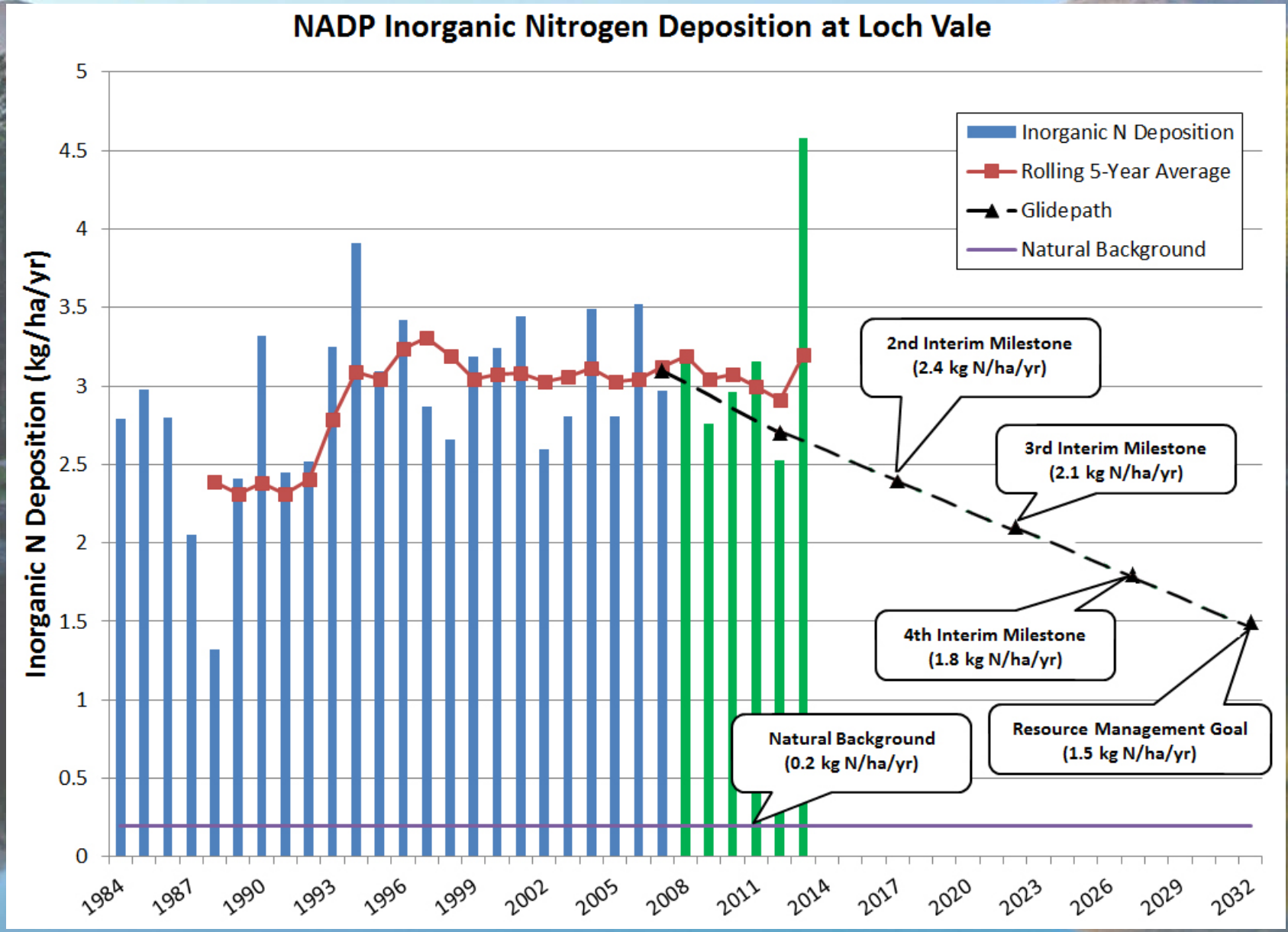
Nitrogen Deposition Early Warning System for Rocky Mountain National Park

USDA Agricultural Air Quality Task Force

December 2014

Nitrogen Deposition Reduction Plan



Early Warning System

www.rmwarningsystem.com

Rocky Mountain National Park Early Warning System

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Colorado Livestock Association

Colorado Department of Public Health and Environment

Colorado State University

National Park Service

NAQSAT National Air Quality Site Assessment Tool NRCS

Rocky Mountain National Park (RMNP) is a spectacular natural treasure encompassing 415 square miles of montane, subalpine, and alpine ecosystems. Air emissions of nitrogen from agricultural, industrial, and urban sources have contributed to increases in the amount of nitrogen deposited into the Park and are impacting the ecosystems.

