc.)	Maps Government records
	Field size	
	Field Status (e.g., left fallow, ineligible crop, eligible crop)	Third-party statements Farmer records
	Soil Type / Suitability	SSURGO via the Web Soil Survey
	Tile-drained	Farmer records
Crop	Primary Crop Type	Farmer records
	Rotation (monoculture, 2-crop, 3-crop) historical, current, planned	Third-party statements Maps
	Project Yield	Farmer records
	County Average Yield	USDA NASS Statistics
	Planting Date	Farmer records Third-party statements Maps
	Harvesting Date	
	Cover Crop (if any)	
	Cover Crop planting date	
	Cover Crop termination date	
Cultivation Equipment		
Synthetic Fertilizer Use	Total Amount (mass) Applied	Maps (demonstrating where applied) Farmer records
	Application Date(s)	
	Type (i.e., liquid or dry)	Farmer records
	Application Method	Farmer records
	N Content	Farmer records N Content records
	Baseline N Rate	Farmer records (Approach 1 ¹) N Content records (Approach 1) Crop Advisor Records (Approach 2) NMPP Eligibility Lookup Tool Benchmarks (Approach 3)
Organic Fertilizer Use (if any)	Amount Applied	Maps (demonstrating where applied)
	Application Date(s)	Farmer records Third-party statements
	Type (e.g., liquid or solid)	Maps (demonstrating where applied) N Content records Farmer records

¹ See Handbook Section 3.2 for guidance on the various approaches to setting baseline N rates.

Category	Requirements	Acceptable Records
	Application Method	Farmer records Equipment records Third-party statements
	N Content	Farmer records N Content records
	Baseline N Rate	Farmer records (Approach 1) N Content records (Approach 1) Crop Advisor Records (Approach 2)
Total N Rate	Synthetic N Rate + Organic N Rate	Project Developer (PD) records
EEF (if any)	Type/Product	Farmer records N Content records
	Application Date(s)	Maps (demonstrating where applied) Farmer records Third-party statements
	N content (if applicable)	Farmer records N Content records
Irrigation (if any)	Irrigation-related CO ₂ emissions (electricity and fuel usage)	Farmer records Third-party statements Maps
Tillage	Tillage practice	Farmer records Third-party statements Government records Maps
	Number of year(s) maintaining tillage practice	
	The year no-till commenced on project field (if applicable)	
	Tillage related CO ₂ emissions (fuel usage)	
Eligibility/Additionality	Start date	Farmer records
	PFP benchmark	NMPP Eligibility Lookup Tool
	Performance Standard Test (PST) results	PD records
	Legal Requirement Test (LRT) results	Copies of air, water, and land use permits relevant to project activities Local jurisdiction NMP requirements
	Credit/Payment Stacking (CS/PS) results	Government records Contracts/Agreements
	Regulatory Compliance (RC) results	RC records
Quantification	PER	NMQuanTool
	PE _{org}	PD records
	SE	PD records

Category	Requirements	Acceptable Records
	ER	PD records
	Leakage results	PD records
Minimum continuous monitoring and reporting requirements (e.g., ineligible crop cultivation years)	Field ID	PD Records
	Primary Crop Type	Farmer records Third-party statements Maps
	Rotation (monoculture, 2-crop, 3-crop) historical, current, planned	
	Planting Date	
	Harvest Date	
	Synthetic Fertilizer Use (all the above)	N Content records Maps (demonstrating where applied)
	Organic Fertilizer Use (all the above)	Farmer records Third-party statements
	Tillage practice	Farmer records Third-party statements Government records Maps
	Number of year(s) maintaining tillage practice	
	The year no-till commenced on project field (if applicable)	
RC results	RC records	

What evidence do I need to provide?

Project developers can use almost any evidence they like, subject to review by the verifier and the Reserve, to document NMPP requirements as summarized in Table 1.3 above. Evidence must cover every year of the baseline look-back period and the crediting period (Table 2.1), even during cultivation years in which CRTs cannot be or are not generated.

In general, it is easier for a verifier to confirm that the protocol requirements are met when the project developer provides as specific and objective evidence as possible. Evidence that is independently sufficient and is able to stand alone as evidence is superior to evidence that must be corroborated by at least one additional piece of evidence. Verifiers will apply professional judgment to determine whether they can conclude with reasonable assurance that the protocol requirements are met.

Table 1.4 below identifies a number of data sources for the “Acceptable Records” in Table 1.3 above that might be useful in demonstrating compliance with NMPP requirements. This information should be considered indicative of what might be useful, and not an exhaustive list. Some types of documentation may carry greater evidentiary weight than others. For example, time and date stamped photographs evidencing when certain activities were carried out might carry greater weight than receipts for products purported to be applied on that given date. The combination of those two pieces of evidence may in turn provide greater assurance than any single one of those pieces of evidence alone. Each project developer will need to provide sufficient evidence to allow their verifier to reach a reasonable level of assurance regarding such activities. Ultimately, Reserve staff must be satisfied that sufficient evidence has been provided to demonstrate NMPP requirements are met.

Table 1.4. Examples of Useful Data Sources

Useful Data Sources	Examples
Government records	USDA Farm Service Agency or Natural Resources Conservation Service records, Property/Tax records, other official records submitted to or generated by a government agency that would indicate the farm management practices during the relevant year(s)
Farmer records	Custom spreadsheets, crop advisor records, notebooks, growers' field notes, as-applied maps, time-stamped photographs/videos, nutrient management plans (NMPs), supply receipts/records (fuel, seed purchases etc.), inventory records, financial records (i.e., crop sales), manufacturer/supplier records, purchase records/receipts, software/on-farm management systems (as exemplified in the next row below); Equipment records, such as electricity billing/metering records, records of fuel deliveries, onsite fuel stocks, vehicle inventory and usage patterns, mileage logbooks, purchase records/receipts, rental agreements, contractor agreements
Software Systems/On-Farm Management Systems	MyJohnDeere, AgWorld, SST, DN2K Sage Insights, Climate Field View, Agrian, MZB, Raven Slingshot, AgLeader SMS, Ag Pro Exchange, Conservis, Farmers Edge, Fieldprint® Platform, AgConnections Land.db, Agrible, MyFarms
Maps	Records from: Quantum GIS, ESRI ArcMap, DeLorme Xmap, ESRI ArcGIS Online, Google Maps, Google Earth, COMET-Farm; GPS records, digital maps, field maps. Examples: <ul style="list-style-type: none"> ▪ KML ▪ KMZ ▪ Shapefile Satellite data As-applied maps
Third-party statements	Statements from independent third parties (e.g., NRCS, University extension staff, crop advisors, service providers etc.);
N content records	Manufacturer/Supplier Records, Fertilizer N-content labels, Certified Laboratory test results, Ag service provider labels, Default Reference(s)
Regulatory compliance records	Notices of Violations, Consent Orders, OSHA citations, ECHO reports, records of written communications with regulators)

2 The Process

The process described here is roughly the same for individual projects and projects that participate in a cooperative, with the difference being that the Cooperative Developer (Table 2.3) will likely do most or all of the work. Figure 2.1 below highlights the major phases of creating offsets from a nitrogen management project and the important activities at each phase.

Project Initiation	Project Development	Verification	Credit Issuance
<ul style="list-style-type: none"> • Determine (or assess) eligibility and feasibility • Pre-assess Performance Standard Test results • Identify ownership and management • Engage technical assistance and/or Cooperative Developer 	<ul style="list-style-type: none"> • Open an account with the Reserve • Nominate project start date and submit project to Reserve • Prepare monitoring report • Monitor all required project parameters • Confirm eligibility • Quantify emission reductions for the reporting period 	<ul style="list-style-type: none"> • Engage Reserve-approved verification body • Verification body conducts site visit and desktop verifications • Submit verification report and statement to the Reserve for review 	<ul style="list-style-type: none"> • Verification report is approved • Project becomes "Registered" • CRTs are created and Project Owner is invoiced • CRTs are deposited into the Project Owner's account and may be transferred to a buyer

Figure 2.1. Overview of Steps Involved in Project Development

Before getting started, it is also important to understand the distinctions between several important periods of time as described in Table 2.1.

