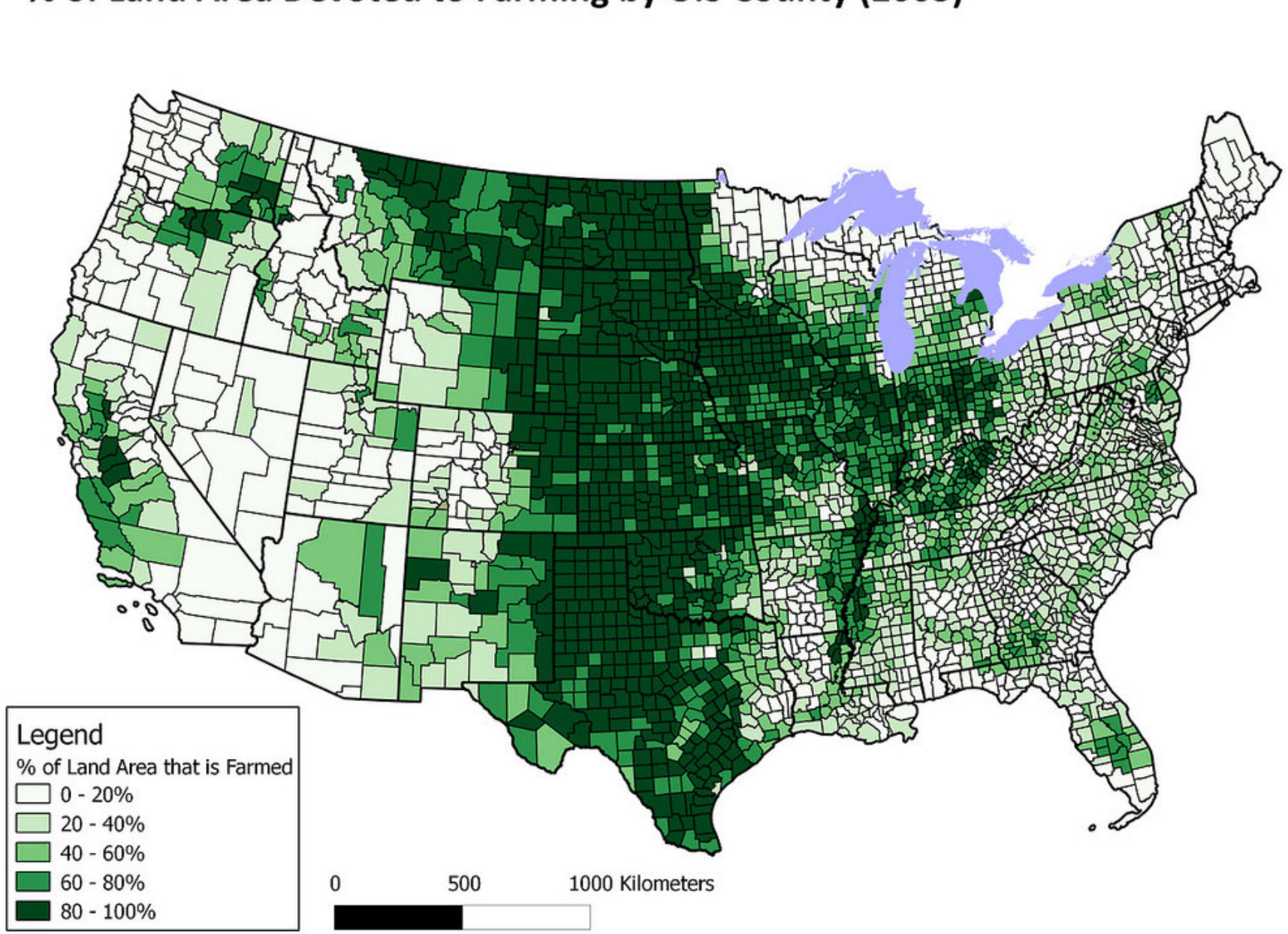
Solutions from the Agriculture Sector

