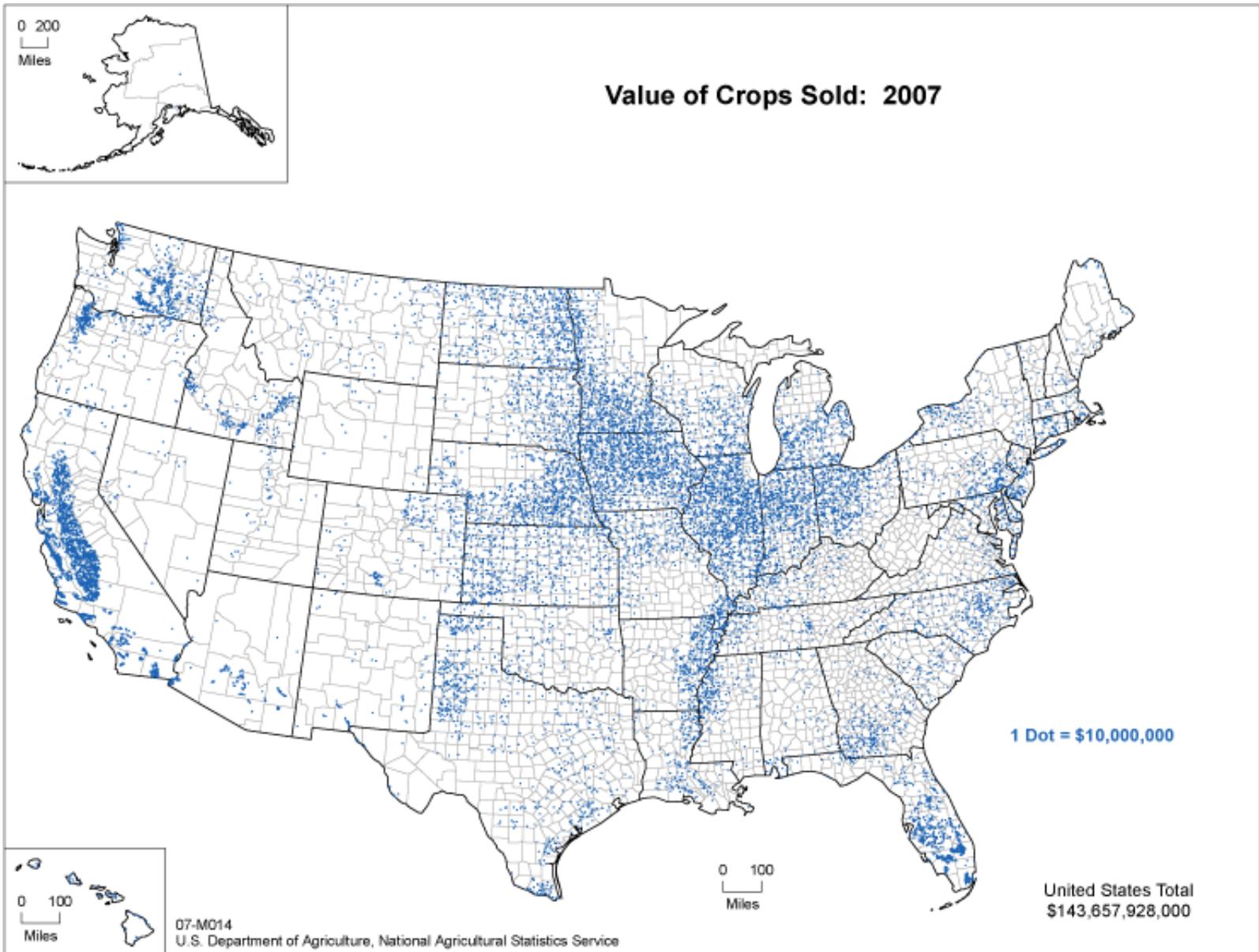


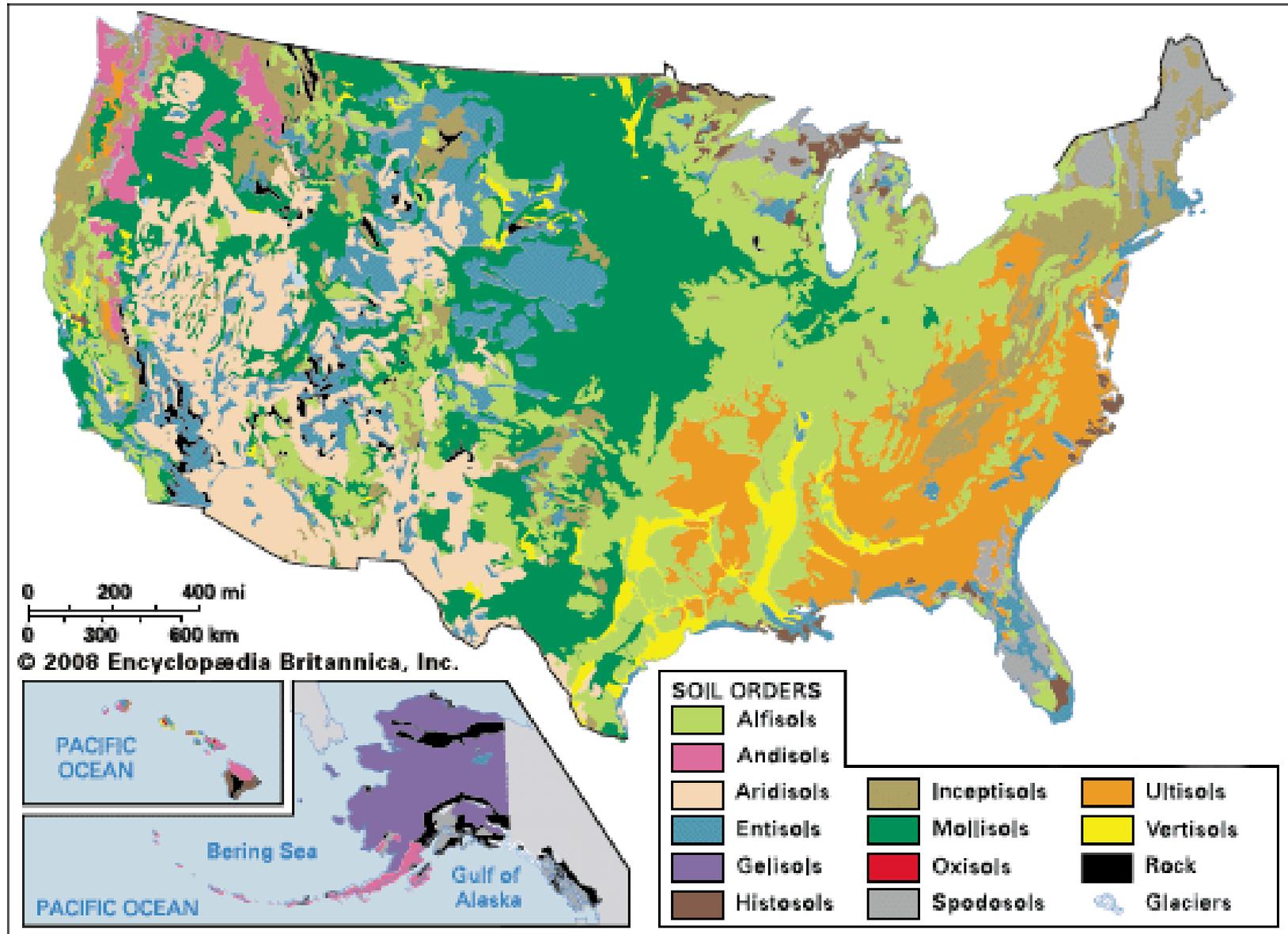
BUILDING CLIMATE