Table 2.1. Periods of Time in a Nitrogen Management Project

Name	Description	Minimum	Maximum
Cultivation Year (CY) (Figure 2.2)	The period between the first day after harvest of the last primary crop on a field and the last day of harvest of the current primary crop on a field. Each eligible crop has its own distinct CY. Cover crops (if planted) are included in the CY of the subsequently planted eligible crop.	N/A	~12 months
Field Start Date (Figure 2.3)	The first day of a new cultivation year in which eligible project activities are implemented on a field. Cannot be earlier than the project start date.	N/A	N/A
Project Start Date (Figure 2.3)	The first day of the overall project, equivalent to the field start date of the first field submitted under the project. Typically, this will be the field with the earliest start date that has not yet completed harvest. Projects must be submitted to the Reserve for listing within 12 months (i.e., before the end of the cultivation year) of the project start date.	N/A	N/A

Name	Description	Minimum	Maximum
Reporting Period (RP) (Figure 2.4)	<p>The period of time over which GHG emission reductions from project activities are quantified. The initial RP begins on the project start date and may cover up to 2 CYs. Subsequent RPs may only cover 1 CY. Each field is limited to a maximum of 10 RPs. Project developers must report GHG emission reductions during each RP.</p> <p>Fields left fallow, cultivating an ineligible crop, and/or cultivating an eligible crop but do not meet protocol requirements or are voluntarily withdrawn for that CY, do not constitute a RP. Continuous monitoring is required.</p>	1 CY	2 CYs (initial) 1 CY (subsequent)
Crediting Period (CP) (NMPP Section 3.4).	<p>The total period of time over which credits may be earned for a project. Each project may be credited for a maximum of 10 RPs, and each individual field will also be eligible for a maximum of 10 RPs, per CP. The CP may be renewed one time, by applying for a 2nd CP within the 12 months before or after the end of the first CP.</p>	1 RP	10 RPs
Verification Period (VP) (NMPP Section 7.4)	<p>The period of time over which GHG reductions and adherence to NMPP requirements from the most recent RP are assessed by a Reserve-approved, third-party, independent verifier. The initial verification must be completed within 12 months of the initial RP. Subsequent VPs can cover one or two RPs. Verification must be completed within 12 months of the VP.</p>	1 RP	1 RP

Figure 2.2, Figure 2.3 and Figure 2.4 below illustrate how the cultivation years, start dates, and reporting periods relate to one another.

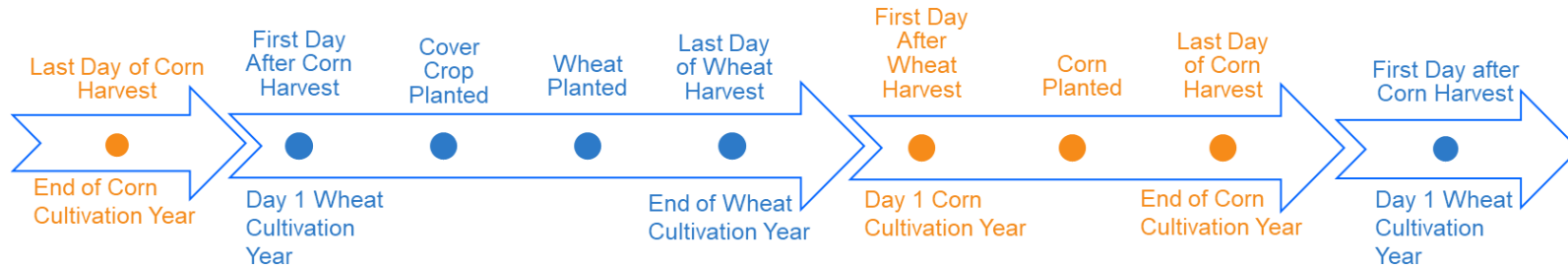
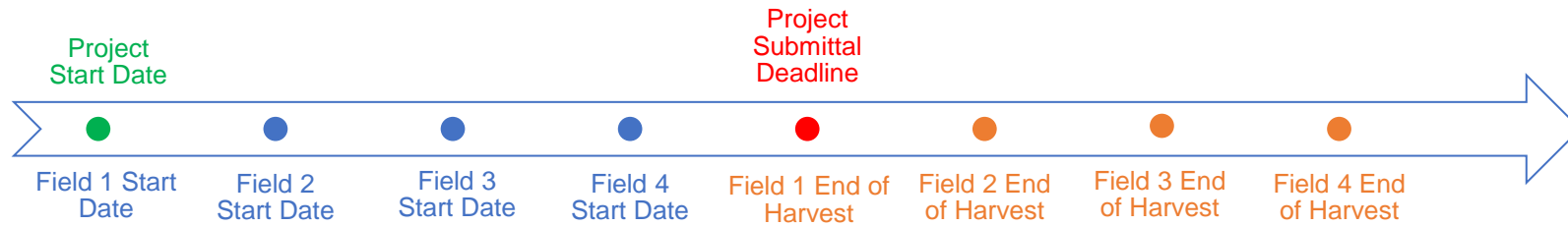


Figure 2.2. Example of a Typical Cultivation Year

1. Conventional Scenario



2. Subsequent Fields Harvested prior to Initial Field

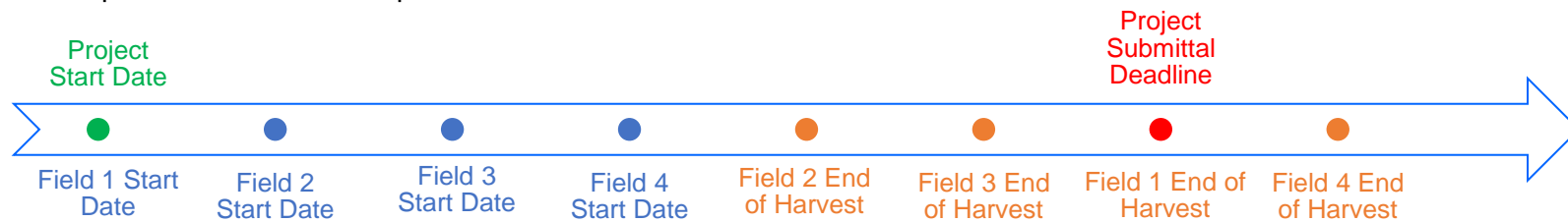
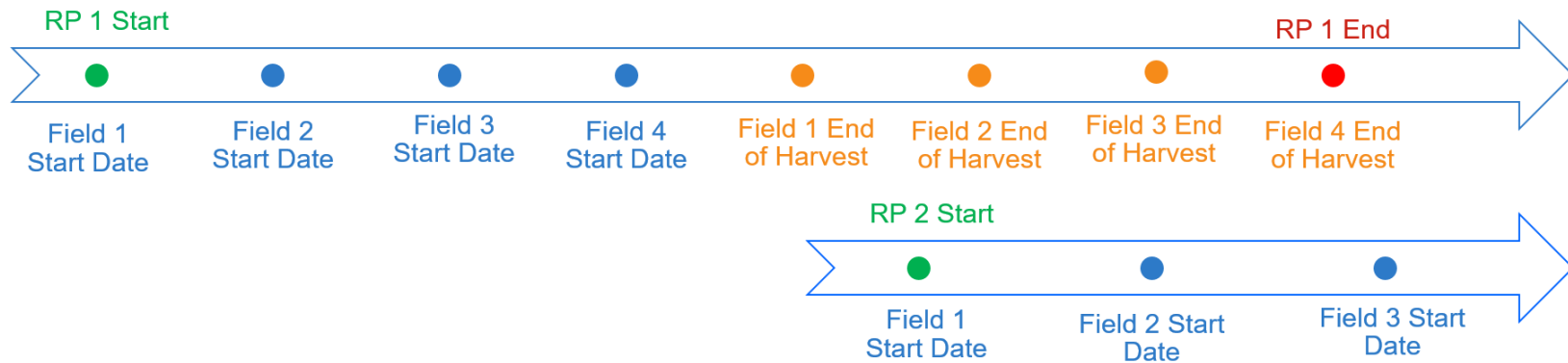


Figure 2.3. Project Start Date Scenarios

(1) Example of a conventional project start date scenario and (2) of a project start date where subsequent fields are harvested prior to harvest of the first field submitted under the project.

1. Conventional Scenario with Overlapping Reporting Periods



2. Initial Reporting Period with Two Cultivation Years

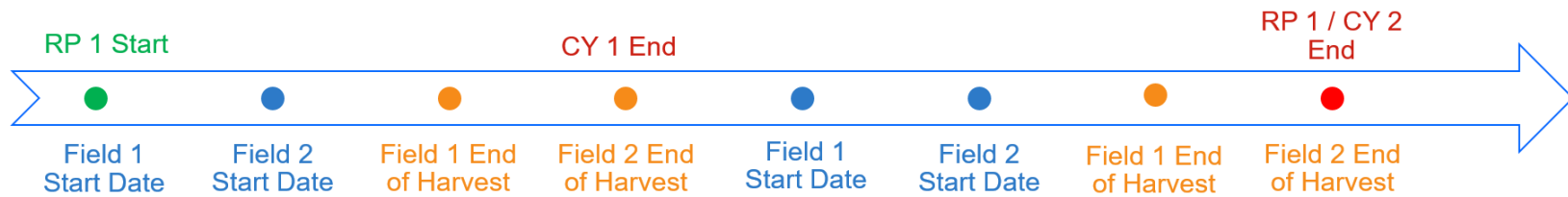


Figure 2.4. Reporting Period Scenarios

(1) Example of a reporting period (RP) following the conventional project start date scenario where the subsequent RP begins before the current RP ends and (2) of an initial reporting period consisting of two eligible crop cultivation years (CY).

2.1 Project Initiation

What should I consider at the onset of a project?

