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Nitrogen Management Project Protocol (NMPP) Version 2.0

11/28/2018

Housekeeping

- Audio is available via telephone and computer
- All attendees will be muted; please ask questions via the chat function
- We will answer as many questions as possible at the end of the webinar
- A recording of the webinar will be made available online after the event
- Please contact the Reserve with questions not addressed
- Thank you again for joining us today. Enjoy the webinar!

Agenda

- Introduction
- Background
- Definitions
- Eligibility Rules
- Quantification
- Monitoring, Reporting, and Verification
- Questions

Climate Action Reserve



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Private, nonprofit dedicated to market based solutions to combat climate change

- Develop carbon offset policies and protocols
- Manage a registry of voluntary offset projects
- Oversee independent verification program
- Accredited Offset Project Registry for California Air Resources Board

18 different project protocols for U.S. and Mexico

>120M offset credits issued, both voluntary and compliance (CA)



Reserve Staff

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- Protocol development

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BACKGROUND

What is the NMPP?

Voluntary carbon offset protocol that credits for reductions in nitrous oxide (N₂O) emissions from the adoption of nitrogen management practices beyond what is projected to happen in the absence of a carbon market

- **Nitrogen management (NM)**: the addition and management of nitrogen (N) to agricultural soils to increase the supply of N to crops, chiefly through the application of fertilizers
- Contains rules and procedures for users to earn carbon credits, termed Climate Reserve Tonnes (CRTs), for the greenhouse gas (GHG) emission reductions (ERs) associated with the implementation of NM best practices

The Need for the NMPP

Studies continue to show that farmers apply N in excess of crop needs*

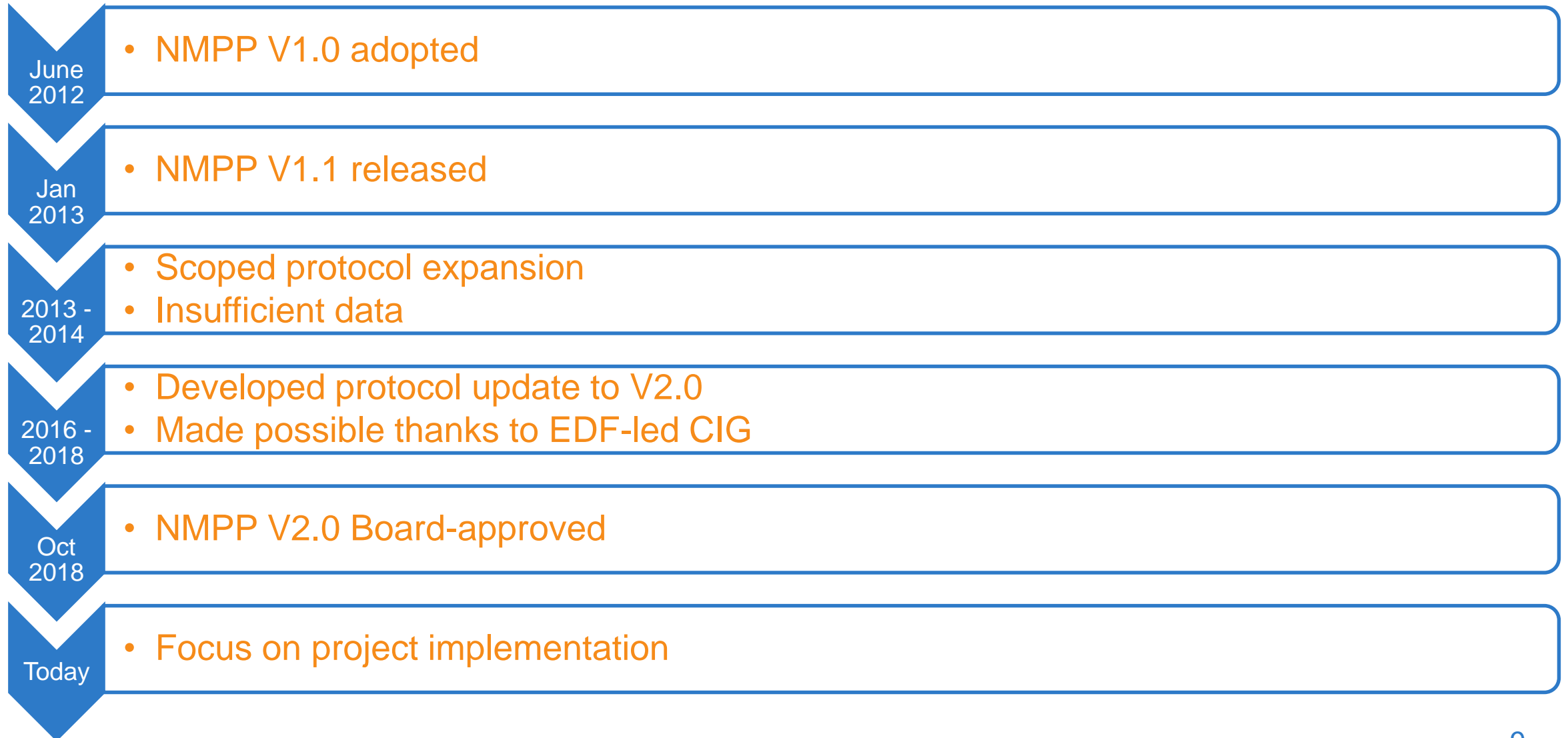
Soil N can be converted to N₂O, a GHG ~300x as potent as carbon dioxide (CO₂)