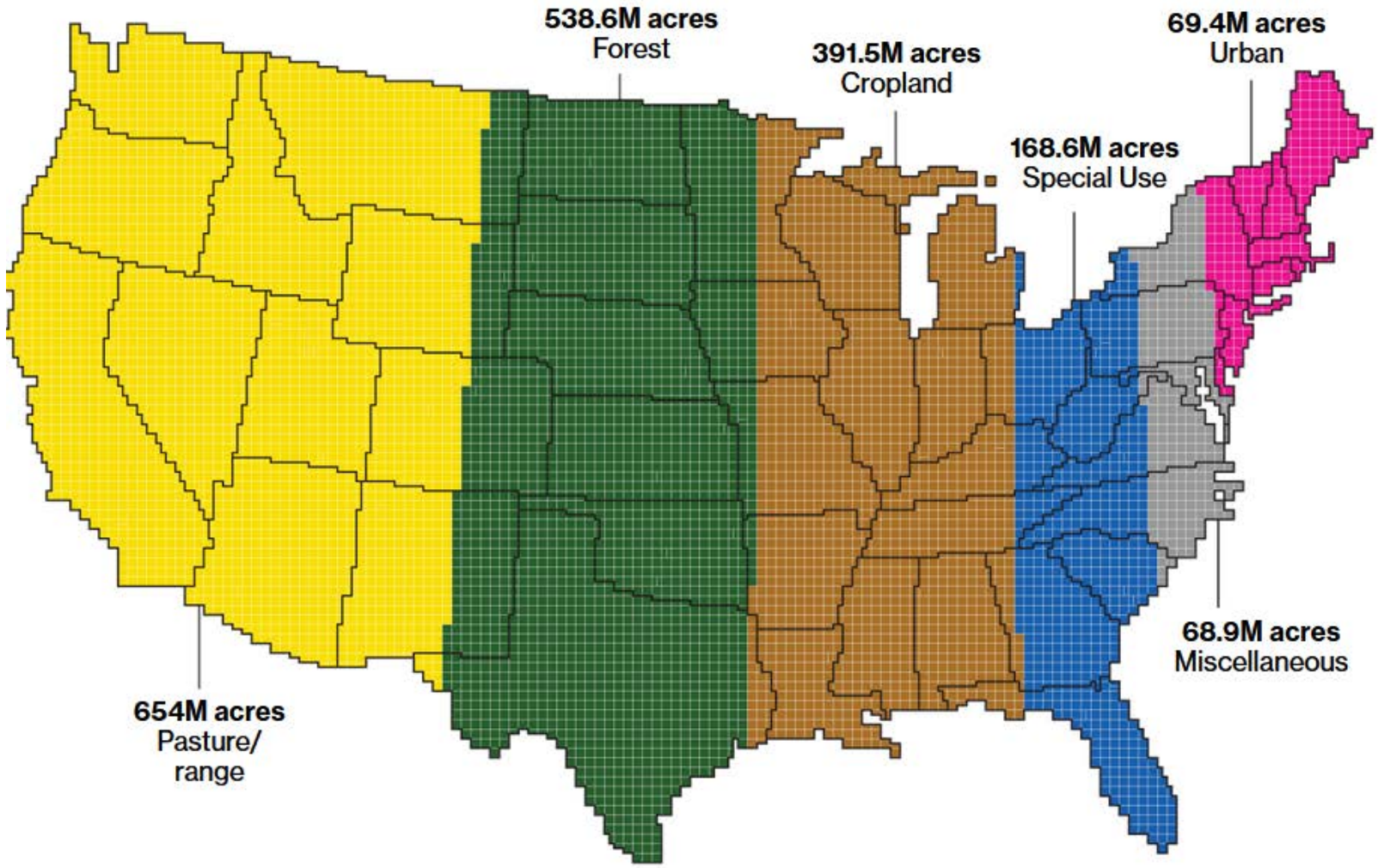
John Quinn, PhD
@ag_biodiversity
April 30, 2021

FURMAN

Why Agriculture?

