

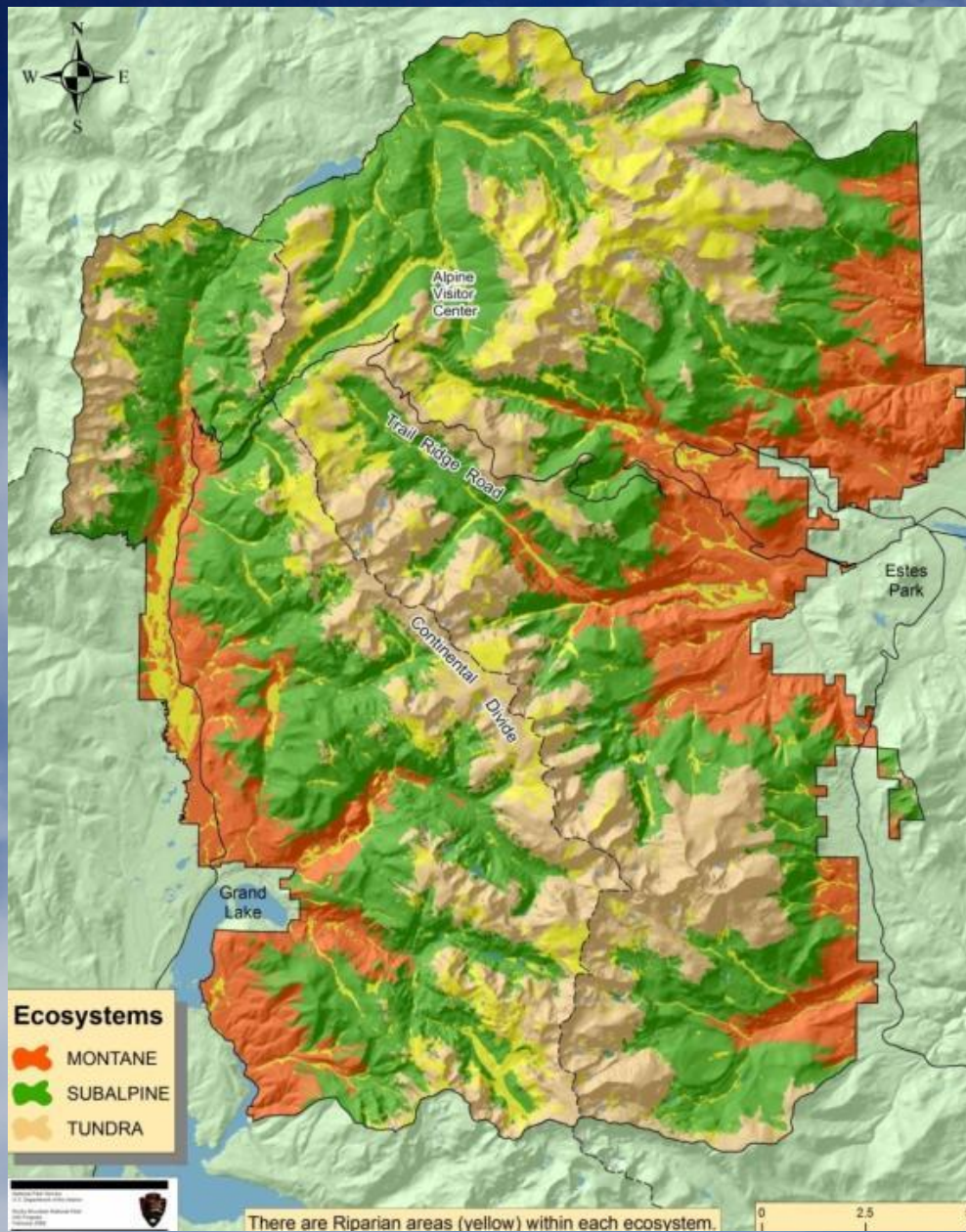


The Rocky Mountain National Park Air Quality Initiative: Partnership to Reduce Nitrogen Impacts

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RMNP AQ Initiative: Background