2016 U.S. Ag N₂O emissions = **283.6 million metric tons (MMt) CO₂e****

- Equivalent to 70 coal-fired power plants in one year
- 4.4% of total U.S. GHG emissions; 76.7% of total U.S. N₂O emissions
- 13.2% higher than 1990 levels
- Expected future increase in activities driving N₂O emissions to meet crop demand

> 20% of U.S. Ag GHG emissions attributed to synthetic fertilizers***

NMPP Timeline





DEFINITIONS

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 N₂O emissions

- Multiple fields, each employing a different combination of crop and project activities, 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”
- No size limits

Eligible Project Activities

There are 2 creditable project activities for this protocol:

1. Synthetic N Rate Reduction (*Required*)

- Reduction in the annual synthetic nitrogen application rate compared to baseline levels, without going below N demand

2. Use of an Enhanced Efficiency Fertilizer (EEF) (*Optional*)

- *Either* the application of nitrification inhibitors (NIs) *or* the conversion from conventional fertilizers to slow release fertilizers (SRFs)

Accounts for Organic N Applications, Irrigation and Tillage Practice

Eligible Crops and Regions

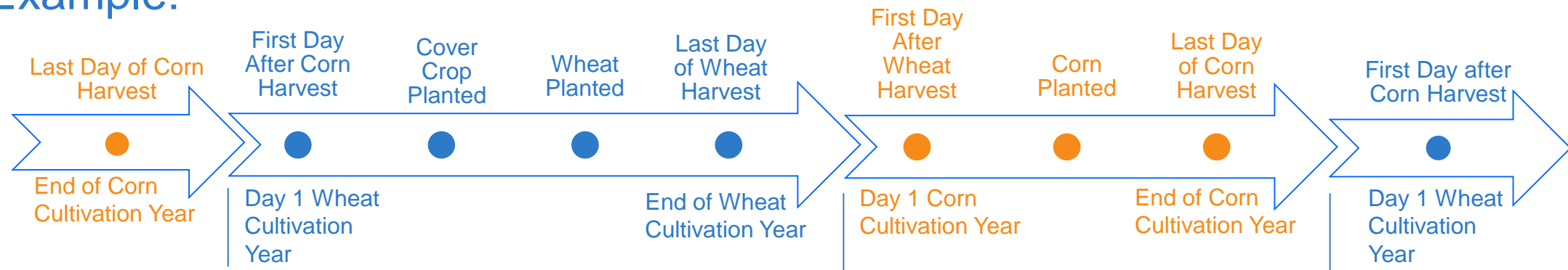
CROP	STATE
Barley	AZ, CA, CO, ID, MN, MT, ND, OR, PA, VA, WA, WY
Corn (Grain)	CO, GA, IL, IN, IA, KS, KY, MI, MN, MO, NE, NY, NC, ND, OH, PA, SD, TX, WI
Corn (Silage)	IA, MN, NY, ND, PA, WI
Cotton	AR, GA, MS, MO, NC, TN, TX
Oats	IL, IA, KS, MI, MN, NE, NY, ND, OH, PA, SD, TX, WI
Sorghum	CO, KS, NE, OK,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

Cultivation Year (CY)