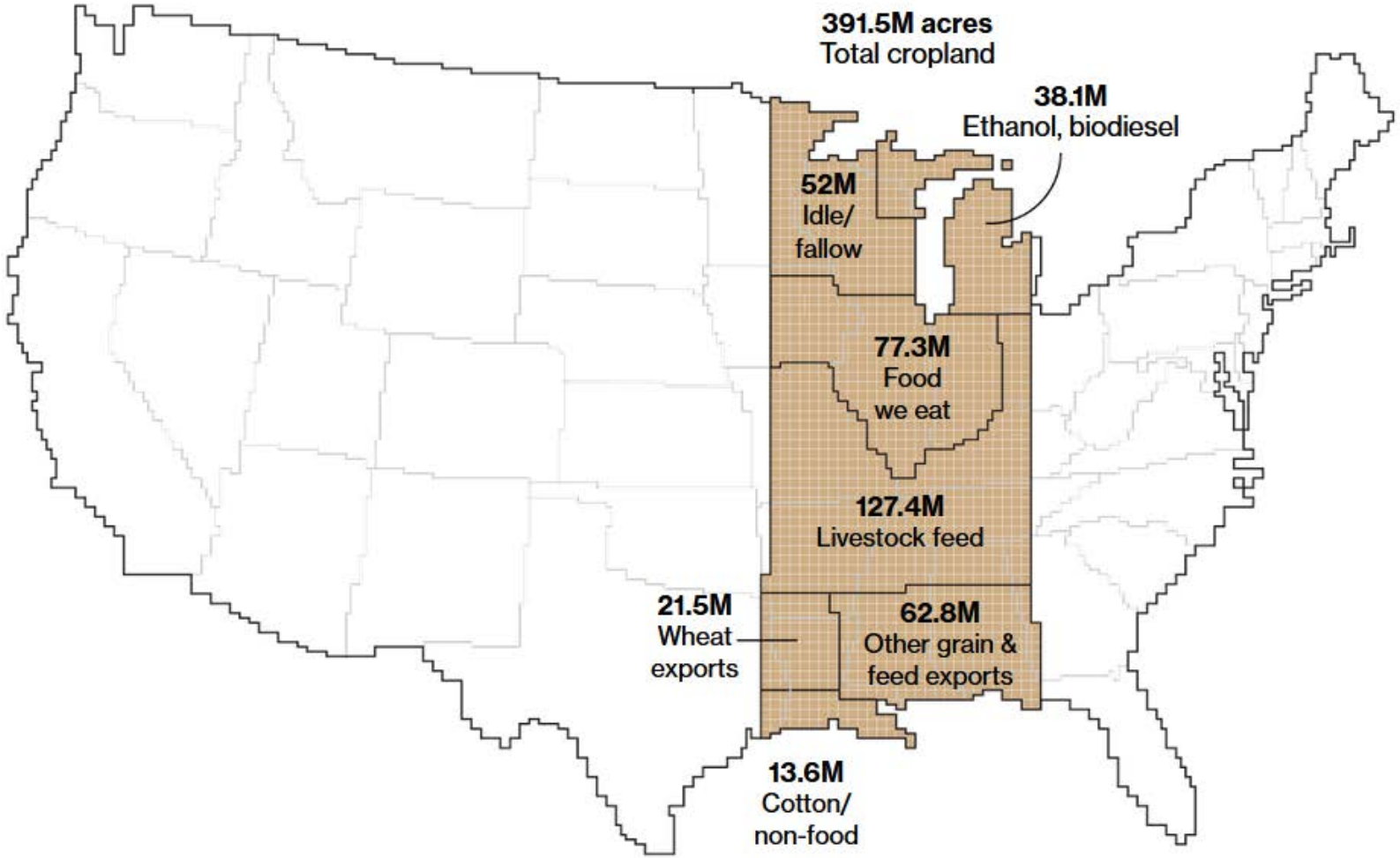


Why Agriculture?



https://www.bloomberg.com/graphics/2018-us-land-use/

Why Agriculture?