The The **Rocky Mountain Atmospheric Nitrogen and Sulfur (RoMANS) study**, published in 2009, demonstrated that a substantial portion of nitrogen deposition into RMNP occurs when large-scale, upslope weather events transport air from eastern Colorado and the surrounding region westward into the mountains. Rain or snow produced during these events captures the atmospheric nitrogen and deposits it in the Park. Most of these large weather events happen in the spring or fall.

In 2013, Colorado's livestock and crop producers and researchers at Colorado State University, with funding from the Colorado Department of Public Health and Environment and the National Park Service, began developing a weather-based "warning system" to inform crop and livestock producers of impending weather events that have a high likelihood of moving nitrogen emissions from eastern Colorado into RMNP. By identifying time periods when nitrogen emissions are most likely to have the greatest environmental impacts, producers may be able to temporarily avoid practices associated with nitrogen emissions, thereby reducing their environmental impacts.

A weather-based warning system will provide agricultural producers a valuable tool to reduce environmental impacts. The warning system gives producers the opportunity to voluntarily apply certain conservation management practices to reduce ammonia emissions -- practices which may not be feasible for year-round implementation -- during strategic times when they will be most beneficial. Implementation of the system will allow producers to be better neighbors and better stewards of our land and water resources while providing management flexibility.

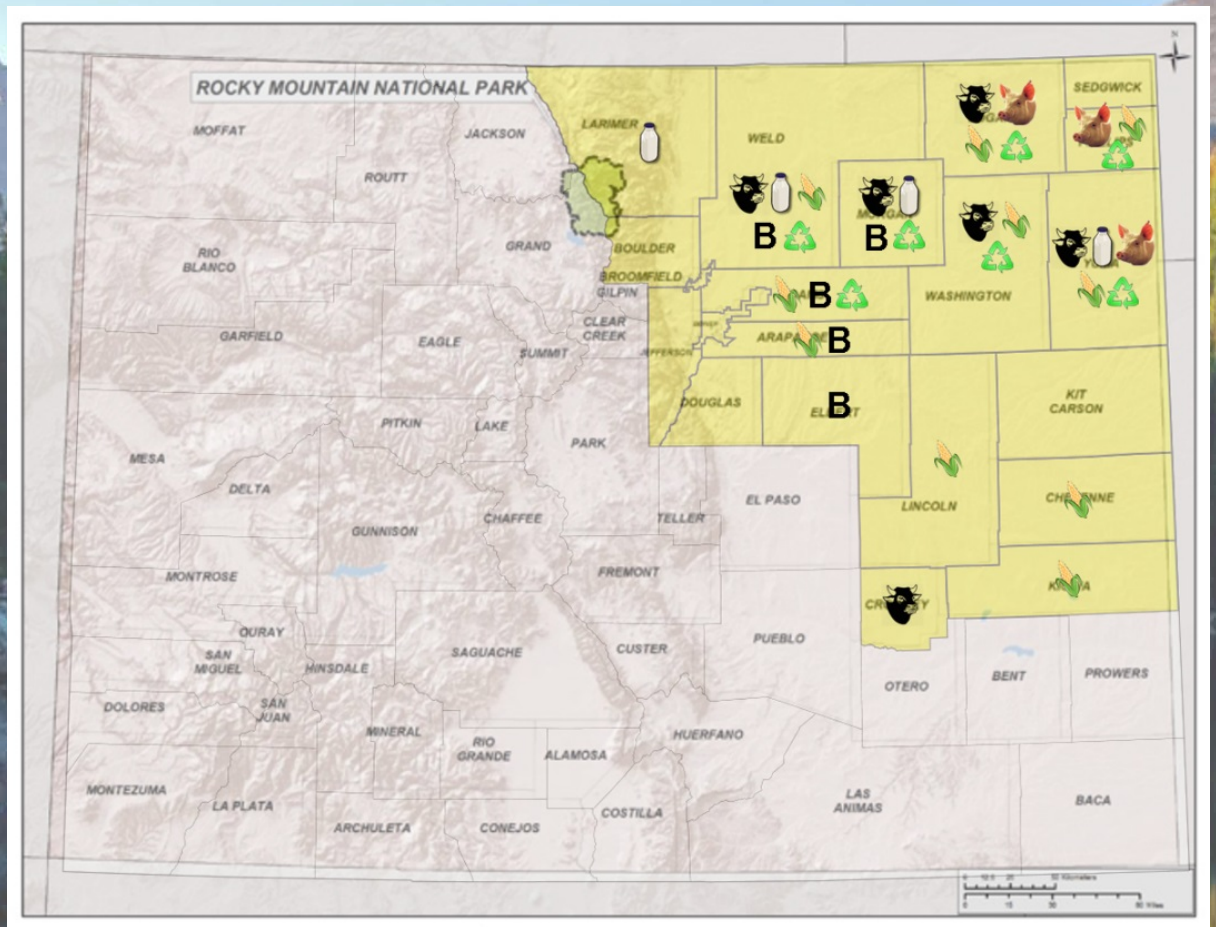
Sign Me Up to Receive Warnings

EWS Pilot Participants

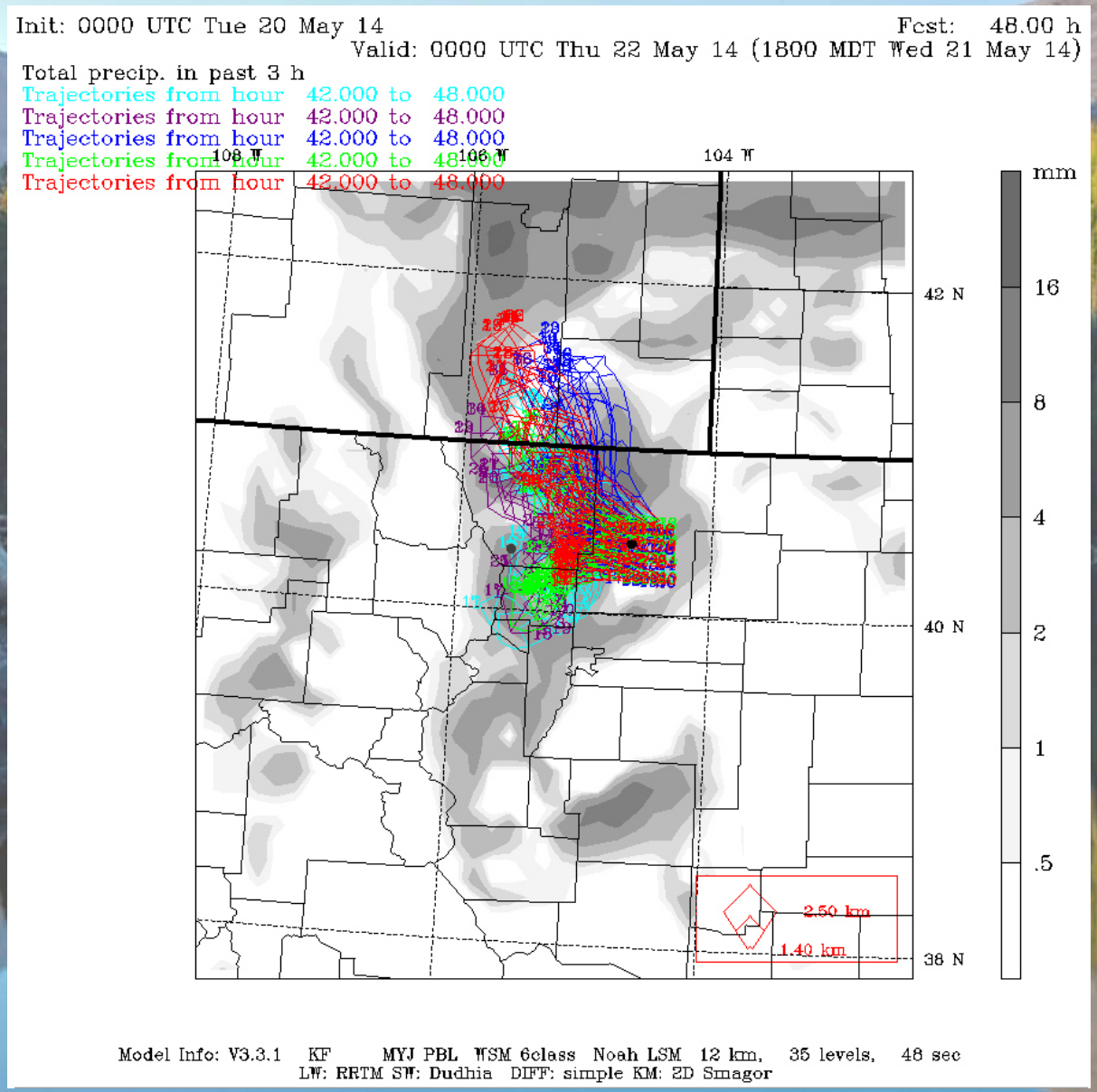
Operation Type	Participants[a]
Feedyards	17 (11)
Dairies	7 (6)
Swine producers	8 (5)
Poultry producers	2 (1)
Crop producers	9 (9)
Composters	2 (2)
Biosolids applicators	2 (1)
"Non-responding" recipients	23
Total People Receiving Warnings	**70**

[a] Number of individuals shown first; number of operations represented in parenthesis.