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

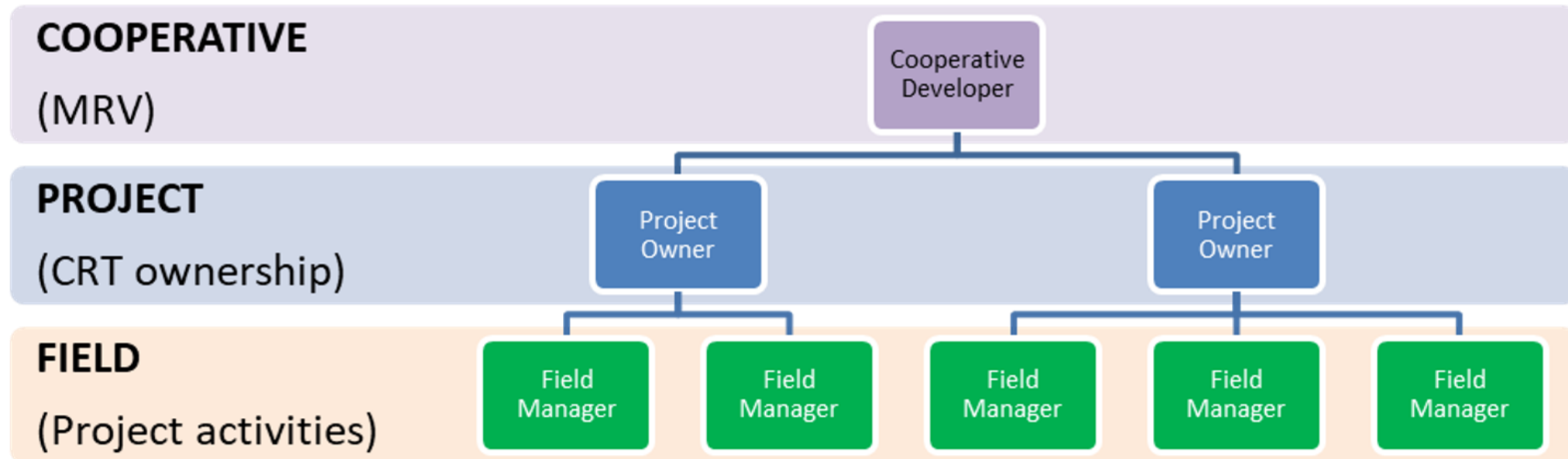
- Primary crop = the main production crop grown on a field in a given year
- Each type of primary crop in a rotation has a distinct CY
- Cover crops are included in the CY of the subsequently planted primary crop
- Approximately a 12 month period (all eligible crops are annuals)

Example:



Project Structure

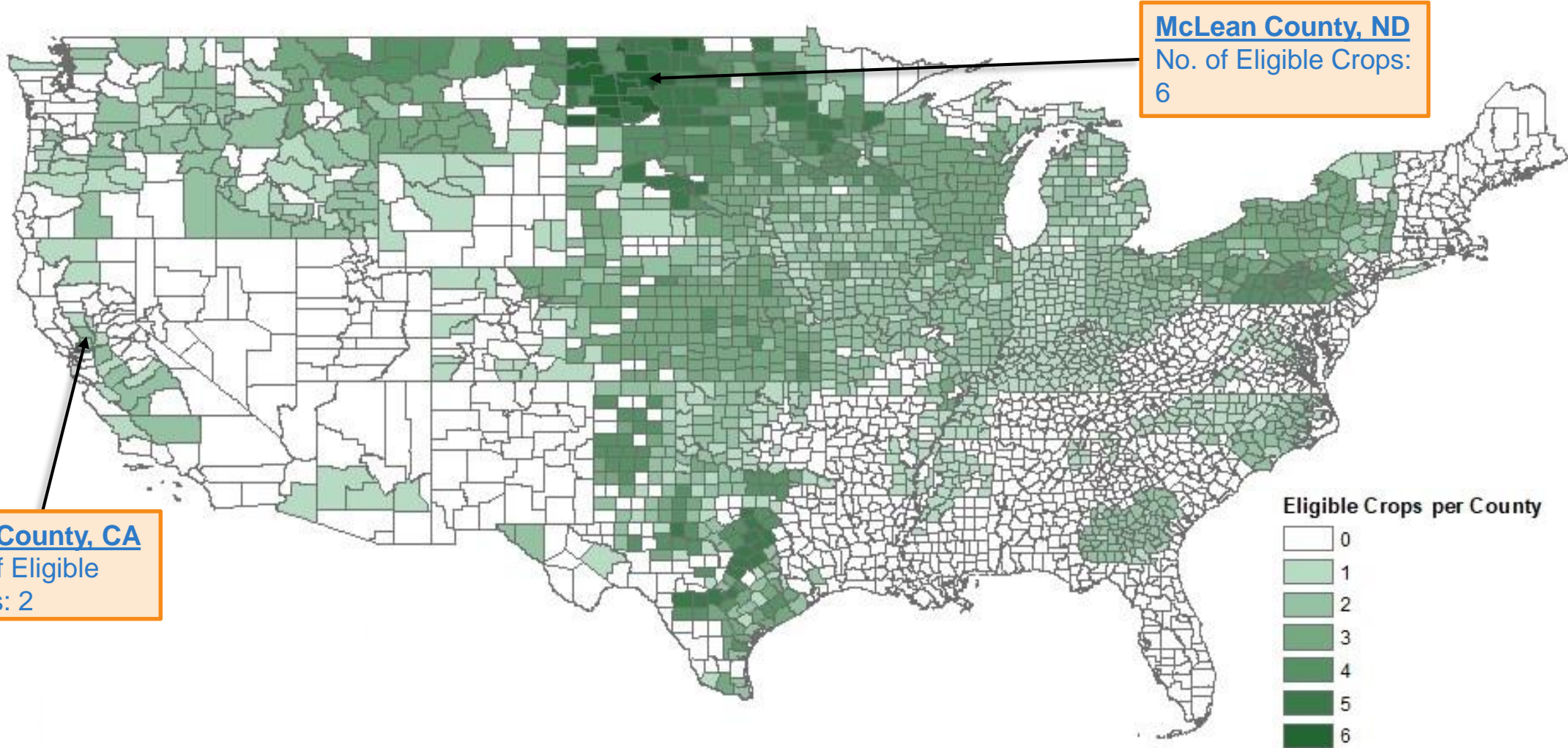
ROLE	DEFINITION	ACCOUNT TYPE
Field Manager	Manges the project activities	None, PO or PD
Project Owner (PO)	Owms the credits (CRTs)	PO or PD
Project Developer (PD)	Manages a project	PD
Cooperative Developer (CD)	Manages a cooperative	PD





ELIGIBILITY RULES

Location



Yolo County, CA
No. of Eligible
Crops: 2

McLean County, ND
No. of Eligible Crops:
6

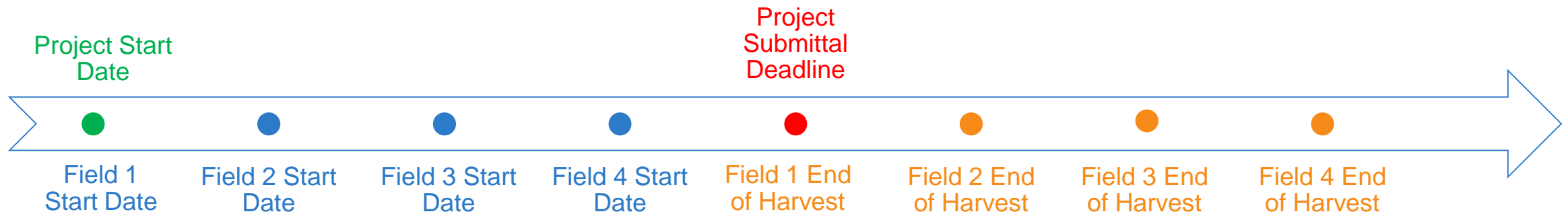
The first day of a new CY during which eligible activities are implemented on a field

Project start date must be nominated for projects with multiple fields

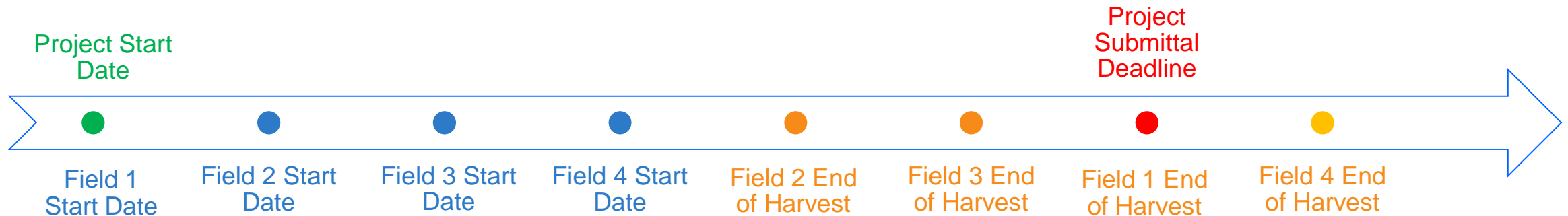
- To set project start date, must nominate one field, the start date of which will be used as the project start date
 - Project must be submitted before the end of that field's CY
- For all other fields, must nominate a start date after the project start date, and the field must be submitted within 24 months of its start date
- No CRTs can be earned for activities prior to the project start date