Before engaging in project development, it is important to clearly answer these key questions:

- **Ownership and Management**
 - Who owns the land?
 - Who implements and manages the project activities?
 - Who owns the rights to the GHG credits?
 - Will the project be part of a cooperative?
 - Who is responsible for project development, monitoring, reporting and verification? Who will carry out and pay for these activities?
- **Project Area**
 - Have you identified the specific land area (i.e., field or fields) to be included?
 - Have all physical boundaries (e.g., roads, watercourses, etc.), wetlands, HEL, and histosols been properly excluded?
 - Have you confirmed the area is in an eligible county for the given crop using the Eligibility Lookup tool?
 - Have you taken steps to create maps of the project area as required by the protocol?
- **Project Commencement**
 - Which field will be nominated for the project start date?
 - Are you prepared to submit the project to the Reserve no more than 12 months after the project start date?
 - Will other fields be added to the submittal form, or added to the project at a later time?
- **Project Activities**
 - What eligible activities will be implemented and what crops will be grown in the project area?
 - Which baseline approach will be followed?
 - What additional cultivation activities (i.e., irrigation, tillage practice) will occur on the project area after the project has commenced?
 - Do you have a monitoring plan in place to ensure that you will be able to meet the protocol requirements during the reporting period?
- **Project Feasibility**
 - Will the project generate enough CRTs to offset the cost of verification services, and other project development and management costs?
 - Have you carried out any pre-project eligibility screening of potential fields using the Eligibility Lookup Tool?
 - Have you completed a pre-assessment for passing the performance standard test for additionality for N rate reductions using yield goals and planned fertilizer use?
 - Have you estimated potential emission reductions from specific fields using the NMQuanTool?
 - Have you consulted with any Reserve-approved Verification Bodies about verification costs?

2.2 Performance Standard Test

How do I pass the performance standard test for N rate reductions?

Each field seeking CRTs must pass a performance standard test to demonstrate its nitrogen management activities result in GHG emission reductions additional to what would have occurred in the absence of the project. In the NMPP, a field passes the performance standard test when its nitrogen use efficiency, measured in terms of partial factor productivity (PFP),² meets or exceeds its applicable county- and crop-specific average PFP benchmark found in the Nitrogen Management Project Eligibility Lookup Tool (Section 1.5). The average PFP represents a “business as usual” nitrogen use efficiency.

PFP is calculated as the ratio of harvested crop yield to the total amount of N applied during the cultivation year, as demonstrated in Equation 2.1.

Equation 2.1. Partial Factor Productivity (PFP) Calculation

$$PFP = \frac{\text{Crop Yield}}{\text{Total N Rate (synthetic + organic)}}$$

Each reporting period, project developers must calculate the PFP for each field in their projects based on *ex post* project yield and total N rate data; that is, based on the harvested yield at the completion of the cultivation year and the total amount of N applied throughout the cultivation year. To be eligible for CRTs, each field’s PFP for that reporting period must meet or exceed the applicable county- and crop-specific PFP benchmarks.

For example, as seen below in Figure 2.5, a field cultivating corn (grain) in McLean County, North Dakota would need to demonstrate a PFP greater than 23.5 to be eligible for credits, while a field cultivating tomatoes in Yolo County, California would need to demonstrate a PFP greater than 452 to be eligible for credits.

² The PFP measures how productive the cropping system is in comparison to its nitrogen input, and is calculated in units of crop yield per unit of nitrogen applied. Gains in the PFP can be realized from N rate reductions to levels that do not go below N demand and affect crop yield, and from yield improvements via the implementation of other fertilizer best management practices.

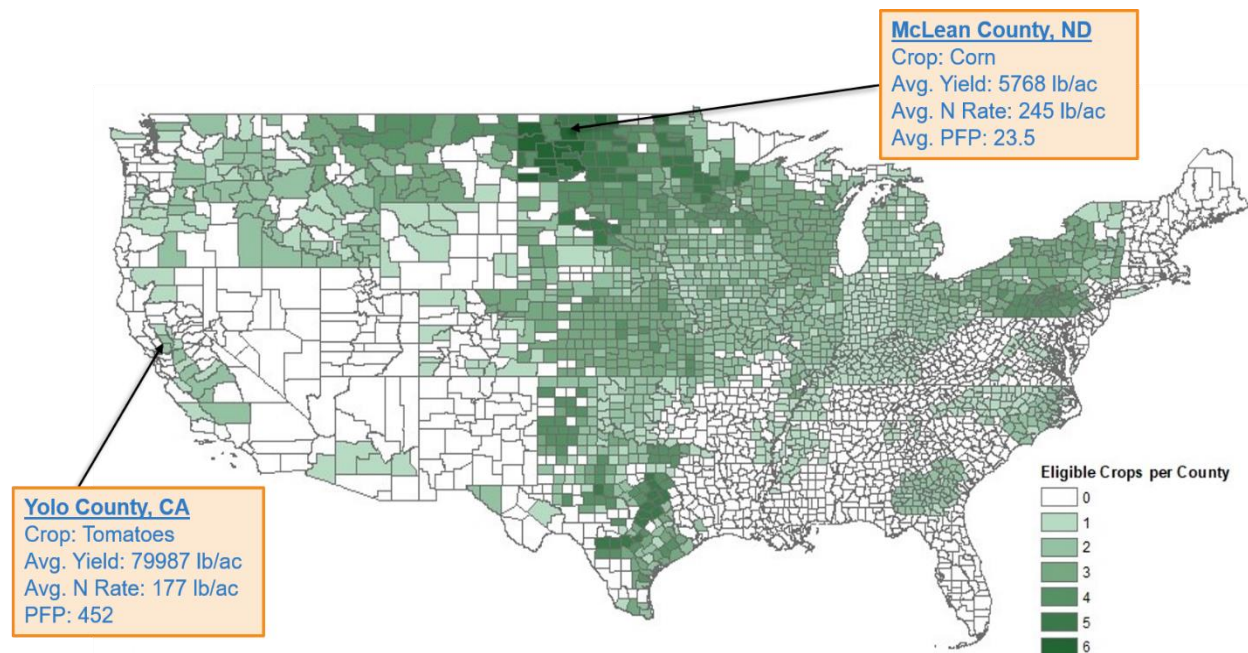


Figure 2.5. Examples of County- and Crop-Specific Benchmarks

Average yield, N rate, and PFP for corn in McLean County, ND and tomatoes in Yolo County, CA. Fields cultivating corn in McLean would need to meet or exceed a PFP of 23.5 and cultivating tomatoes in Yolo would need to meet or exceed a PFP of 452 in order to pass the performance standard test for additionality and be eligible for CRTs.

The PFP is a unitless assessment of performance. To calculate the PFP, both yield and N rate must be in the same units (e.g., pounds per acre). For reference, the Reserve uses pounds per acre for all relevant equations throughout the NMPP. Before calculating, crop yield in the numerator may need to be converted into the proper units. For assistance, please see Table 2.2 below for yield conversion factors based on the USDA National Agricultural Statistics Service (NASS) reported yield units for the eligible crops.

Table 2.2. Crop Yield Conversion Factors

Eligible Crop	NASS Reported Yield Units	lb/bu ³	lb/ton
Barley	bushels/ac	48	
Corn	bushels/ac	56	
Corn (silage)	tons/ac		2000
Cotton	lb/ac	32	
Oats	bushels/ac	32	
Sorghum	bushels/ac	56	
Spring Wheat	bushels/ac	60	
Tomatoes (Processing)	tons/ac		2000
Winter Wheat	bushels/ac	60	

Please note, the same synthetic N rate used in the denominator of the PFP calculation is used in the synthetic N rate reduction (%) calculation between the baseline and the project (Equation 1.1; NMPP Section 5.1.3)

³ <https://extension2.missouri.edu/g4020>.

As a critical initial step, project developers should estimate their fields' PFPs at the onset of the reporting period, based on yield goals and planned fertilizer use (taking the project percentage synthetic N rate reduction into consideration), to assess the likelihood the field will pass the performance standard test at the end of the reporting period.

What if my field does not pass the performance standard test?

If a field has been submitted to the Reserve under a project, and that field does not pass the performance standard in an eligible crop year, it does not forfeit eligibility for the remainder of the crediting period, provided continuous reporting requirements are met for that field (Table 1.3). However, such fields will not be eligible to earn CRTs in the reporting periods in which they do not pass the performance standard test, unless they are still within the grace period (see below). If a field has not yet been submitted to the Reserve, then there is no need to report anything until that field is submitted.

At the beginning of a project's first crediting period, each field shall be given a grace period for the first two eligible cultivation years to meet or exceed its applicable county- and crop-specific PFP performance benchmark in the Nitrogen Management Project Eligibility Lookup Tool. During the grace period, the field will be eligible so long as its own PFP increases each cultivation year. Such fields will be able to generate CRTs, but those CRTs will not be issued until the field actually meets or exceeds its applicable PFP benchmark. If a field passes its PFP threshold and completes verification by its third eligible cultivation year (e.g., for corn, the third time CRTs are sought for growing corn on that field, after the field's start date), then CRTs shall be issued for any credits for the grace period. If the field does not pass the PFP by its third eligible cultivation year, CRTs generated during the grace period will be forfeited.

2.3 Project Development

What administrative steps do I need to take to start my project?

