Nutrient Management Project Protocol (NMPP)

Workgroup Meeting #2
June 27, 2011
12 – 2 pm PDT
Agenda

- Review timeline
- Preview of background paper research
  - Nutrient management practices
  - Fertilizer use trends
  - Data available to assess common practice
- Discuss performance standard conceptual framework (not covering legal constraints)
- Next steps
# Protocol Development Timeline

<table>
<thead>
<tr>
<th>Event</th>
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<tbody>
<tr>
<td>Methodology Synthesis Paper</td>
<td>May 6, 2011</td>
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<tr>
<td>WG Meeting 1 (conference call)</td>
<td>May 18, 2011</td>
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<tr>
<td>WG Meeting 2</td>
<td>June 27, 2011</td>
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<tr>
<td>Background Paper Completed</td>
<td>Expected July 6, 2011</td>
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<tr>
<td>Draft protocol to workgroup</td>
<td>Week of July 25, 2011</td>
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<td>WG Meeting 3 (Los Angeles)</td>
<td>August 1, 2011</td>
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<tr>
<td>Second draft protocol to WG and SAC</td>
<td>Week of Aug 29, 2011</td>
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<td>Science Advisory Committee Meeting</td>
<td>September 7, 2011</td>
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<tr>
<td>WG Meeting 4 (conference call)</td>
<td>Week of Sept 12 or 19, 2011</td>
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<td>Revised protocol &amp; start of 30-day public comment period</td>
<td>November 1, 2011</td>
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<tr>
<td>WG Meeting 5 (conference call)</td>
<td>Week of November 14, 2011</td>
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<tr>
<td>Public workshop</td>
<td>Week of November 28, 2012</td>
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<td>Protocol adoption by Reserve Board</td>
<td>February 2012</td>
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Background Paper

- Definitions of nutrient management practices
- Additionality research
  - Related legal constraints, review of data on common practice, recommendations on performance standards
- Review of relevant GHG sources and sinks
- Information on environmental credit stacking (phase II)
- Review and comparison of GHG accounting in existing methodologies
- Recommendations on the use of biogeochemical process models (phase II)
Nutrient Mgmt Practices

- Reducing annual N application use rate
- Changing timing of N fertilizer application
  - Apply nutrients no more than [30] days prior to planned planting date
  - Apply [50%] or more of the total N needs after crop emergence
  - Split application technology and management
- Changing N source
  - Changing fertilizer composition
    o Change chemical composition (e.g., anhydrous ammonia to urea)
    o Change to controlled-release nitrogen fertilizer
  - Use of nitrification and urease inhibitors
  - Replacing inorganic fertilizer with organic amendments
    o Partially replacing inorganic N application by manure
    o Partially replacing inorganic N application by compost
    o Complete transition to Organic Cropping Systems
Nutrient Mgmt Practices

- Changing Placement of N application
  - When seeding
    - From broadcast to banding
    - Rate modification for different areas of field based on yield expectations (e.g. precision agriculture w/ GPS)
  - In sub-surface drip irrigation (fertigation)
  - Injection to root zone

- Including mixed cover crops in a rotation
  - Plant a cover crop to absorb residual nitrogen post-harvest
  - Use of legume cover crops as a nitrogen source

- Adding deep rooting plants into crop rotations (e.g. alfalfa or other hay plants)
Fertilizer Trends: US Corn

![Graph showing nutrients in pounds per planted acre and yield in bushels per planted acre over the years from 1964 to 2006. The graph indicates a general increase in both nutrients and yield, with fluctuations over time.]
Fertilizer Trends: US Total

Nutrient Input (in millions of metric tons)

- Fertilizer nitrogen (1945–1986)
- Fertilizer nitrogen (1987–2001)
- Atmospheric nitrogen (1987–2001)
- Fertilizer phosphorus (1945–1986)
- Fertilizer phosphorus (1987–2001)
Fertilizer Price and Use

- Fertilizer price increased 300% in past 10 yrs
- In US, fertilizer use is price-inelastic mainly due to lack of economic substitutes to synthetic fertilizer.
- Fertilizer application rates are likely to remain unchanged in the US during 2010 - 2025, even if N fertilizer prices and demand for agricultural commodities increase (Rosas 2011)
  - Global crop production, demand, and fertilizer use models; WorldNPK linked to FAPRI ag production model
Common Practice Data:  
Are data available to approximate “common practice” for nutrient management?

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<tr>
<th>Type of Data</th>
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| USDA surveys                             | • NASS Agricultural Chemical Use Program  
• NASS Annual Surveys (yields, acres, state-level expenses)  
• NASS 2008 Organic Survey  
• Economic Research Service (ERS) Fertilizer Use and Price Datasets  
• ERS Indices of historic consumption by state (1960-2004) |
| Fertilizer sales data & derived fertilizer use data | • Association of American Plant Food Control Officials (AAPFCO) annual fertilizer sales data (county-level for 75%, otherwise state-level)  
• EPA report on N types, using AAPFCO sales data (dated – 1999)  
• USGS county-level estimates of fertilizer N and manure use, derived from AAPFCO sales data  
• State Dept of Ag collection of sales data at county level (e.g. CA) |
| State surveys                            | • MN Farm Nutrient Management Assessment Program  
• CA Statistical Review of Organic Agriculture  
• WI Nutrient Management Survey for Dairy Farms |
| Expert opinion surveys                   | • California – UC Davis Cost and Return Studies (surveys of producers and/or extension staff)                                                                                                               |
| N rate calculators based on yield goals  | • Agricultural Extension Specialists and Universities (e.g. Iowa State); typically a look-up table or simple web-based calculator                                                                                  |
Common Practice Data

- **Fertilizer application rate**
  - Multiple options available that span various geographic scales
  - Crop-specific data are only widely available at state level
  - County or multi-county scale information is available for only some regions and is not crop specific
  - Recommended N rate calculators could be used but require data on yields and may not be strong indicators of actual practice

- **Type, timing, placement, and source**
  - Less widespread data availability
  - At least some promising resources were found
  - May be enough available to develop performance standards for main crop growing regions and California
Performance Standard
Conceptual Framework

(1) Project fertilizer application rate must be below the determined threshold for a region/crop, regardless of pre-project application rate:

– Data sources and stringency thresholds TBD
– Purpose is to ensure projects achieve a certain level of performance; is not to determine the baseline

  • Baseline quantified using data on site-specific historic rates
Performance Standard Conceptual Framework

(2) And, projects must adopt at least [2] practices from standards specified by region/crop, e.g.:

- Apply at least [30%] of N from organic sources
- Plant a mixed cover crop for at least [4] months to immobilize N outside of the growing season and supply N during growing season
- Supply at least [50%] of N within [30] days of planting
- Use nitrification and urease inhibitors
- Install and use fertigation system

Standards to be developed by Reserve with WG input

- Thresholds should represent better than common practice
- Limited data available, significant effort to develop
WG Reaction & Input on Conceptual Framework

- General reactions, questions, or concerns?
- Advice on fertilizer rate data resources
  - Are we missing any data resources?
  - Thoughts on which data source(s) to use?
  - What level of performance should thresholds represent?
- Advice on resources for other practice standards?
  - Other sources like the UC Davis cost and return studies?
  - Suggestions of how to rapidly collect similar data?
Next Steps

- Complete and circulate Background Paper to WG
- Begin targeted development of performance standards
- Protocol draft to workgroup before in-person meeting
- In-person meeting on August 1, 2011
- WG written comments on draft protocol by August 16, 2011
- Revised protocol to WG and SAC by August 29, 2011
Thank you!

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