Start Date - Examples

Example 1 – Conventional Scenario



Example 2 – Subsequent Fields Harvested prior to Initial Field



Reporting Period (RP)

The period of time over which GHG ERs from project activities are quantified

Equal to one complete CY of an eligible crop (i.e., eligible crop year)

Projects with multiple fields may experience overlapping RPs

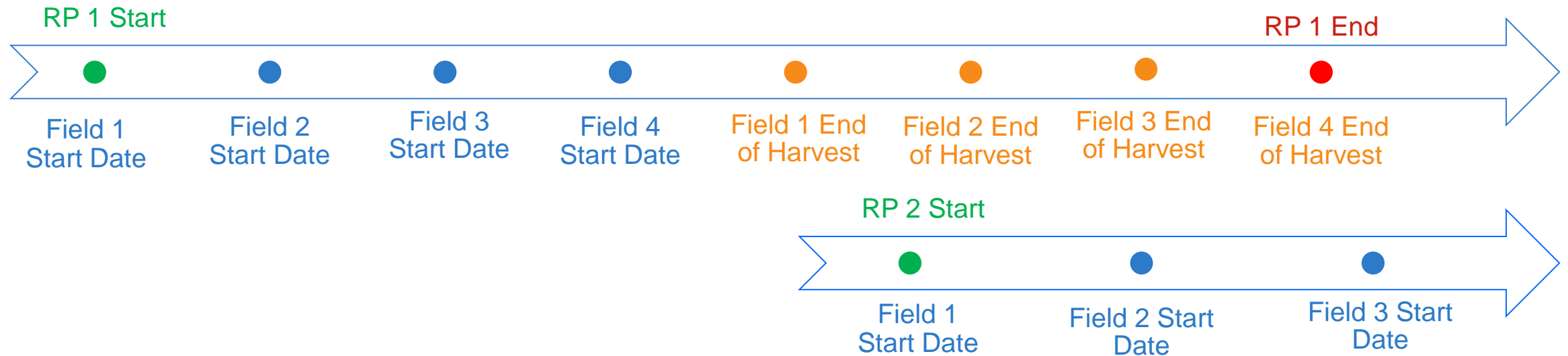
Initial RPs may consist of two CYs

CYs that will *not* count as RPs include:

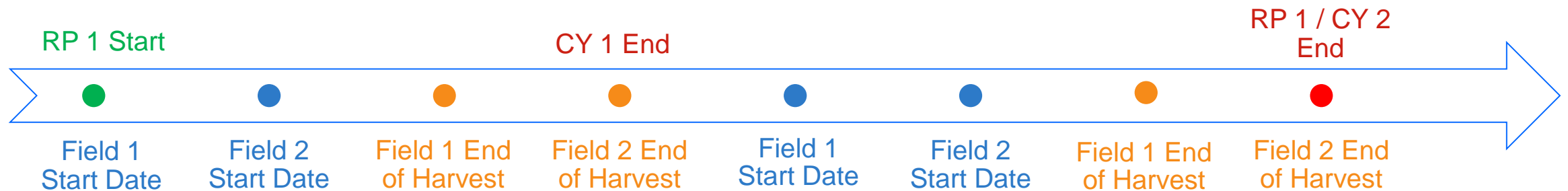
- Fields left fallow;
- Fields cultivating an ineligible crop; and
- Fields cultivating an eligible crop, but either do not meet protocol requirements or are voluntarily withdrawn for that eligible crop year

Reporting Period Examples

Example 1 – Conventional Scenario with Overlapping RPs



Example 2 – Initial RP with 2 CYs



Crediting Period (CP)

The period of time over which projects can earn CRTs

Defined as 10 RPs:

- Projects and fields are each limited to a max of 10 RPs per CP
- Only eligible years in which CRTs are earned are treated as RPs
- It is possible not all fields will reach their 10-RP limit