Once it has been decided that the project will go forward, there are a series of administrative steps involved, outlined in the following sections, before CRTs can be issued.

2.3.1 Project Management Structures

Who can manage my project and will I "own" the CRTs?

In the NMPP, the term "Project Owner" (PO) specifically refers to the owner of the GHG emission reductions and is ultimately responsible for compliance with the protocol. However, the various tasks involved in developing a project may be carried out by another entity, or even several, with the generic term "project developer" used to denote any of the various parties that may be involved in managing the project. Landowners and/or field managers who do not have the capabilities to carry out these tasks may hire a third-party for assistance. Multiple fields and growers may even be included in the same project, or developers may choose to aggregate multiple projects into a cooperative. Cooperatives will all be managed by a single cooperative developer, although that entity may or may not own the rights to the GHG emission reductions. In preparation for the project, it should be decided who will own the rights to the GHG emission reductions (the landowner/grower or a third party) and who will carry out offset project responsibilities. Table 2.3 references the various ownership and account types for a project or cooperative.

Table 2.3. Project/Cooperative Ownership and Account Types

Term	Definition	Required?	Registry Account Type
Field Manager	The entity with management control of the project activities. Unless we see evidence to the contrary, we assume this person/entity holds the GHG rights). This may or may not be the landowner, Project Owner, project developer, Cooperative Developer, or cooperative participant.	Yes. There will ALWAYS be a field manager identified, but they may not play any role in the monitoring, reporting and verification (MRV)	Depends. May be any of the following: <ul style="list-style-type: none"> ▪ None ▪ Project Owner ▪ Project Developer
Landowner	The entity listed on the deed to the property as the landowner.	No, unless they play one of these other roles.	None (unless they are a Project Owner or Cooperative Developer)
Project Owner (PO)	The entity which holds rights to the CRTs from the project at time of issuance.	Yes. There will ALWAYS be a PO identified.	Either Project Owner (if they are simply a cooperative participant), or Project Developer.
Project Developer (PD)	The entity which does the MRV required by the protocol.	Yes, although it may or may not be a separate entity.	A project developer who does the MRV required by the protocol and is not the Project Owner, requires a Project Developer account. A project consultant who solely provides guidance and is not also issued credits, may not be an account holder.
Cooperative Developer (CD)	The entity which manages a cooperative. The CD may or may not also be a PO.	Yes, if there is a cooperative to manage.	Project Developer
Cooperative Participant	A participant whose project or field(s) is being managed as part of a cooperative, with a separate CD.	Yes, if the project is part of a cooperative.	Project Owner, Project Developer, or neither, depending on the desired functionality.

2.3.2 Account Creation

How do I create an account with the Climate Action Reserve?

The first step in the official process is to open an account in the online registry system, also known as the Climate Action Reserve. The process for creating a Reserve user account is detailed at this site: <http://www.climateactionreserve.org/open-an-account/>. An account setup fee will be invoiced to the Project Owner.⁴ The important consideration at this step is that the account holder for the project must be the Project Owner, as defined in the NMPP:

“The entity which holds rights to the CRTs from the project at time of issuance.”

The key point here is ownership of the GHG emission reductions, as it is the single Project Owner to whom the Reserve will issue credits. Ownership of emission reductions should be determined prior to creation of a Project Owner account in the Reserve system, although it is

⁴ The Reserve fee schedule is available at: <http://www.climateactionreserve.org/how/program/program-fees/>.

possible to move the project to a different account at a later date if there is an error or a change in ownership. A project developer who does the implementation, monitoring and reporting work required by the protocol and is not the Project Owner, requires a Project Developer account.

2.3.3 Project Submittal

How do I submit a project to be listed with the Reserve?

Once the Project Owner has created a Reserve user account, the Project Owner may “create” the project in the Reserve. This process is described on this page of the Reserve website: <http://www.climateactionreserve.org/how/projects/register/>. After the Project Owner has entered the project details in the online system it will be possible to upload the Project Submittal Form,⁵ along with a list of fields, and submit the project for review.

Reserve staff will review the submittal form and respond to the project developer with any questions. If the form is complete and there is no indication that the project would violate either the protocol or the Reserve Program Manual, the project is accepted and becomes publicly listed in the Reserve. At this point project development can continue and verification can commence.

2.3.4 Project Forms

What forms do I need to complete and when?

The Project Submittal form is an important form project developers will need to become accustomed to. Other pertinent forms to become familiar with pertain to project/field transfers and cooperatives, as described in Table 2.4 below. Example scenarios of when each form would need to be used are also provided below in Table 2.5.

Table 2.4. Overview of Project Forms

Form Name	Who?	When is it Required?
Project Submittal Form	Project Developer	This form is used when a project is entering the Reserve program for the first time, whether as a standalone project or a participant in a cooperative. This includes projects which were previously listed/registered in another offset program. Critically, this form sets the start date for the project.
Project Transfer Form	Project Developer	This form supplements the Project Submittal Form when a project which was previously listed/registered in another offset program is entering the Reserve program for the first time, whether as a standalone project or a participant in a cooperative. The Project Transfer Form should be submitted with a Project Submittal Form.
Field Enrollment & Transfer Form	Project Developer	This form is used when a field(s) being added to a Listed project currently underway. This includes new field(s) or existing field(s) wishing to leave one project and join another. Complete projects that have already been submitted to the Reserve may also choose to join another existing project by submitting this form.
Cooperative Submittal Form	Cooperative Developer	This form is used to initiate a new cooperative in the Reserve program. The Project Submittal Forms for all of the participant projects will be attached to the Cooperative Submittal Form.

⁵All forms and documents related to nitrogen management projects may be found at: <http://www.climateactionreserve.org/how/program/documents/>.

Form Name	Who?	When is it Required?
Cooperative Enrollment & Transfer Form	Cooperative Developer	This form is used when a project is joining a cooperative which has already been Listed. This includes new projects or existing standalone projects.
	Project Developer	It is also used when a participant project wishes to leave a cooperative, either to become a standalone project or to join another cooperative in the Reserve.

Table 2.5. When to Use Each Project Form

Example Scenarios	Form(s) Required
A new project is created which will not be a part of a cooperative	Project Submittal Form
A new project is created which will be a part of a new cooperative	Project Submittal Form Cooperative Submittal Form
A new project is created which will be part of an existing cooperative	Project Submittal Form Cooperative Enrollment & Transfer Form
A pre-existing project from another offset program is transferred to the Reserve, which will not be a part of a cooperative	Project Submittal Form Project Transfer Form
A pre-existing project from another offset program is transferred to the Reserve, which will be a part of a new cooperative	Project Submittal Form Project Transfer Form Cooperative Submittal Form
A pre-existing project from another offset program is transferred to the Reserve, which will be a part of an existing cooperative	Project Submittal Form Project Transfer Form Cooperative Enrollment & Transfer Form
An existing standalone project wishes to join a new cooperative	Cooperative Submittal Form
An existing standalone project wishes to join an existing cooperative	Cooperative Enrollment & Transfer Form
An existing participant project wishes to leave an existing cooperative to join a new cooperative	Cooperative Enrollment & Transfer Form Cooperative Submittal Form
An existing participant project wishes to leave an existing cooperative to join a different, existing cooperative	Cooperative Enrollment & Transfer Form
An existing participant project wishes to leave an existing cooperative to become a standalone project	Cooperative Enrollment & Transfer Form Project Submittal Form
A new field is created which will be part of a new project	Project Submittal Form
A new field is created which will be part of an existing project	Field Enrollment & Transfer Form
An existing participant field wishes to leave an existing project to join another existing project or to create a new project	Project Submittal Form Field Enrollment & Transfer Form
An existing participant field wishes to join a different, existing project	Field Enrollment & Transfer Form

2.3.5 Project Start Date

How do I establish the start date of my project?

Project developers are required to select a field whose start date (i.e., first day of its cultivation year) will signify the start date for the overall nitrogen management project. The project must be submitted to the Reserve for listing before the selected field's harvest is completed, most likely within a 12-month period from its start date. Additional fields for the same cultivation year can

then be added to the project with 24 months of their start dates, even if they have been harvested, so long as their field start dates occur after the project start date. No CRTs can be earned for any activity prior to the project start date. For these reasons, the field with the earliest start date possible should be selected to trigger the project start date.

2.3.6 Monitoring Plan

What information do I need to include in the project monitoring plan?

All projects are required to prepare a detailed monitoring plan, per the requirements of Section 6 of the NMPP. A comprehensive, organized project monitoring plan (PMP) will save time and effort during verification and will help ensure that important protocol requirements do not go overlooked. The PMP should be viewed as a living document, updated for each reporting period as project activities change. For a cooperative, all participating projects should adopt the same monitoring plan format.

A comprehensive monitoring plan will address each requirement of the protocol and describe how it will be met. At a minimum, this must include the information listed in Table 1.3 and field data outlined in NMPP Section 6.3 Table 6.1 and Table 6.2. The monitoring plan will ultimately be a roadmap for the verification of the project, while also demonstrating to the verifier that the project owner understands what they are doing.

2.4 Verification

What does verification of a nitrogen management project entail?