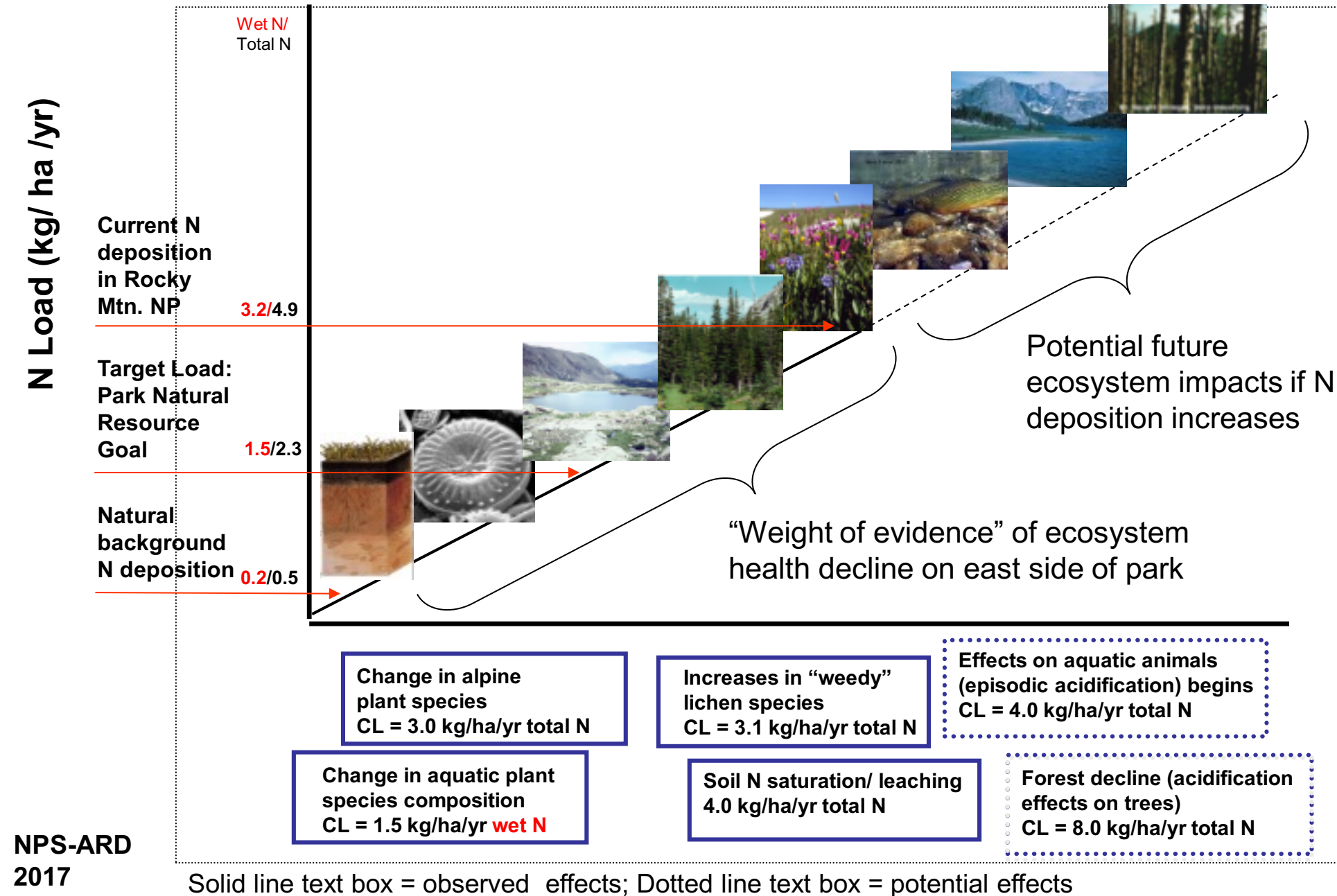
- Petition from Environmental Defense and Colorado Trout Unlimited - Sept 2004
 - ID's adverse impacts from air pollution
- Interagency effort addresses air pollution issues in RMNP
 - Focus on nitrogen deposition
- “Weight of the evidence” approach considers:
 - Monitoring/trends
 - Attribution studies
 - Planned reductions
- Nitrogen Deposition Reduction Plan (2007)
- Contingency Plan (2010)
- 2012 Milestone Report (2014)