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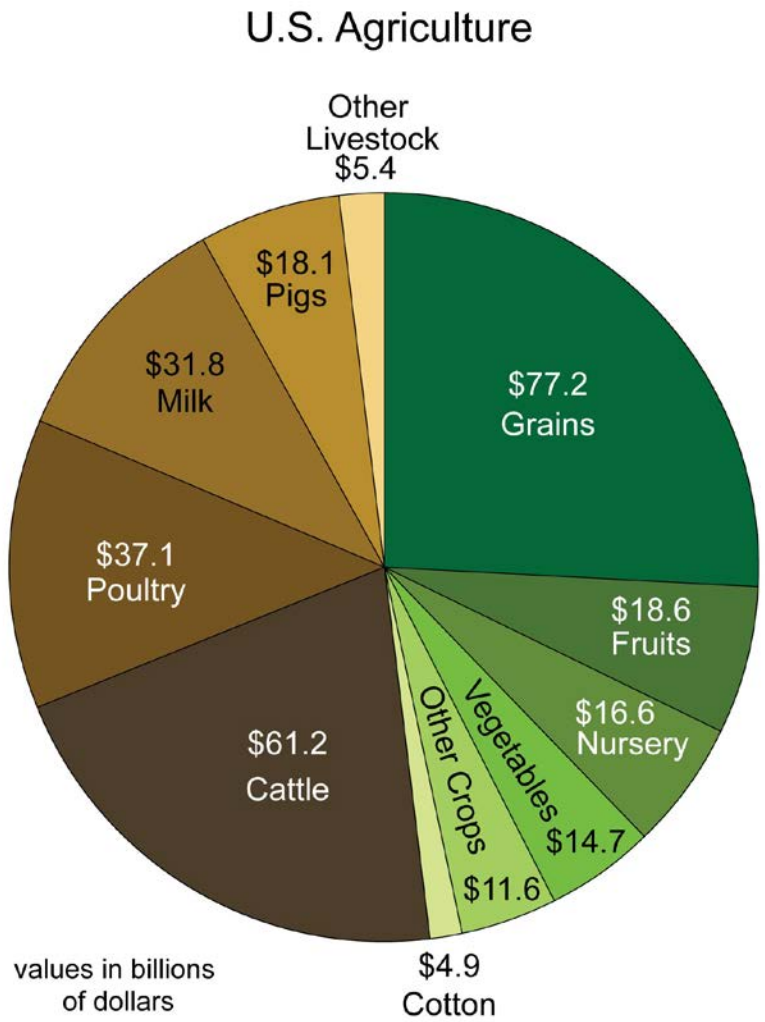