Project developers quantify emission reductions in blocks of time known as reporting periods (Table 2.1). Reporting periods include one cultivation year, with the exception of the initial reporting period, which may include one or two cultivation years. These reporting periods must be verified before credits are issued by the Reserve. Verification bodies verify the emission reductions from each reporting period in blocks of time known as verification periods. The initial verification must be completed within 12 months of the initial reporting period, while subsequent verification periods can cover one or two reporting periods. All verification activities must be completed within 12 months of the verification period.

The project developer is responsible for coordinating all aspects of the verification process. The basic steps are as follows:

1. Engage with a verification body approved by the Reserve to verify nitrogen management projects.⁶
2. Verifier submits a Notice of Verification Activities and Conflict of Interest (NOVA/COI) form to the Reserve for review.
3. Project developer makes all requisite data and information relied on to determine eligibility and emission reductions available to the verification body, including:
 - a. Project Monitoring Plans (PMPs) (NMPP Section 6.1)
 - b. Project Monitoring Reports (PMRs) (NMPP Section 7.2.1)
 - c. completed Eligibility Lookup Tool(s) and performance standard test results
 - d. completed NMQuanTool(s)

⁶A list of approved verification bodies can be found at: <http://www.climateactionreserve.org/how/verification/connect-with-a-verification-body/>.

- e. all records relied on to determine eligibility and emission reductions; and
 - f. any further information requested by the verifier
4. Verifier conducts the following 3-step combination of risk-based and random sampling approaches to identify the minimum percentage of fields in the project or cooperative required for site visit and desk review:⁷
 - a. Verifier selects fields for site visits through a risk-based approach
 - i. Example situations that may constitute greater risk include fields generating large proportions of the emission reductions of the project, lack of historical records, and/or demonstrated poor communication of N-reduction strategies and implementation between Project Owners, Field Managers and project developers
 - b. Additional fields must be selected at random until the number of site visits meets the protocol required minimum of 5% of the total number of fields enrolled in the project with an eligible crop-county combination
 - c. Randomly select a sample of fields out of the remaining subset not selected for a site visit, to undergo a desk only review of their field data, equal to two times the square root of the total number of fields in the project
 5. Verification body documents all fields selected for planned site visits and provides list to the project or cooperative developer and the Reserve. No advance notice of which fields' data will be subject to desktop only reviews in a given verification period is given.
 6. Project verification entails assessing the following items against the requirements of the NMPP:
 - a. Evidence for the project start date
 - b. Evidence for meeting eligibility criteria
 - c. Evidence for relevant prior farm management activities applied during the baseline look-back period
 - d. Evidence for farm management activities applied during the reporting period
 - e. Ownership of the project area and the GHG emission reductions
 - f. Passing the tests for additionality
 - g. Quantification of emission reductions
 - h. Monitoring of project emission sources
 - i. Fertilizer management
 - ii. Fossil fuel and/or electricity consumption
 7. Verifier completes a detailed report and submits required documents to the Reserve for review.
 - a. Reserve staff may request additional information or documents from the verifier and/or project developer.
 8. Upon approval, the project is registered, and an invoice is generated for the CRT issuance fees.
 9. Upon payment of the issuance fees, CRTs are issued to the Project Owner and may be transferred to a buyer's account.

⁷A field is considered verified if it is in the pool of fields under consideration for site visits and/or desktop verifications, even if not selected for either a site visit or desktop verification.

CRTs are only issued following successful verification of a reporting period. The same verification body may be hired again for subsequent verifications, however, there are limits to the amount of time the same verification body can work with a project before a different one must be hired to avoid a conflict of interest (COI).⁸

2.5 Credit Issuance

How and when do I get my CRTs?

Once the Reserve approves the verification report, the reporting period is “registered” and the CRTs are created in the registry. When the Project Owner requests issuance of the CRTs, an invoice will be generated for the issuance fees. Once the issuance fees are paid, the CRTs will be issued into the Project Owner account for the project. If there is a cooperative with several Project Owners, CRTs for each project will go to the Project Owner account associated with that project. The CRTs will have serial numbers which identify, among other things, the project ID and the vintage (i.e., the year in which the GHG emission reductions occurred).

CRTs can be held indefinitely, transferred into a retirement account (where they are locked forever), transferred into a subaccount (for internal tracking purposes), or transferred to another Reserve account holder. These transfers can be setup in the system prior to CRT issuance so that they happen immediately upon payment of the issuance fees.

⁸ For further details on rotating verifiers see Section 3.7 of the Verification Program Manual, which can be found here: <http://www.climateactionreserve.org/how/verification/verification-program-manual/>.

3 Quantification

For each reporting period, the project developer will quantify the amount of GHG reductions attributable to the project activities. The calculation of emission reductions, i.e., CRTs, involves quantifying the primary effect emission reductions (PER) from the implementation of project activities using the NMQuanTool, and then, as necessary, deducting any primary effect emissions from increases in organic N rates (PE_{org}) and any secondary effect emissions (SE) from increases in fossil fuel and/or electricity use using protocol equations compared to baseline values. Figure 3.1 below provides an overview of this process.

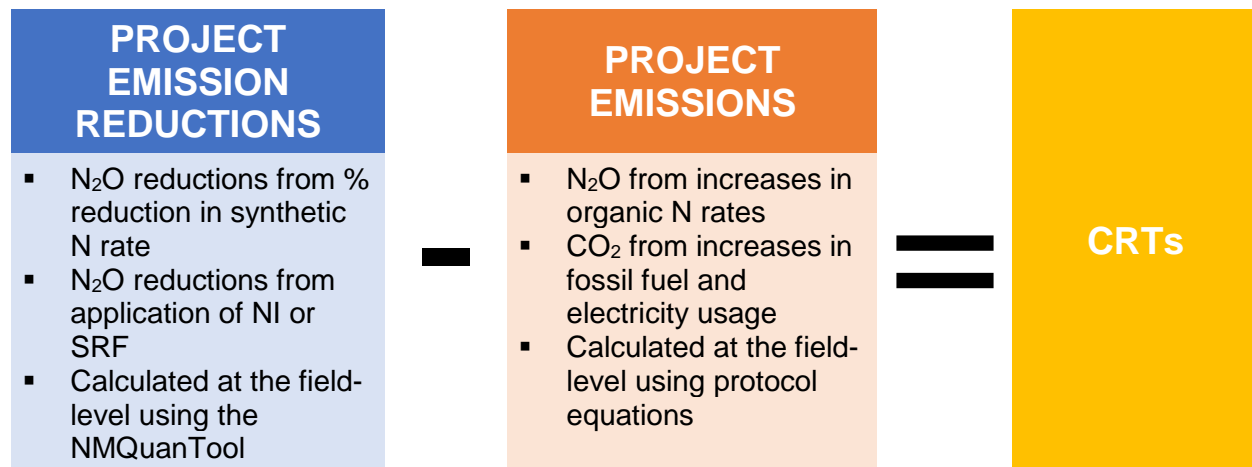


Figure 3.1. Overview of the CRT Quantification Process

The following outline summarizes the key steps involved in the quantification of CRTs:

1. Determine baseline average synthetic, organic, and total N rates (NMPP Section 5.1.2)
 - a. Identify look-back period (Section 3.2)
 - b. Select approach 1, 2 or 3 (Figure 3.2; NMPP Section 5.1.2.1)
 - i. Approach 1 or 2 (NMPP Equations 5.4 – 5.11)
 - ii. Approach 3 (Eligibility Lookup Tool)
2. Calculate project synthetic, organic & total N rates (NMPP Section 5.1.3)
 - a. Sum all N applications made during the cultivation year by type, i.e., either synthetic or organic (NMPP Equations 5.13 – 5.14)
 - b. *If applicable*, add increase in synthetic and/or organic N rate from previous cultivation year if CRTs were not earned (Section 3.5) (NMPP Equations 5.15 – 5.16)
 - c. *If applicable*, add increase in synthetic N rate due to leakage (Section 3.6) (NMPP Equations 5.17 – 5.18)
3. Calculate reduction (%) from baseline average synthetic N rate to project synthetic N rate (Equation 1.1)
4. Confirm eligibility of region-crop-activities in Eligibility Lookup Tool (Section 1.5)
5. Calculate PFP and confirm field passes performance standard test (Section 2.2)
6. Quantify emission reductions using NMQuanTool (Section 3.3)
7. Calculate N₂O emissions from increases in organic N use between baseline and project (*if applicable*) (Section 3.7)
8. Calculate CO₂ emissions from increases in fossil fuel and electricity use between baseline and project cultivation and irrigation equipment use (*if applicable*) (Section 3.8)

9. Deduct GHG emissions from steps 7 and 8 from the emission reductions calculated in step 6 (*if applicable*)
10. Sum net emission reductions from all eligible fields in project to generate CRTs (Section 3.9)

3.1 The GHG Assessment Boundary

Which greenhouse gases are included?