EWS Pilot Participants

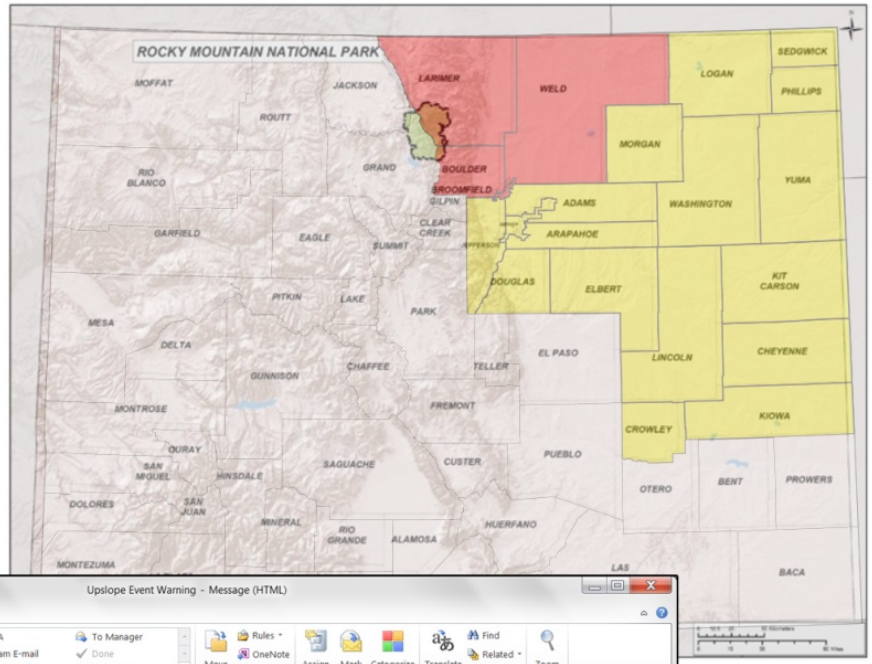


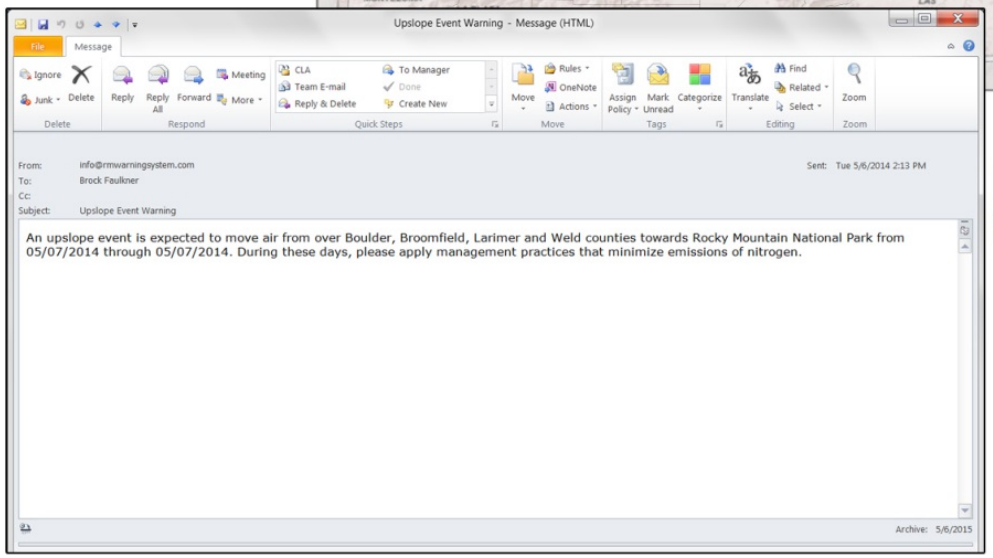
Step 1. Forecasting



Step 2. Issue Warnings