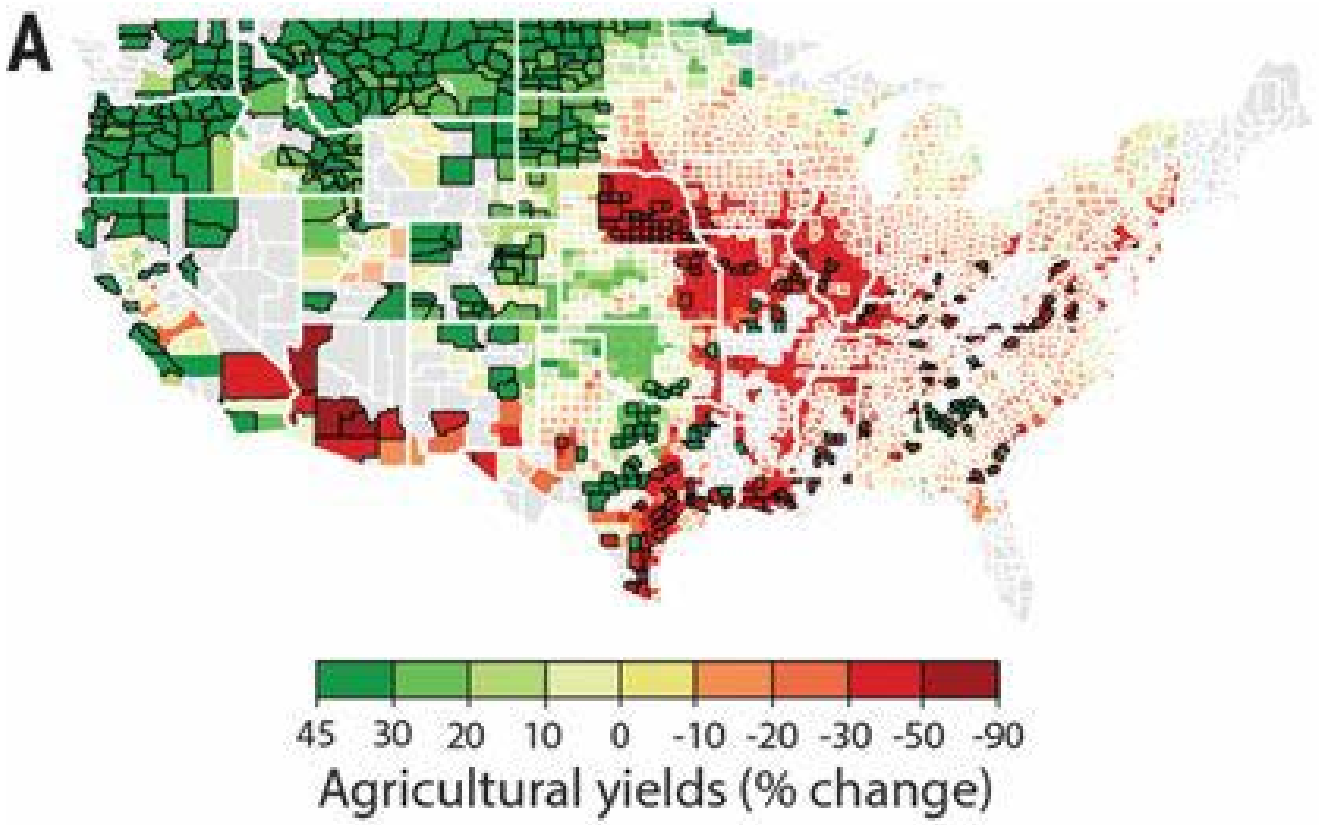
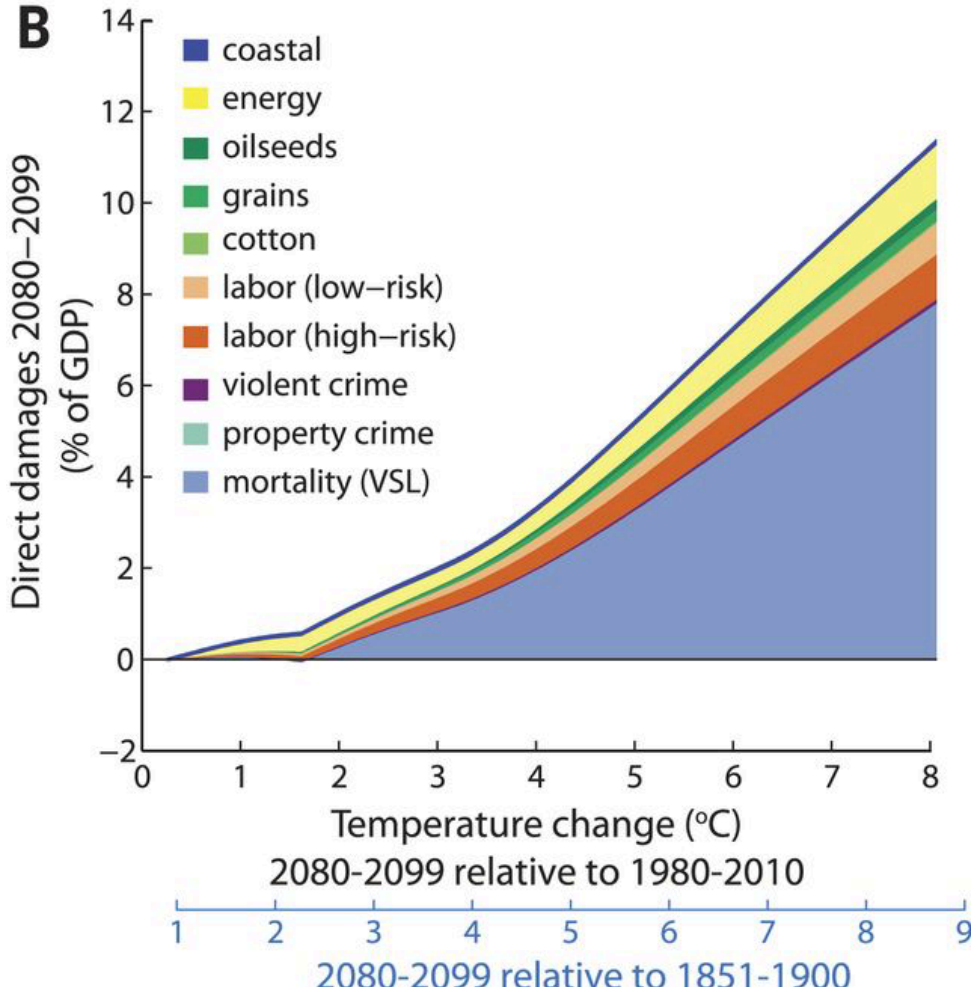