RESILIENCE INTO OUR AGRICULTURAL SYSTEM

Jeremy Emmi, National Sustainable Agriculture Coalition

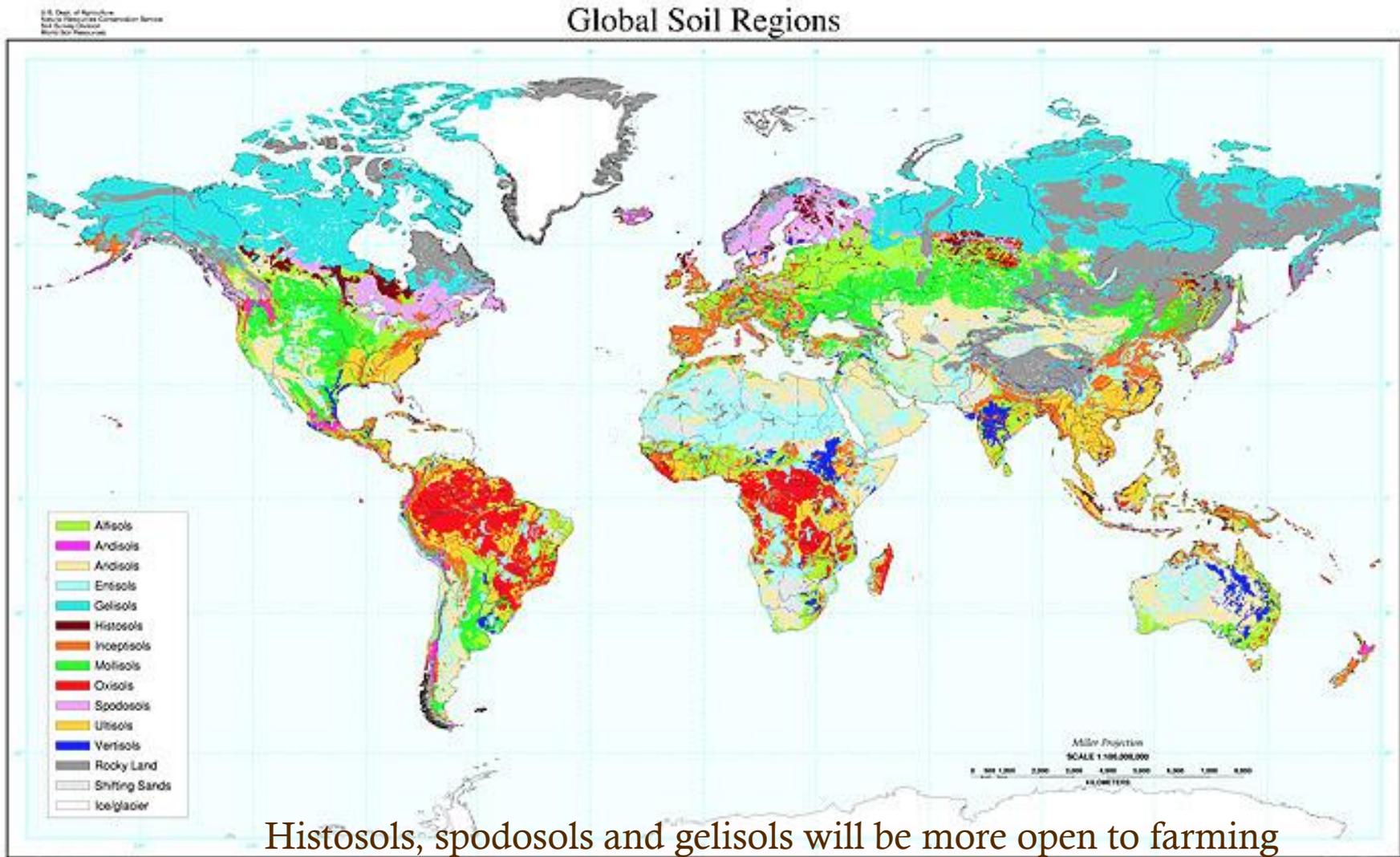
Climate change may bring a tendency to adapt by moving farming northward