The protocol's GHG Assessment Boundary encompasses all the GHG sources, sinks, and reservoirs (SSRs) that may be affected by project activities, that is, from improvements to NUE. The SSRs included are distinguished between primary effect – the project's intended emission reductions – and secondary effects – the project's unintended changes – as follows:

- Primary Effect Emissions/Emission Reductions
 - Direct Nitrous Oxide (N₂O) Emissions/Emission Reductions that occur at the site of nitrogen use
 - Indirect N₂O Emissions/Emission Reductions that occur offsite from a portion of nitrogen that escapes via leaching, volatilization or runoff (LVRO)
- Secondary Effect Emissions
 - Carbon Dioxide (CO₂) Emissions from changes in fossil fuel/electricity use associated with cultivation and irrigation equipment

The eligible activities in the protocol do not result in a net change of soil carbon and soil carbon improvements and are therefore not included.

3.2 Baseline Scenario

How do I determine the baseline scenario?

The baseline scenario is the continuation of the historical cultivation and N management practices where, in the absence of the nitrogen management project, N fertilizer is applied in a "business as usual" manner. That is, the baseline is a depiction of the typical cultivation and N management practices happening before the offset project was implemented. N fertilizer application and other project activities must be compared to the same crops(s) and activities during the baseline. The NMPP uses a baseline look-back period, defined as the three most recent cultivation years of the given crop on the given field prior to the project start date, to establish the baseline scenario. Depending on the field's historical cultivation, the baseline look-back period could, for example, consist of the previous three years (monoculture), six years (three cultivation years of a two-crop rotation), or nine years (three cultivation years of a three-crop rotation) prior to the field's start date. If there is something preventing a project developer from using a particular baseline year, for instance an extreme weather event (e.g., drought) or the application of a disqualifying EEF in that year, then keep going back until finding another recent eligible baseline year with the requisite crop.

The baseline average N rate (either synthetic and/or organic) is defined as the average amount of N applied to the eligible crop in the project field over the baseline look-back period. The required project activity of synthetic N rate reduction is the reduction from the baseline average synthetic N rate. For added flexibility, the protocol provides a hierarchical approach with three different options for project developers to set their fields' baseline average synthetic and organic N rates, as follows:

- **Approach 1**
Historical N management records for that crop and field
 - **Approach 2**
Historical records of N rate recommendations from independent third-party agronomic experts for that crop and field for the years in the baseline look-back period
 - **Approach 3**
Estimated historical county average N using the Nitrogen Management Project Eligibility Lookup Tool

Figure 3.2 below shows how to select which baseline approach to use based on data availability.

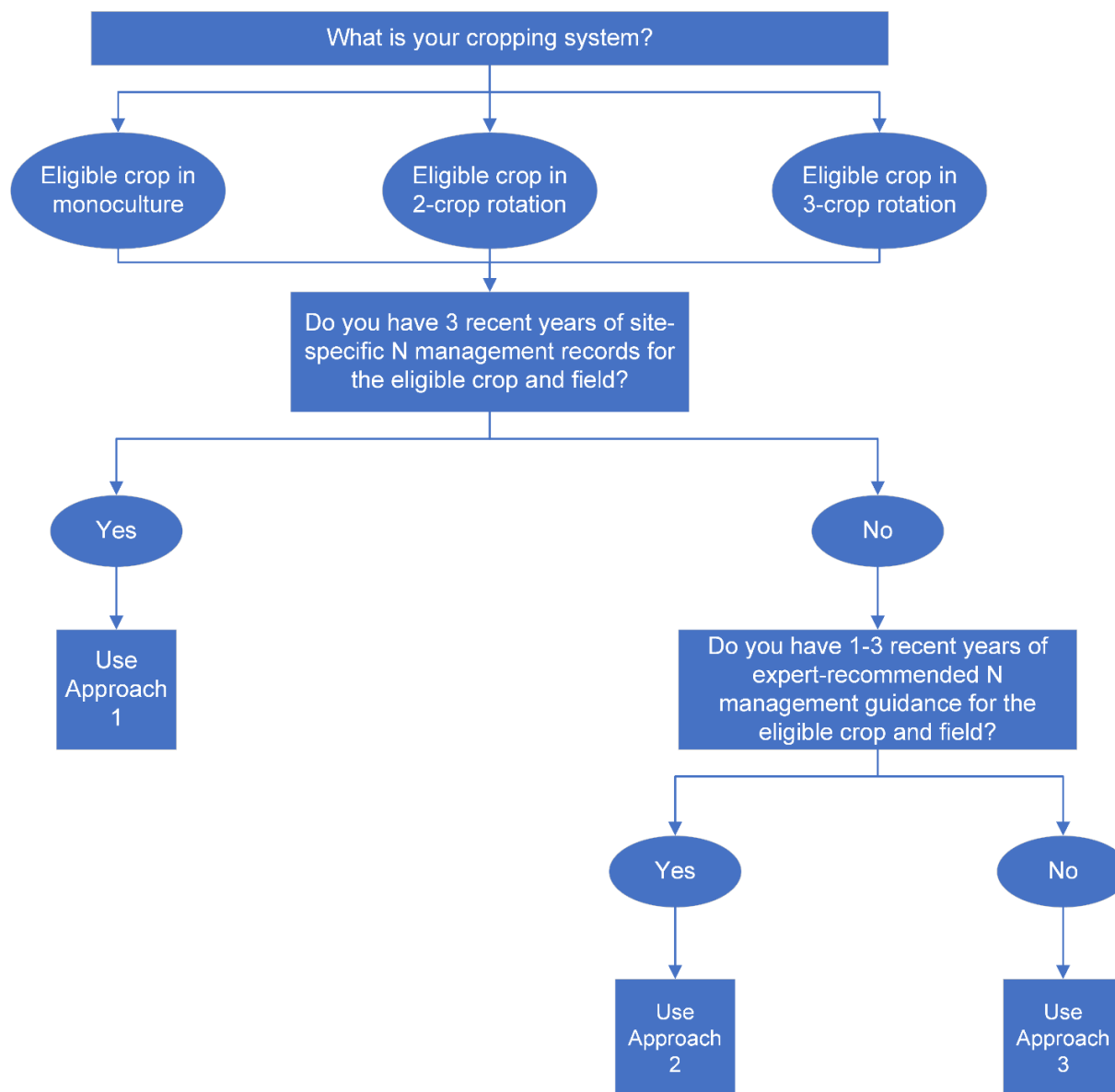


Figure 3.2. Decision Tree for Selecting Baseline Approach

3.3 NMQuanTool

What is the NMQuanTool?

To improve the ease of emissions quantification, NMPP V2.0 employs the use of an emission factor-based quantification tool, coined the NMQuanTool. Built in Microsoft Excel, the NMQuanTool calculates N₂O emission reductions resulting from the implementation of eligible nitrogen management project activities in tandem with the field's region, crop and other farm management practices (i.e., irrigation status and tillage practice). Quantification of a nitrogen management project cannot be carried out without use of the use of the NMQuanTool.

What does the NMQuanTool quantify?

The NMQuanTool calculates the field-level reductions in N₂O emissions from the baseline to the project, based on:

- Percentage reductions in synthetic N rate
- Use of an EEF (if applicable)
- Irrigation status; and
- Tillage practice (i.e., either full till or no till)

It then sums the results for up to 20 fields per tool. For projects with more than 20 fields, additional copies of the NMQuanTool will need to be utilized to calculate and then sum all emission reductions stemming from the complete project. The process would be similar for cooperatives.

Any increases in N₂O emissions associated with increases in organic N rate from the baseline to the project and any increases in CO₂ emissions associated with increases in fossil fuel equipment and/or electricity from the baseline to the project are calculated outside of the tool using protocol equations.

How do I use the NMQuanTool?

As with the Eligibility Lookup Tool, prior to using the NMQuanTool, project developers must first calculate percentage reductions in synthetic N rates from the baseline per project field, per eligible cultivation year (Equation 1.1). Project developers must then round down the reduction in synthetic N rate to the nearest applicable value and select that percentage reduction as the Nitrogen Fertilizer Reduction (%) in the applicable drop-down menu in the NMQuanTool. Additionally, prior to using the NMQuanTool, project developers must utilize the Nitrogen Management Project Eligibility Lookup Tool to check and confirm their fields' combinations of region-crop-activities are eligible.

To use the NMQuanTool, for each field project developers enter the Field ID and make the same series of selections from drop-down menus as in the Eligibility Lookup Tool for the following field conditions:

- State
- County
- Crop
 - Please note that Barley, Oats, Spring Wheat (Durum) and Spring Wheat (excluding Durum) are grouped under "Spring Small Grain"
- Synthetic Nitrogen Fertilizer Reduction (%) (rounding down)
- Irrigation Status (yes/no)

- Enhanced Efficiency Fertilizer Use (NI, SRF, None)
- Conversion to Short Term No Till (yes/no)

Field size (acres) must also be input into the applicable cell of the tool. Once all inputs and selections are completed, the baseline emissions and project emission reductions per field, as well as the sum total for up to 20 fields, will automatically populate toward the bottom of the tool.

For detailed instructions, please see the first spreadsheet in the NMQuanTool, which is available upon request by sending an email to policy@climateactionreserve.org.