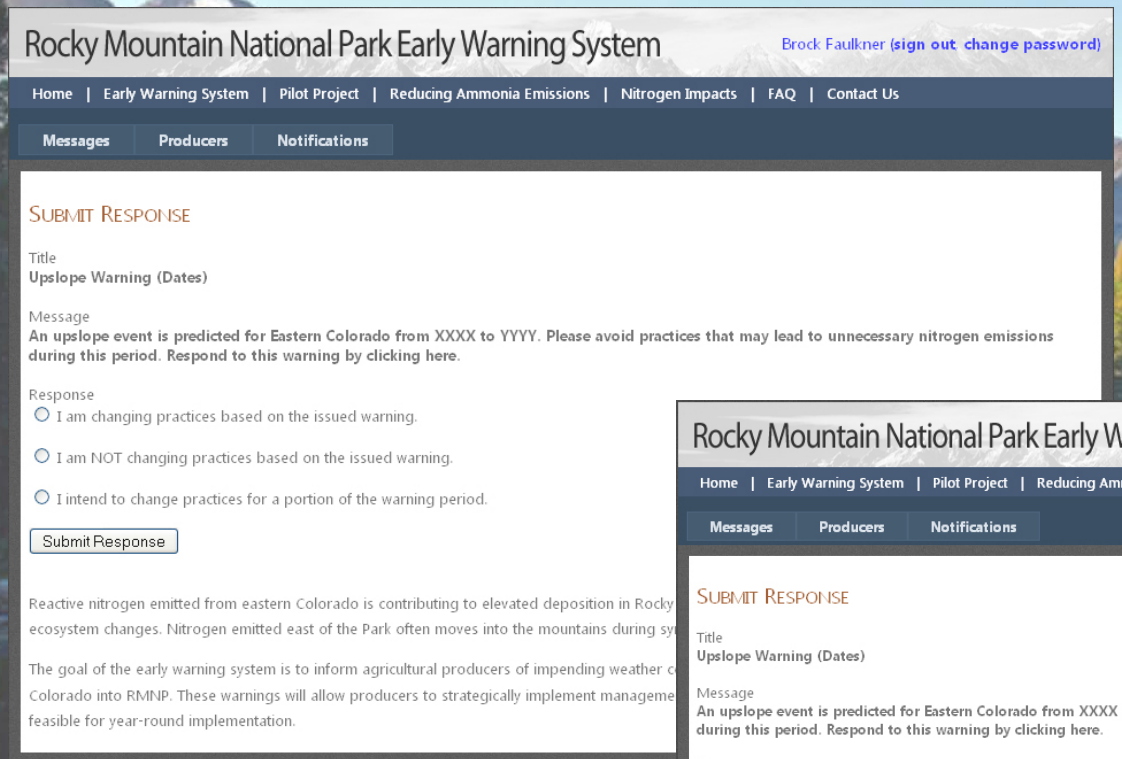
Warning System Website Map

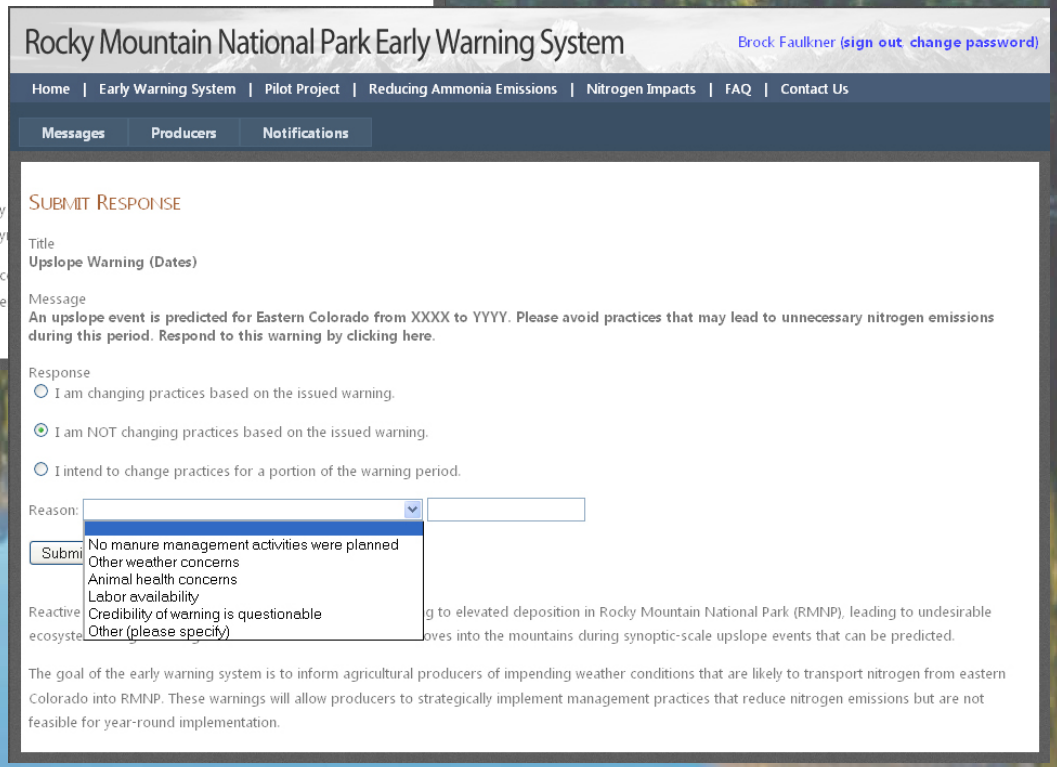




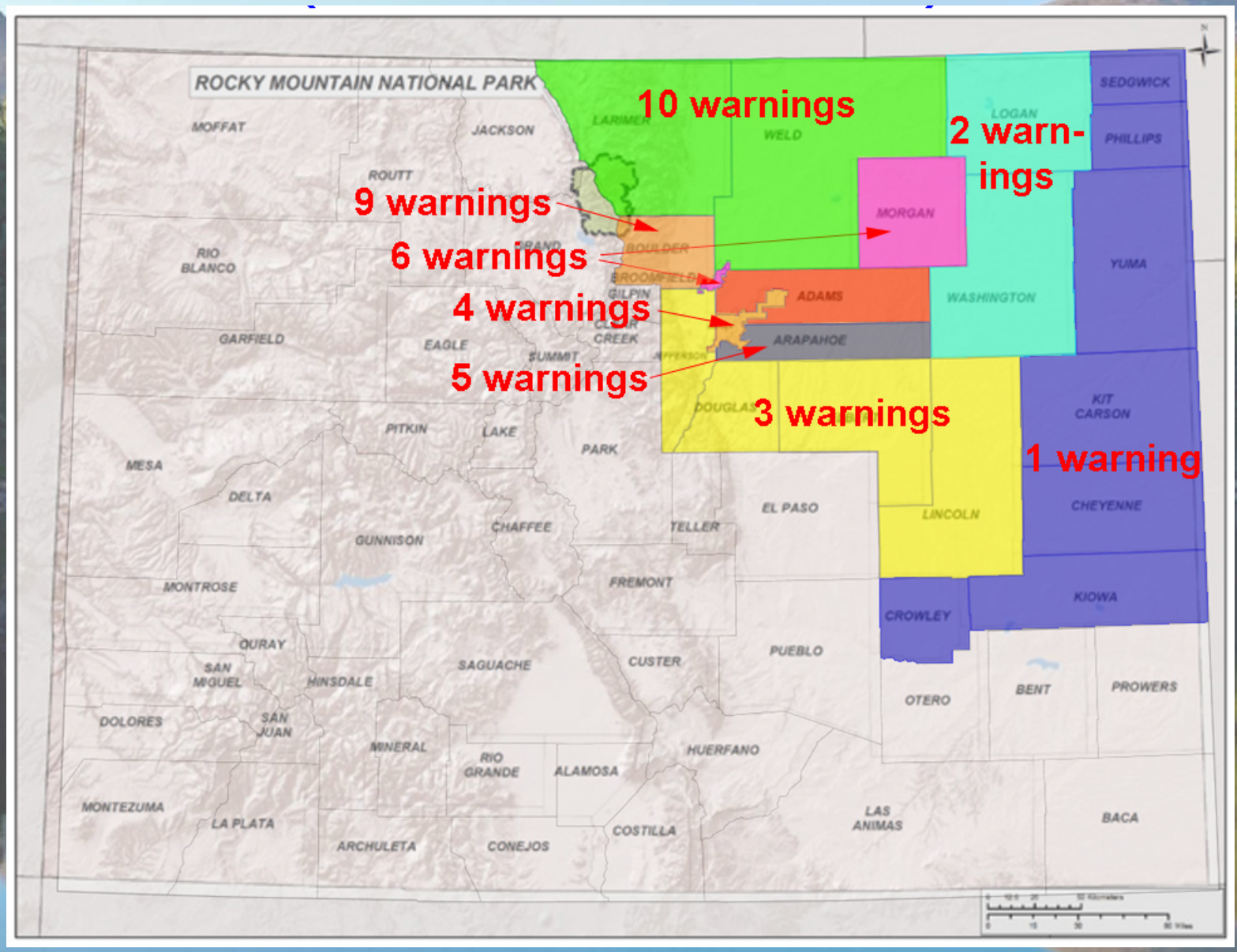
Email/Text Notification