The northern edge of the Midwest differs in soil type



Soils can release carbon into the atmosphere, some more easily than others

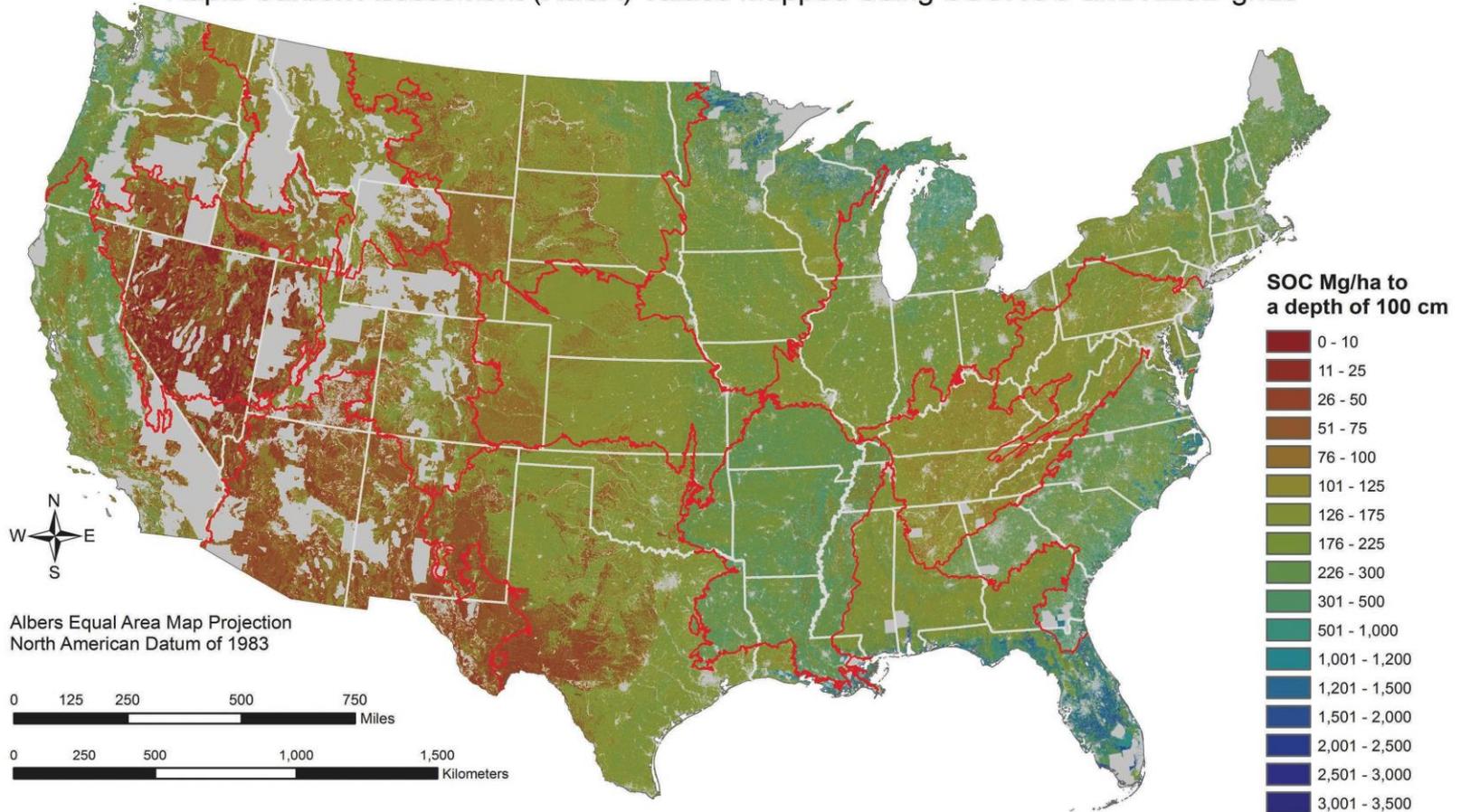


Histosols, spodosols and gelisols will be more open to farming

Northern Midwest soils contain large amounts of carbon

Soil Organic Carbon Stocks

Rapid Carbon Assessment (RaCA) Values Mapped Using SSURGO and NLCD grids



Albers Equal Area Map Projection
North American Datum of 1983

0 125 250 500 750 Miles

0 250 500 1,000 1,500 Kilometers

— Region Boundaries

— State Lines

□ Not Assessed

The first National Climate Assessment of 2000 had a moderate outlook, but since then, research and weather events have shown a more challenging future.