$330 billion per year

in agricultural commodities

Impacts of climate change





Hsiang et al. 2017 Estimating economic damage from climate change in the United States

Solutions from the agricultural sector

SOLUTIONS IN THIS SECTOR

COASTAL WETLAND PROTECTION

CONSERVATION AGRICULTURE

FARM IRRIGATION EFFICIENCY

FOREST PROTECTION

GRASSLAND PROTECTION

IMPROVED RICE PRODUCTION

INDIGENOUS PEOPLES' FOREST TENURE

NUTRIENT MANAGEMENT

PEATLAND PROTECTION AND REWETTING

PLANT-RICH DIETS

REDUCED FOOD WASTE

REGENERATIVE ANNUAL CROPPING

SUSTAINABLE INTENSIFICATION FOR SMALLHOLDERS

SYSTEM OF RICE INTENSIFICATION

PROJECT DRAWDOWN®

Conservation Agriculture

PROJECT DRAWDOWN

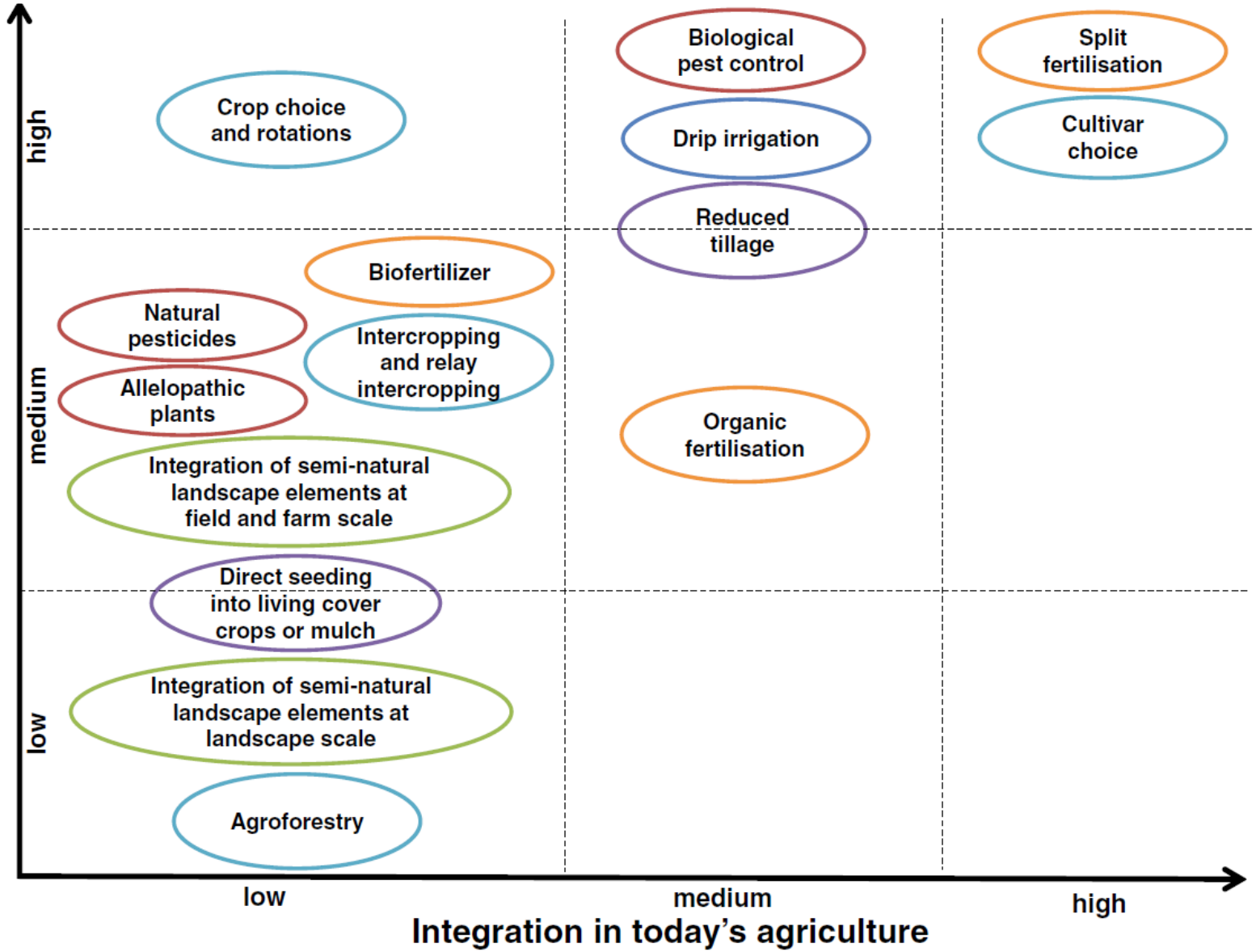
- **9.43-13.4** gigatons of CO_2 equivalent reduced/sequestered
- **78-113** billion $US net profit