Step 3. Collect Responses





Step 4. System Evaluation

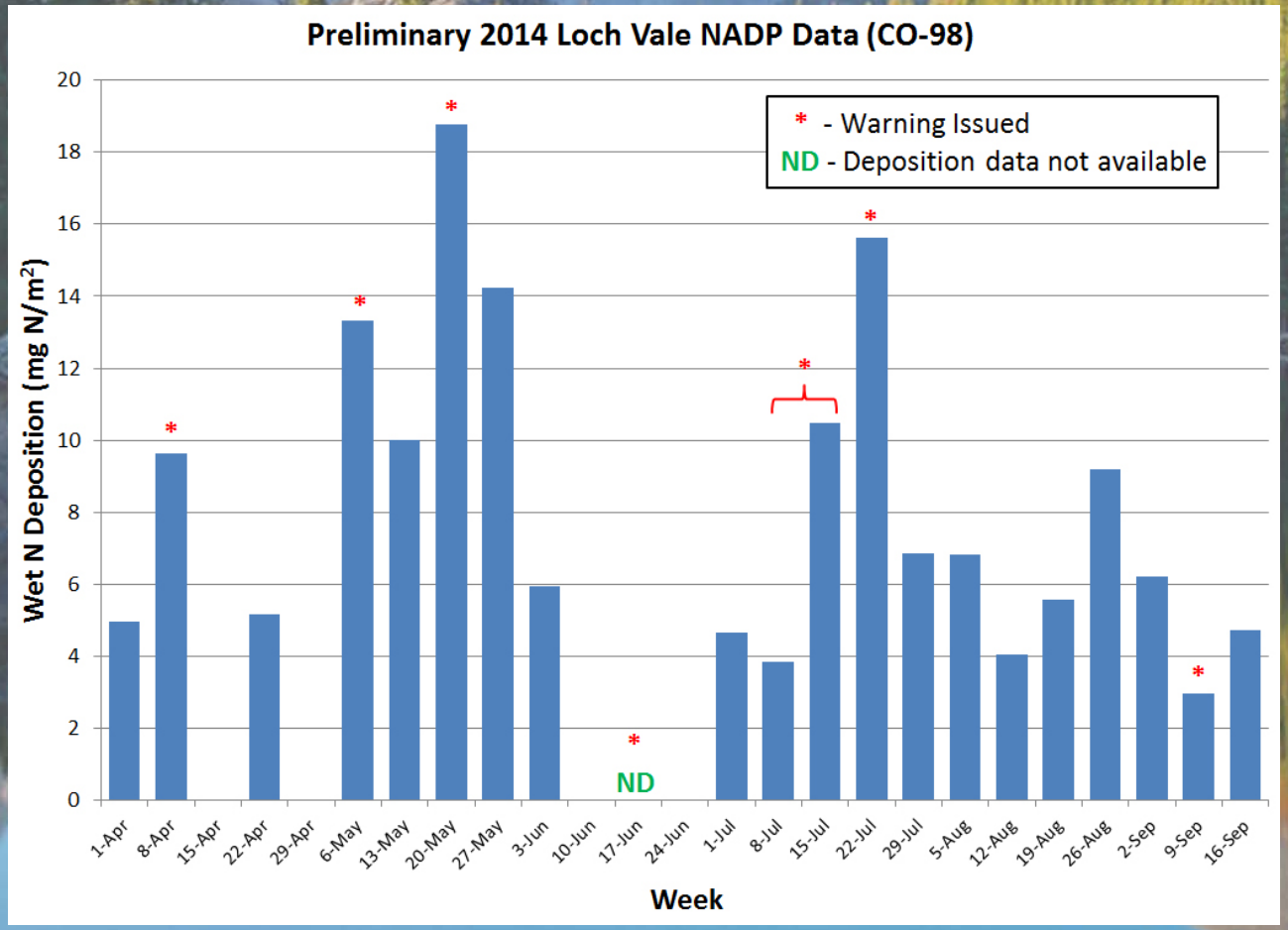


From April 1 to October 15…

- 10 warnings issued
- Participating producers affected ranged from 15 to 27
- Response rates ranged from 33 to 69 percent of affected producers
- 60 to 90 percent of respondents changed practices based on warnings*