“Positive impacts will possibly be associated with climate changes such as warmer winters in the North, more precipitation in the Southwest, and longer growing seasons in parts of the nation where agriculture and forestry are important.”

“A general sense emerged that American society would likely be able to adapt to most of the impacts...”

We're still learning and building off the NCA findings – a complex problem

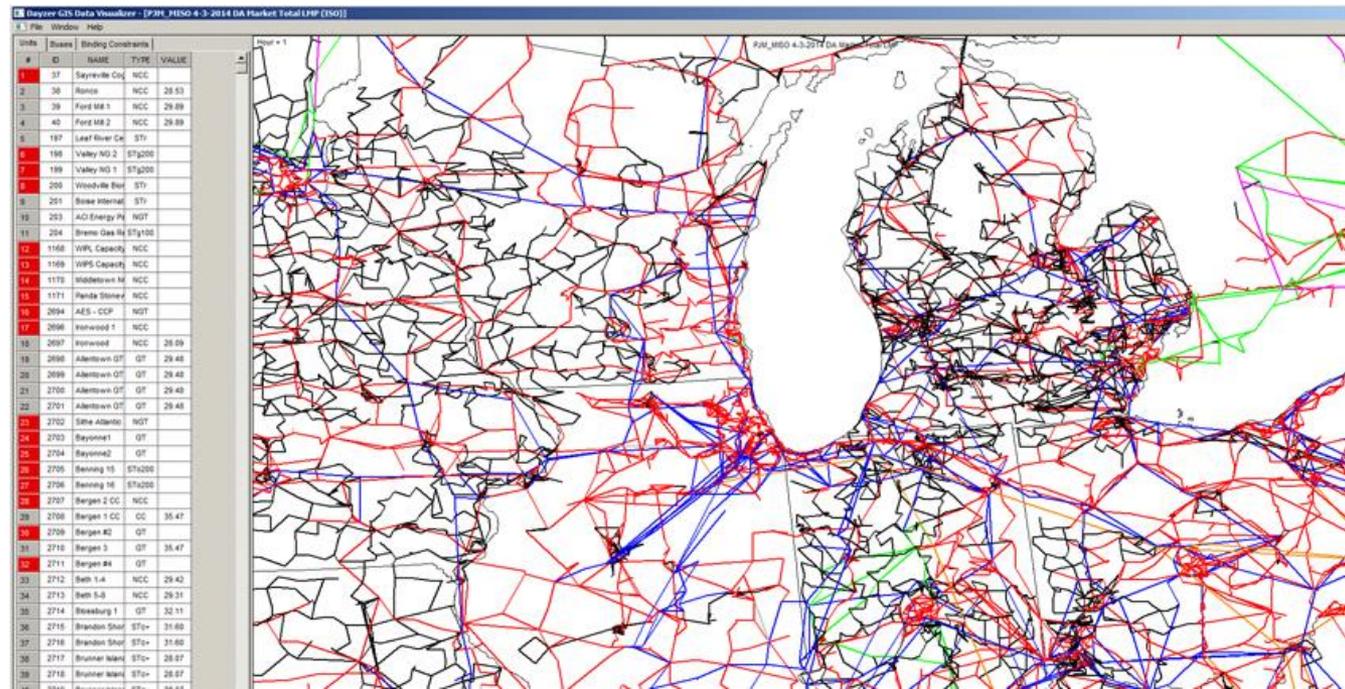
- The 3rd National Climate Assessment showed that most crops will have a lower yield with higher temperatures related to higher GHG levels
- May 2014 publication in *Nature* – research showed that elevated CO₂ concentrations resulted in lower concentrations of zinc, iron and protein in certain crops
 - An increase in carbon dioxide levels adversely affect assimilation of nitrates into protein...
 - Which means that more fertilizer is needed = more emissions
- Not just lower yields, but lower nutrition value too