Critical Load

- Large body of evidence indicates nitrogen deposition has affected and continues to cause harmful effects on sensitive ecosystems within the park.
 - Current wet deposition monitored at ~ 3.2 kg N/hectare/year (rolling 5-year average - 2011-2015)
 - Natural background estimated at 0.2 kg N/hectare/year
- Specific, published (peer-reviewed) research has shown that wet deposition levels at the time harmful effects started to occur was ~ 1.5 kg N/ha/yr.
- Continuing research on this front



Rocky Mountain National Park: Continuum of Impacts to Ecological Health

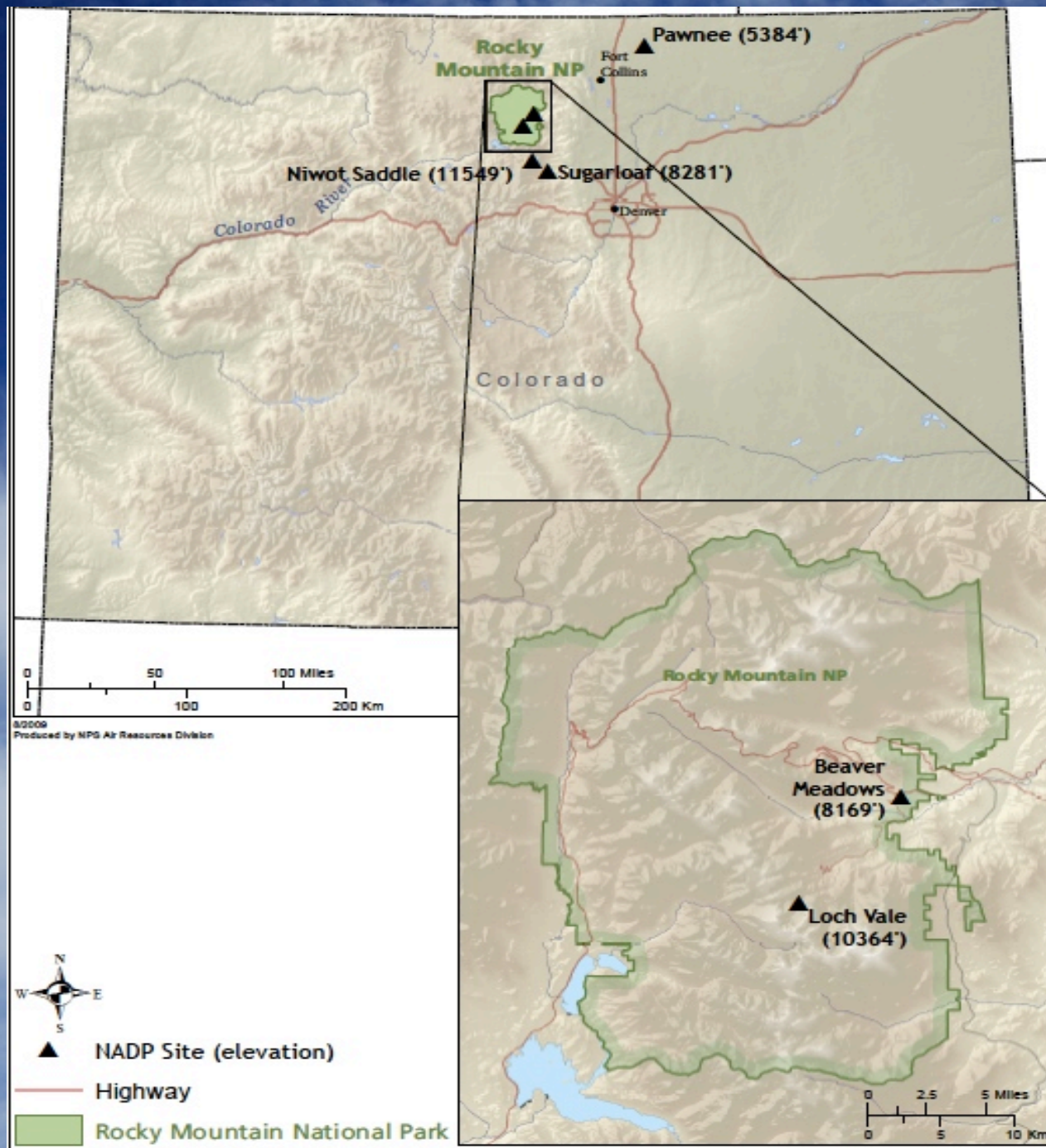


Nitrogen Deposition Reduction Plan & Contingency Plan



- Original NDRP endorsed by NPS, EPA and CDPHE and the Colorado Air Quality Control Commission on August 16, 2007
 - 1) Management approach based on collaborative process
 - 2) Voluntary approach, no mandatory requirements or standards
 - 3) Sets long-term (25-year) resource management goal
 - 4) Sets timeline and interim (5-year) milestone goals intervals to achieve nitrogen reduction goal by 2032
 - 5) Strategies to achieve goal
 - 6) Identifies options that can be implemented on a voluntary basis
- Contingency Plan endorsed by NPS, EPA and CDPHE and the Colorado Air Quality Control Commission on June 22, 2010
 - ❖ Adaptive management approach consisting of 5 elements
 - 1) Data Tracking Plan
 - 2) Triggering Mechanism
 - 3) Recommending & Implementing Contingency Measures
 - 4) List of Potential Contingency Measures
 - 5) Public Outreach & Participation