No-till farming

Cover Crops

Crop Rotations

Potential of adoption in 10 years



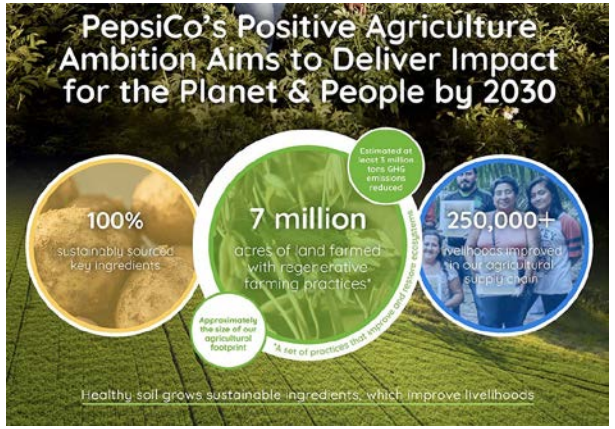
Agroecological practices for sustainable agriculture- DOI:10.1007/s13593-013-0180-7

Regenerative Annual Cropping

PROJECT DRAWDOWN

- **14.5-22.3** gigatons of CO_2 equivalent reduced/sequestered
- **$136-206** billion net profit

6 Core Principles of
REGENERATIVE AGRICULTURE



Farm Irrigation Efficiency

- **1.13-2.07** gigatons of CO_2 equivalent reduced/sequestered
- **$540-930** billion savings

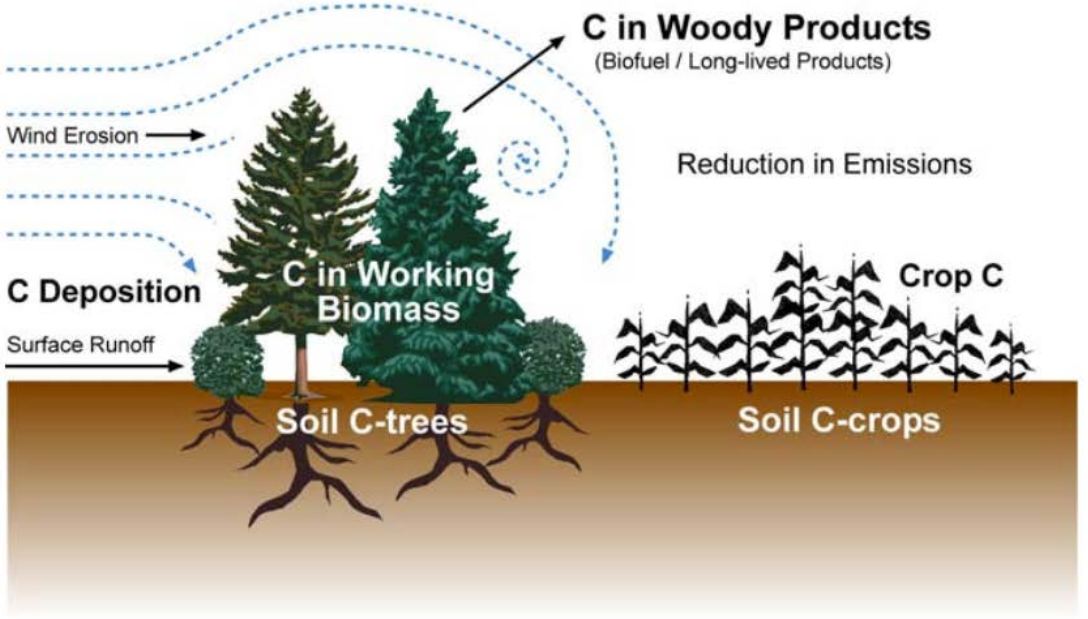
NRCS
United States Department of Agriculture
Natural Resources Conservation Service

PROJECT DRAWDOWN

Environmental Quality Incentives Program

Agroforestry

Alley Cropping (311)	Multistory Cropping (379)	Riparian Forest Buffers (391)
Silvopasture Establishment (381)	Windbreak Establishment (380)	Windbreak Renovation (650)