- Under Executive Order 13653, President Obama directs agencies to “focus on program and policy adjustments that promote the dual goals of greater climate resilience and carbon sequestration, or other reductions to the sources of climate change.”
- USDA Secretary Vilsack has pointed to the Natural Resources Conservation Service (NRCS) conservation programs as the existing tools that USDA has to address climate change mitigation and adaptation under its farm bill authority.
- Farm Bill implementation gives USDA the opportunity to revisit how it administers programs to better recognize and support adaptation and mitigation benefits of sustainable agriculture.

1) NRCS should promote energy conservation, increased energy efficiency, and on-farm solar, wind, and other renewable energy production as ways to mitigate GHG emissions and increase resiliency.



- Provide farmers with information and coordinate with sister programs - Rural Energy for America Program (REAP) programs
- Connecting on-farm energy production to the grid is also important – MISO in Carmel, Indiana



2) NRCS should assist producers, especially livestock farmers and ranchers, in the transition to systems that keep the land in sod and other perennial vegetation, and should support rangeland management that promotes climate benefits.



- Work with Farm Service Agency to engage in outreach to Conservation Reserve Program landowners to enroll in Conservation Stewardship Program and transition those land to grass-based and perennial agriculture
- Update Conservation Practice Standard GHG Ranking Tool to reflect benefits of perennial vegetation, rotational grazing

3) Prioritize farming systems and conservation activities that build soil organic matter, increase carbon sequestration, and prevent denitrification.



- Increase incentives for use of legumes (cover crops) and organic inputs like compost and manure
- Education – make program applicants aware of climate-specific benefits of various activities
- Diversify crop systems to build resilience
- Integrate Soil Health Initiative into working lands programs and easement programs

4) Promote farmscaping that supports resilience and sequestration in woody biomass and soils.



- Update the Conservation Practice Standard GHG Ranking Tool to properly reflect benefits of perennial vegetation – buffer strips, field borders, hedgerows, filter strips, grassed waterways
- Use woody biomass and deep-rooted native perennials for largest carbon sequestration
- Consider regional appropriateness of ranking activities in conservation programs

5) Encourage practices that reduce methane emissions, especially in livestock systems.



- Do not support Concentrated Animal Feeding Operation (CAFO) expansion through financial assistance programs
- Promote pasture-based systems (rotational grazing, mob grazing), distribute manure over large areas



6) Prioritize conservation easements on lands that currently provide climate benefits and that are most at risk of conversion to development uses that would increase GHG emissions.



- When selecting land for enrollment in easement programs, prioritize lands that provide climate benefits
 - Land that has strongest soil health management practices
 - Land that will avoid development and transportation related GHG emissions
 - Land that has increased carbon sequestration capabilities
- The Regional Conservation Partnership Program (RCPP) is an ideal vehicle to move this goal forward

7) When promoting conservation activities for their climate change benefits, NRCS should ensure that both the adaptation and mitigation benefits are assessed and appropriately reflected.



- Use new regional climate hubs to review NRCS practice standards that may provide both adaptation and mitigation benefits.
 - Improving water use efficiency and conservation in irrigated cropland through drip irrigation with scheduling
 - Improved soil management
 - On-farm ponds
 - Energy saving irrigation options, reducing emissions

8) In the implementation of conservation programs, NRCS should account for and work to reduce the impacts of climate change on terrestrial and aquatic habitats and ecosystem services, such as clean air and water.



- Use new rulemakings associated with the conservation program changes to maximize the ability of NRCS programs to deliver **resilience**
 - Update program priorities
 - Update practices and ranking criteria
 - More outreach to encourage wider adoption of conservation activities