3.4 Enhanced Efficiency Fertilizers

Why can I not earn CRTs for applying both nitrification inhibitors and slow release fertilizers?

Projects that employ N rate reductions and both nitrification inhibitors and slow release fertilizers are eligible, however, the NMQuanTool is only capable of quantifying emission reductions associated with the implementation of one of the EEFs and not their combined impacts. Both EEF products serve similar functions and stacking one another would not be expected to result in cumulative benefits (i.e., benefits are not additive). Additionally, it is not anticipated that multiple EEFs would be applied simultaneously in practice. If seeking CRTs for either of the EEFs, project developers must select only one of them in the NMQuanTool.

3.5 Previous Cultivation Years

When do I adjust project N rates in the current cultivation year for N applied in the previous cultivation year?

The NMPP allows flexibility in dealing with instances where the project developer either cannot or does not want to claim CRTs for a given crop cultivation year. These situations, which do not count as a reporting period, include:

- Fields left fallow;
- Fields cultivating an ineligible crop (e.g., soy as part of a corn-soy rotation); and
- Fields cultivating an eligible crop, but either do not meet protocol requirements (such as the performance standard, verification requirements, regulatory compliance requirements, etc.), or are voluntarily withdrawn for that eligible crop year

Even if a field is not generating CRTs in a given cultivation year, once enrolled it must continue to meet continuous monitoring and reporting requirements (Table 1.3).

If CRTs are not earned in the previous cultivation year prior to the current project cultivation year, and if either synthetic and/or organic N rate increased from baseline levels in the previous cultivation year, that increase in synthetic and/or organic N rate must be added to the project synthetic and/or organic N rate in the project cultivation year. For example, if the amount of synthetic N applied to soy in the soy cultivation year of a project field with a corn-soy rotation increased by 10 pounds per acre above the soy's baseline average synthetic N rate, then the project synthetic N rate in the subsequent corn cultivation year would need to be increased by 10 pounds per acre. This would then result in a decreased percentage synthetic N rate reduction between the baseline and project for the corn field, and a decrease in CRTs.

These restrictions are intended to ensure excessive N is not applied in intervening cultivation years, with the intent to have residual N then affect the subsequent eligible crop cultivation year.

3.6 Leakage

When do I adjust project synthetic N rate for leakage?

Leakage refers to an increase in GHG emissions outside the project area that may occur due to project activities. The concept of leakage is internalized in the NMPP as such: if a project reduces its N rate to the point yield significantly declines, that will cause farmers elsewhere to apply more N to produce more of that crop. To counter this, NMPP Section 5.1.3.2 requires users to determine if there was a statistically significant drop in project yield compared to the normalized historical average yield over the baseline look-back period using USDA National Agricultural Statistics Service (NASS) data. If so, NMPP Equation 5.18 directs users to increase their project N rate proportionately, and thus minimizes the N rate reduction to account for such leakage. If not, then no further changes to project N rate are required. Similarly, the project N rate does not need to be adjusted if the decline in yield is a direct result of extreme weather events, such as flood, fire or drought.

Yield data from USDA NASS can be readily retrieved using the Quick Stats Database, accessible at the following address: <https://quickstats.nass.usda.gov/>. Once there, follow the steps below to download the applicable yield data. Note, yield data for more than one crop and region can be downloaded at the same time.

Under the “Select Commodity” section:

1. Select “Crops” from the “Sector” menu
2. Select “Field Crops” for all eligible crops less tomatoes and “Vegetables” for tomatoes from the “Group” menu
3. Select the applicable eligible crop(s) from the “Commodity” menu
4. Select “Yield” from the “Category” menu
5. Select the “Yield, measured in *units/acre” for the applicable eligible crop(s) from the “Data Item” menu

Under the “Select Location” section:

6. Select “County” from the “Geographic Level” menu
7. Select the applicable State(s) from the “State” menu
 - a. If retrieving data for a large number of counties, it is recommended to make no more selections in the “Location” section
 - b. If only retrieving data for a small number of counties, it is recommended to select the few applicable counties from the “County” menu

Under the “Select Time” section:

8. Select the year(s) associated with the project’s baseline look-back period

After making all selections, click “Get Data”

9. On the new page, click “Spreadsheet” to download an Excel copy of the yield data based on the user selections

Note, if following baseline approach 3, the average yield can be retrieved from the Eligibility Lookup Tool.

Also, please note, at the time of this writing, Reserve staff are working to develop a tool to streamline the leakage assessment for project developers, and will notify stakeholders once available.

3.7 Organic N Applications

When do I need to deduct N₂O emissions from organic N applications?

Any time organic N rate increases from baseline levels, the project must account for and deduct the direct and indirect N₂O emissions stemming said increases in organic N use. If no organic N is applied in the project, if organic N rate decreases in the project, and/or if organic N rate does not change from baseline to the project, then this step does not pertain.

When selecting the baseline approach and determining the baseline average organic N rate, if organic N was used during the field's baseline look-back period, it is important to take the following into consideration:

- **Approach 1**
If grower records of organic N use are non-existent or insufficient, it will be assumed any organic N applied in the project is an increase from the baseline
 - **Approach 2**
If records of agronomic guidance do not recommend a specified amount of organic N to apply distinct from synthetic N, it will be assumed any organic N applied in the project is an increase from the baseline
 - **Approach 3**
This approach is not applicable for the determination of the baseline average organic N rate. As such, it will be assumed any organic N applied in the project is an increase from the baseline

Without sufficient data on the relationship between organic N and N₂O emissions to inform the development of the NMQuanTool, the tool is unable to quantify N₂O emissions from organic N sources and is strictly for synthetic N use. However, two validated quantification approaches exist for calculating N₂O emissions from organic N rates:

1. Michigan State University and Electric Power Research Institute (MSU-EPRI)⁹
2. Intergovernmental Panel on Climate Change (IPCC)¹⁰

The MSU-EPRI approach is specifically limited to quantifying direct N₂O emissions from corn fields in the U.S. North Central Region¹¹ using NMPP Equation 5.20, while the IPCC method is applicable to quantifying direct N₂O emissions for all other crops and regions using NMPP Equation 5.21 and indirect N₂O emissions for all crops and regions using NMPP Equation 5.22.

Field-level N₂O emissions from increases in organic N rate must then be summed together for all fields in the project and subtracted from the project's primary effect emission reductions.

Why are organic N rate reductions not eligible for CRTs?

As part of the update process to Version 2.0, the Reserve conducted an expansive literature review to assess whether there were enough published studies, field data and/or statistics supporting the N₂O emission reduction benefits of a suite of fertilizer best management practices. Based on the results of this review, supplying nitrogen in organic forms (e.g., manure,

⁹ Millar et al. (2012). *Methodology for Quantifying Nitrous Oxide (N₂O) Emissions Reductions by Reducing Nitrogen Fertilizer Use on Agricultural Crops*. American Carbon Registry, Winrock International, Little Rock, Arkansas. July 2012.

¹⁰ Available here: https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/4_Volume4/V4_11_Ch11_N2O&CO2.pdf

¹¹ The U.S. States in the North Central Region include: Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin.

compost, crop residue, etc.) demonstrated inconsistent results when it came to N₂O emission reductions – that is, the reviewed studies showed either an increase, decrease or no change in N₂O emissions from changes in the rates of organic N applications. The inconsistency may be attributed to variations in the type, nutrient content, application method, and organic to synthetic ratios, difficulties in distinguishing emission reductions strictly from organic sources when applied in tandem with synthetic fertilizer, and a general overall lack of sufficient data.

Please note that the combination of eligible nitrogen management activities, crops, and regions will be updated over time as new data allows.

Unable to demonstrate a consistent reduction in N₂O emissions, organic N rate reductions are not eligible for CRTs. However, organic N applications are permissible in the project area, under the following two conditions to keep organic N use in check:

1. Total N rate (synthetic plus organic) must decrease below baseline levels; and
2. Quantifying and deducting N₂O emissions associated with increases in organic N rate from baseline levels from the emission reduction calculations via the NMQuanTool

Without such measures in place, projects may compensate for reductions in synthetic N with gains in organic N, which would negate the CRTs earned for synthetic N rate reductions.

3.8 Fossil Fuel and Electricity Use

When do I need to deduct CO₂ emissions resulting from fossil fuel and/or electricity use?

CO₂ emissions from cultivation and irrigation equipment may increase, decrease or go unchanged as a result of project activities. As with organic N rate use, if fossil fuel and/or electricity use increase as a result of the project, the associated increase in CO₂ emissions must be calculated and subtracted from the total calculated primary effect emission reductions.

Examples of such potential instances include:

- Purchasing/renting new cultivation and/or irrigation equipment
- Increasing the number of fertilizer applications/splitting applications
- Increasing irrigation frequency

However, if the project can demonstrate that fossil fuel and/or electricity use is reasonably expected to increase by 5 percent or less, relevant to usage over the baseline look-back period, the emissions associated with such usage do not need to be accounted for.