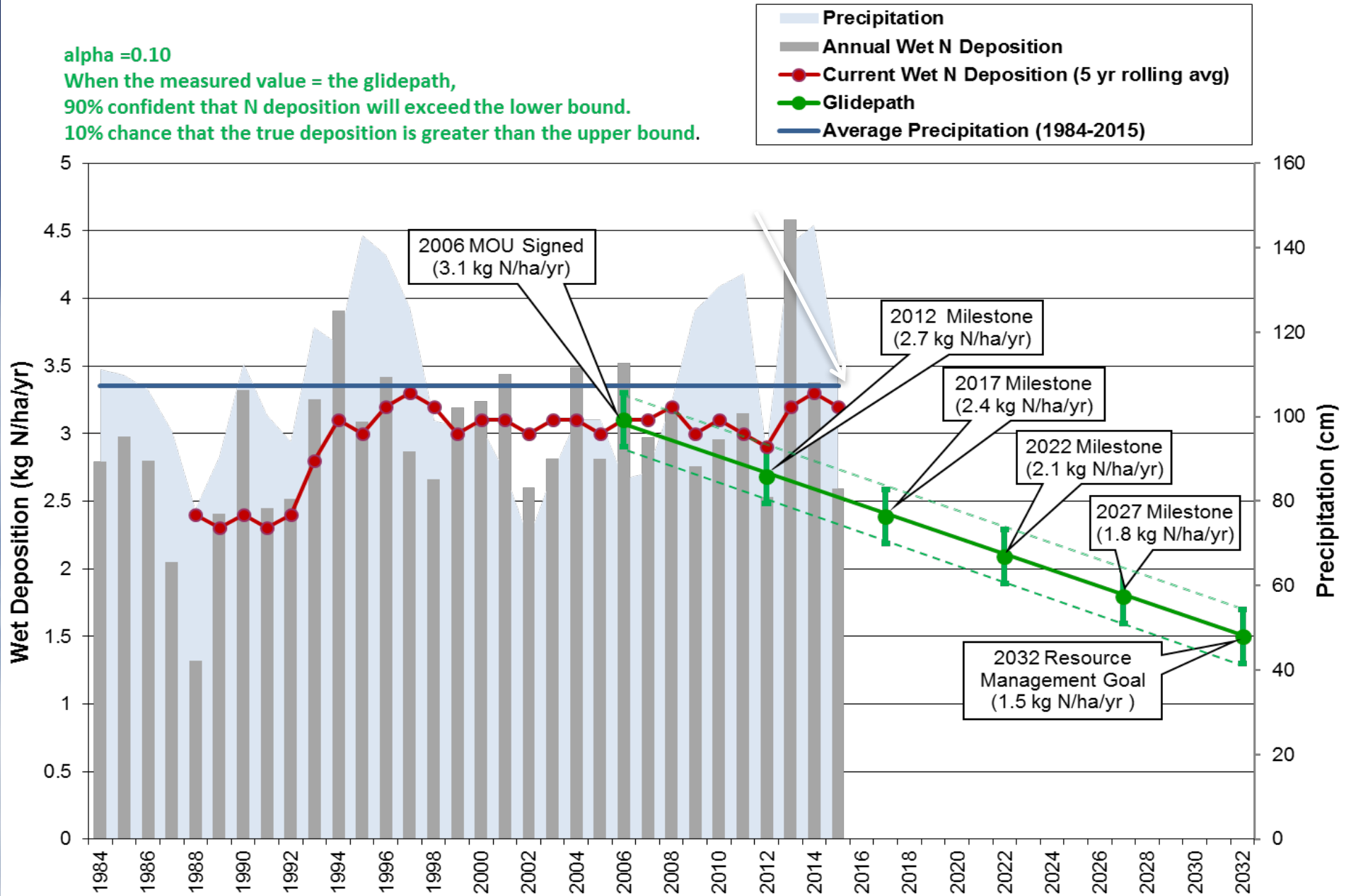
Monitoring & Tracking

- **Wet nitrogen deposition has stabilized in both the long- and short-term**
- Long-Term Statistical Trend (1984-2015*):
 - Wet nitrogen deposition increased at RMNP Loch Vale until 2010 and is now stable, although it continues to increase at RMNP Beaver Meadows
 - Ammonium is increasing at all 5 sites
 - Nitrate is decreasing at 2 sites
- Short-Term 5 or 7 year Statistical Trends (2011-2015 or 2009-2015):
 - Wet nitrogen deposition is stable at all sites
 - Ammonium is increasing at 3 sites
 - Nitrate is decreasing at 1 sites
- Loch Vale Co-located site (2009 - 2013)
 - Provided QA/QC support for trends
 - Basis for confidence intervals

*Site records vary between 1980 and 1987



RMNP Loch Vale Nitrogen Deposition & NDRP Glidepath



Agricultural Best Management Practices:

Helping to Reduce Nitrogen Impacts at Rocky Mountain National Park



Agency efforts with Colorado Agriculture

- What does success look like with CO Agriculture?
 - reduced nitrogen deposition contributions
 - ongoing collaboration
 - filling data gaps
 - demonstrated implementation of BMPs
 - Increasing participating producers
 - Early Warning System implementation



Colorado Agriculture discussions

- Focus our efforts on what matters most geographically, by industry, or size of operation.
 - Improve understanding of the agricultural community's role to help inform reduction strategies and the next milestone decision.
 - Establish “S.M.A.R.T” indicator(s) of ammonia emissions (specific, measurable, achievable, relevant, time-bound). (e.g., beef production vs manure), and key data sources.
 - Use “S.M.A.R.T” indicator(s) to determine trends in agricultural ammonia emissions.
 - Evaluate efficacy of the Early Warning System following roll-out as warranted.





Monitoring & Research Projects

- Mobile ammonia measurements in NE Colorado (June 2016) (CDPHE)
- Upcoming 2017-2019 Denver/Boulder Urban Deposition Study (CDPHE/Denver/USGS/CU-Boulder/USFWS)
- Analysis of real-time data for evaluation of Early Warning System and source analysis (CSU)
- Comparison with Satellite Observations (CSU)
- Comparison with CAMx Model Simulations (CSU)



Questions?

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RMNP Website: www.colorado.gov/cdphe/rmnpinitiative