EWS Next Steps/Goals

- Evaluate forecasting reliability

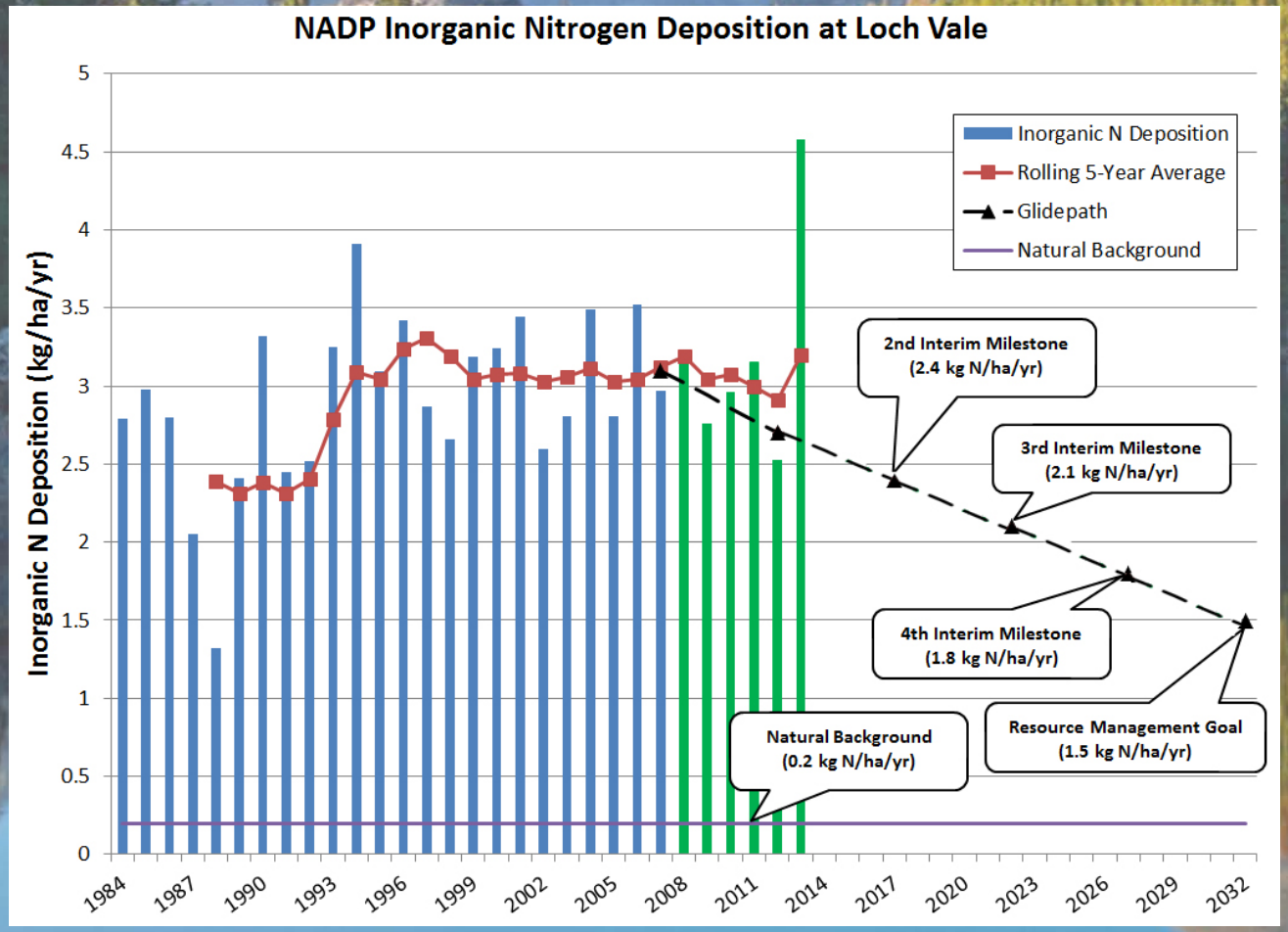


EWS Next Steps/Goals

- Evaluate forecasting reliability
- Increase participant response rates
- Outreach to / recruitment of additional participants in Front Range counties

N-Deposition Reduction Plan

- 2012 milestone was not reached



N-Deposition Reduction Plan

- 2012 milestone was not reached
- Additional monitoring activities
- Communication Plan
  - MOU Agency outreach efforts
  - Push for outreach to out-of-state sources