In order to assess whether usage has increased by more than 5 percent relative to baseline usage, levels of fossil fuel and electricity usage may be estimated through a conservative method proposed by the project developer and deemed acceptable by the verifier. The project developer could also qualitatively assert to their verifier and demonstrate that no significant changes have occurred in their management practices (e.g., the same or commensurate equipment is being used, the same number of fertilizer applications are being made, the same irrigation frequency is maintained, etc.). If the verifier is satisfied that fossil fuel and/or electricity usage did not increase by more than 5 percent, then there is no need to calculate such emissions. If electricity and/or fossil fuel usage is reasonably expected to have increased by more than 5 percent, then the project developer must account for emissions associated with such increases by using NMPP Equation 5.29.

3.9 Summing it All Together

How do I determine the amount of emission reductions for CRT issuance?

The quantification of emission reductions is carried out separately for each individual field within a project each reporting period. The sum total of all emission reductions from all fields in the project constitute the number of CRTs. Similarly, the quantification of emission reductions is carried out separately for each individual project within the cooperative; the cooperative structure does not change the quantification methodology contained within this section. CRTs are serialized and issued to individual projects, rather than the cooperative.

4 Cooperatives

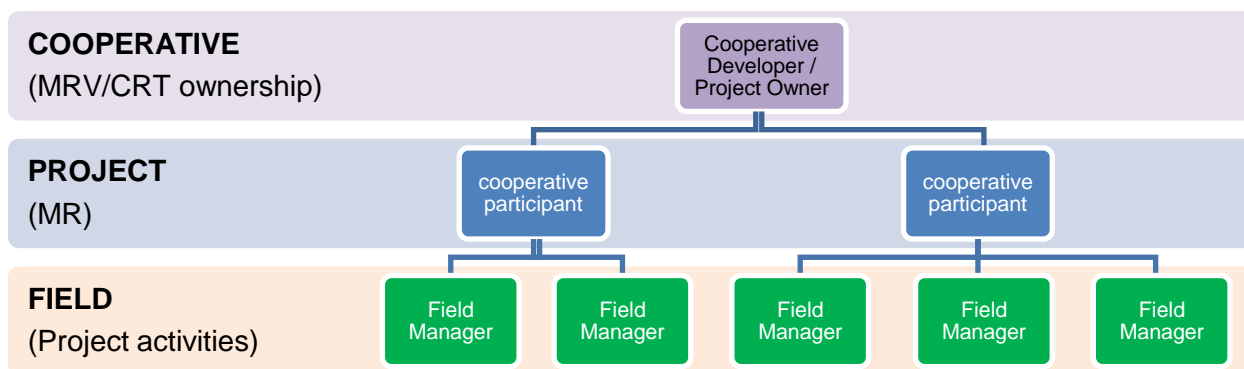
Project Owners can choose to enroll nitrogen management projects into a “cooperative,” which is a collection of two or more individual nitrogen management projects managed by a common entity (NMPP Section 2.2). Cooperatives can reduce the administrative burden faced by individual nitrogen management projects, as projects within a cooperative undergo joint monitoring, reporting, and verification activities. Project Owners who wish to minimize their interaction with the Reserve system and are willing to relinquish project management duties are strongly encouraged to join a cooperative, or possibly even another project.

4.1 Cooperative Ownership

How does the ownership structure differ for a cooperative?

Table 2.3 in Section 2.3 above outlines the roles of each entity involved in a project and cooperative. Each cooperative is managed by a “Cooperative Developer” (NMPP Section 2.4). The Cooperative Developer may act as the Project Owner for all nitrogen management projects within the cooperative, a portion of the projects, or none of the projects, i.e., have no GHG ownership claims to any of the projects within the cooperative. Figure 4.1 below illustrates two ownership structures which may occur within a cooperative.

- 1) Example of a cooperative in which the Cooperative Developer is also the Project Owner



- 2) Example of a cooperative in which the Cooperative Developer carries out project MRV but is not the Project Owner

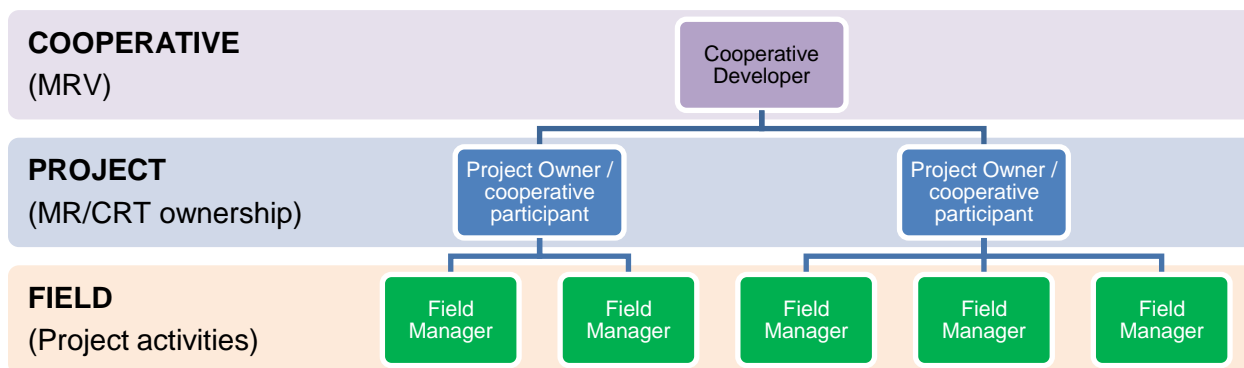


Figure 4.1. Two Examples of a Cooperative Structure

In the first diagram, the Cooperative Developer maintains responsibility for the overarching MRV requirements for all projects within the cooperative and owns the CRTs. The Cooperative Developer would open a Project Developer account with the Reserve. The cooperative participants function as project developers conducting the monitoring and reporting (MR) for the projects they oversee, while the Field Managers implement the project activities on the field(s) within each project. Neither would need to open an account with the Reserve. In the second diagram, the Cooperative Developer maintains responsibility for the overarching MRV requirements for all projects within the cooperative but does not own the CRTs. The Cooperative Developer would open a Project Developer account with the Reserve, and the cooperative participants conducting the MR for the projects they oversee and owning the CRTs, would open Project Owner accounts. The Field Managers implementing the project activities on the field(s) within each project would not need to open an account with the Reserve.

4.2 Cooperative Formation

How is a cooperative formed?

After opening a Reserve user account, the Cooperative Developer can form a cooperative in the Reserve system. The individual projects within the cooperative are created by Project Owners, but the Cooperative Developer must submit the information related to those projects in the Cooperative Submittal Form (Table 2.4). New or pre-existing projects can be added to a cooperative after the cooperative has been formed, and projects can leave a cooperative at any time, provided the continuous reporting requirements are met. All of the projects within a cooperative must report under the same version of the protocol, and projects can choose to update to the latest version of the protocol in any reporting period.

Cooperatives are not bound to a specific crediting period; rather, the length of time a cooperative can report emission reductions corresponds to the crediting periods of the individual projects within the cooperative. When a new project enters an existing cooperative, that cooperative can continue to operate for the duration of that project's remaining crediting period.

4.3 Cooperative Monitoring, Reporting and Verification

How is cooperative MRV conducted?

The Cooperative Developer is responsible for the overall MRV of the cooperative, including coordinating verification services of the projects enrolled, while cooperative participants may be tasked with project-level monitoring and reporting. It is recommended that the Cooperative Developer draft and update a single monitoring plan that contains information on every project within the cooperative, since having all of the data in one place can reduce the costs and timeframe of a verification (see NMPP Table 6.1 and Table 6.2 for a list of required monitoring parameters). However, if the Cooperative Developer chooses to aggregate monitoring data in this fashion, it must be demarcated such that the verifier can easily identify information pertaining to individual fields within the individual projects. This can be accomplished through the use of separate tabs, rows, etc. for each project.

GHG reductions must be quantified separately for each project, but the Cooperative Developer has the ability to consolidate the reported reductions of the entire cooperative much like the monitoring data. The required documentation must be uploaded to the Cooperative Developer's account in the Reserve system, and certain documents such as proof of ownership and maps must be submitted for each individual project within the cooperative. Cooperative Developers are allowed to consolidate project-specific documentation into a single file or zipped folder

before uploading to the system. For example, the Attestations of Title for every project can be combined into a single PDF and uploaded once per cooperative reporting period.

Cooperatives have the same verification scheduling options as individual projects to demonstrate field-level conformance to the protocol (Table 2.1); the verification period for the initial reporting period is limited to the length of the initial reporting period, while subsequent verification periods can cover one or two reporting periods. Projects within a cooperative will likely have different start dates and reporting periods, but the cooperative reporting period, and thus verification period, encompasses the complete length of time of all projects' reporting periods within the cooperative. As with monitoring and reporting, verifiers are allowed to consolidate their findings for all projects within the cooperative into a single verification report.

4.4 Cooperative CRT Issuance

How are CRTs issued in a cooperative?

In many cases, the Cooperative Developer will not have ownership rights to all of the projects within the cooperative. Therefore, the Reserve system issues CRTs to each Project Owner account based on the reductions generated per project rather than issuing the sum to the Cooperative Developer. This approach is designed to reduce transfer activities, simplify contracts, and minimize ownership disputes.