Continuous monitoring and reporting is mandated throughout

May be renewed one time for a max of 2 CPs

Project fields must satisfy the following tests to be considered *additional* (i.e., would not have occurred without the carbon market)

1. The performance standard test

- Pass by meeting a performance threshold, i.e., a standard of performance applicable to all projects

2. The legal requirement test

- Pass when there are no laws, statutes, regulations, etc., that require adoption or continued use of eligible activities

3. The credit/payment stacking test

- Pass when not receiving ecosystem credits inclusive of the GHG benefits from nor payments for the adoption or continued use of eligible activities

Synthetic N Rate Reductions

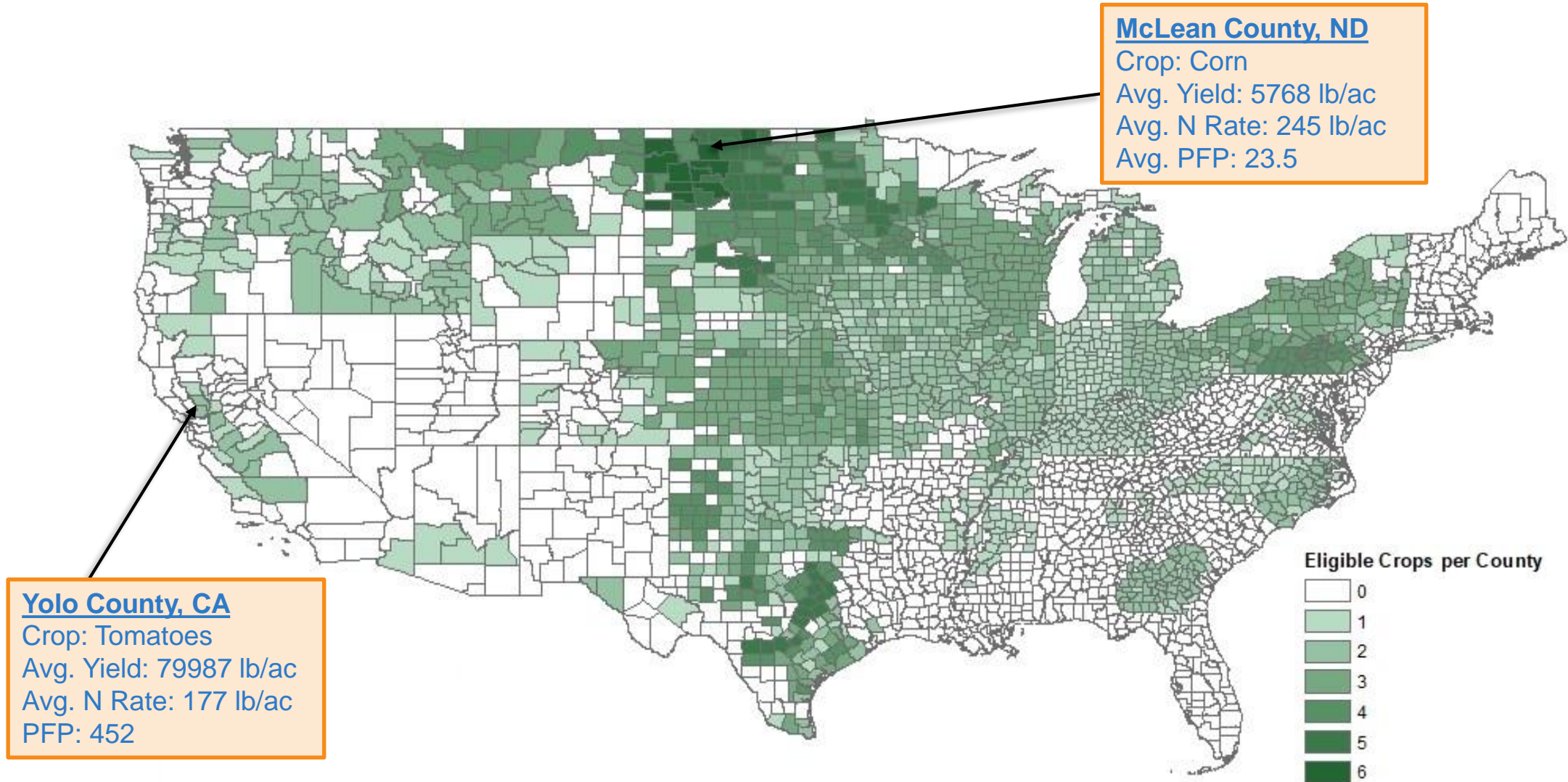
Growers must demonstrate that each project field's nitrogen use efficiency (NUE) exceeds the 3-year county average (“benchmark”)

- Assessed at the field level; must be calculated and passed each RP
- NUE Metric: Partial Factor Productivity (PFP)
- $$PFP = \frac{\text{Crop Yield}}{\text{TOTAL N Rate}}$$
- PFP benchmarks are found in Eligibility Lookup Tool

Enhanced Efficiency Fertilizers

Growers that apply NIs or switch to SRFs, and have not done so in the baseline, *and* pass the above test, pass the test for EEFs

Performance Standard Test - Examples





Eligibility Lookup Tool Demonstration

No laws must be broken in the implementation of a project

- If a verifier finds that activities on any given project field(s) have caused a material violation, then CRTs will not be issued for ERs that occurred on that given field during the period(s) when the violation occurred



QUANTIFICATION

Quantification Overview

ERs are quantified by comparing baseline and project activities

$$\text{CRTs} = \text{ER} = \text{PER} - \text{PE}_{\text{org}} - \text{SE}$$

PER

- **Primary Effect Emission Reductions** from the implementation of eligible NM activities
- Primary Effect Emissions = Direct and Indirect N₂O Emissions
- Quantified using the NMQuanTool

PE_{org}

- **Primary Effect Emissions** from increased **organic N** applications (*if applicable*)
- Calculated using protocol equations

SE

- **Secondary Effect Emissions** (may be *de minimis*)
- CO₂ emissions from increased fossil fuel use from cultivation and irrigation equipment
- Calculated using protocol equations

Baseline Scenario

Baseline Look-Back Period: Period of at least 3 years immediately prior to the field's start date that comprises at least 3 eligible crop cultivation years

Baseline Average N Rate: Average amount of N applied to the eligible crop in the project field over the baseline look-back period

Selection of Average Baseline N Rate - Hierarchical Approach

1. Historical N application records

2. Historical expert recommendations

➤ If no/insufficient records

3. County average N rate benchmarks

➤ If no/insufficient records or agronomic guidance

Primary Effect Emission Reductions

NMQuanTool: User-friendly Excel tool to quantify N₂O ERs

1. Calculate synthetic N rate reduction (%) between baseline and project

Project Synthetic N Rate

Total synthetic N rate applied over entire CY

Increase from CYs in which CRTs are not claimed (*if applicable*)

Increase due to production shifting (*if leakage*)

2. Confirm eligibility using Eligibility Lookup Tool
3. Enter minimal inputs and make series of selections from drop down menus
4. Sum ERs for all fields in the project

NMQuanTool Example

Field Name	State	County	Crop	Field Acres	Nitrogen Fertilizer Reduction (%)	Irrigated?	Enhanced Efficiency Fertilizers?	Conversion to Short Term No-Till?
1	ND	McLean	Corn	500	20% fertilizer reduction	No	None	No
2	CA	Yolo	Tomatoes	200	30% fertilizer reduction	Yes	Nitrification Inhibitor	No

Field Name	Acres	Baseline emissions (tCO ₂ -e / field)	Emission Reductions (tCO ₂ -e / field)
1	500	215.050	14.739
2	200	88.951	33.309

	Acres	Total Project Baseline emissions (tCO ₂ -e)	Total Project Emission Reductions (tCO ₂ -e)
Total	700	304.00	48.05



MONITORING, REPORTING, AND VERIFICATION

Monitoring Plan and Report

Requires a Monitoring Plan and Monitoring Report to be established for all monitoring and reporting activities associated with the project

- Monitoring plans specify how data for all relevant parameters to calculate ER s are collected and recorded
- Monitoring reports include the data necessary to determine eligibility and calculate emission reductions
- Must be submitted annually to the Reserve within 12 months of the end of each RP

Verification Process

The Monitoring Plan and Monitoring Report serve as the basis for verifiers to confirm that protocol requirements have been met

Project ERs must be verified for each reporting period before CRTs can be issued

- Site visits required for a minimum of 5% of the total number of eligible fields in each project
 - Informed by risk-based, random sampling approaches
- Desktop reviews required for an additional number of fields based on random sampling approaches

Thank you! Questions?

Nitrogen Management Project Protocol

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