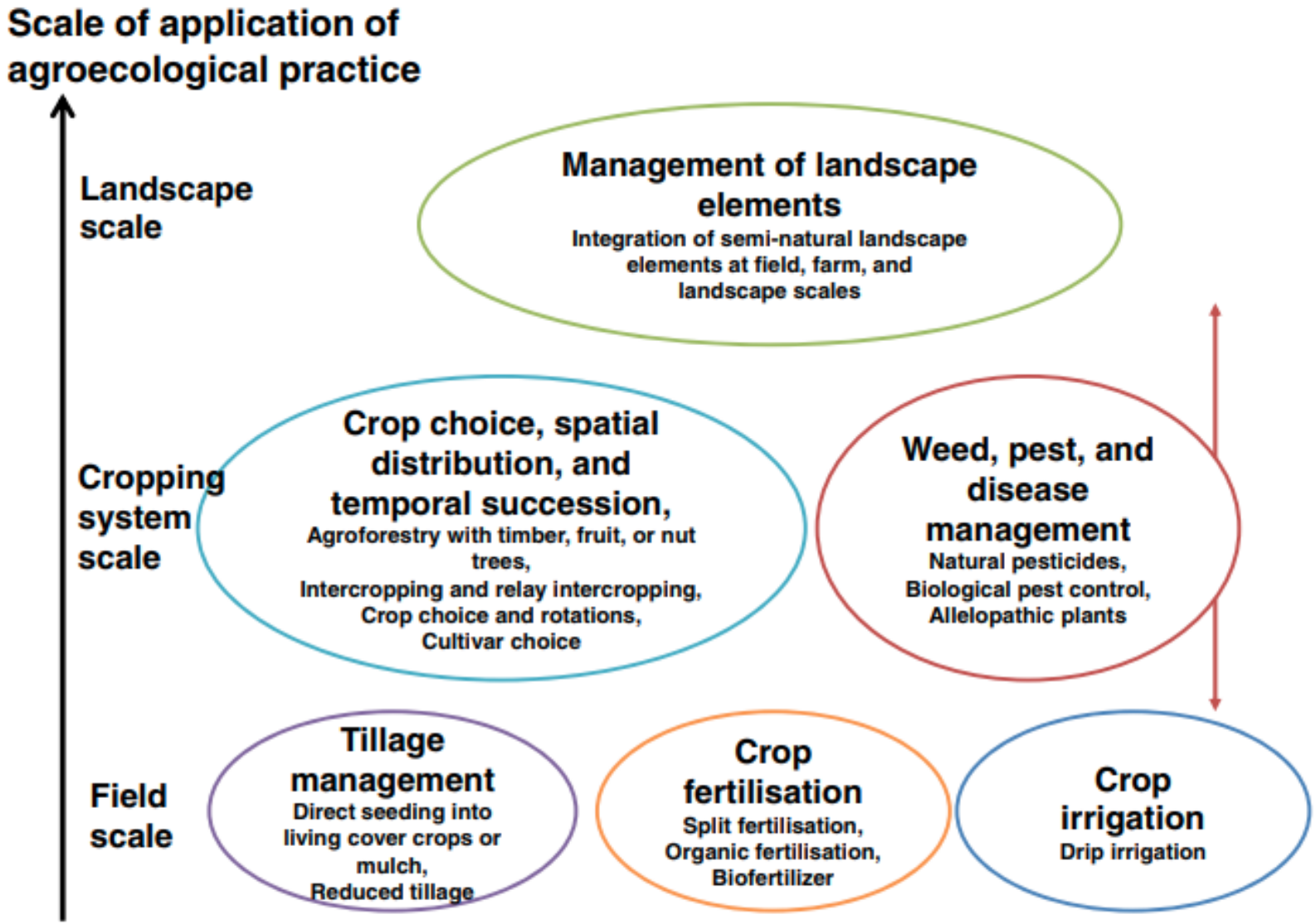


- Silvopasture at Greenbrier Farms
- https://www.fs.usda.gov/nac/

Figure 1: Major carbon sinks and sources that can be affected by a field windbreak. Image credit: Schoenberger 2008.

At the same time farmers mitigate climate change through agroforestry practices, they can also get other benefits.

Scale of interventions



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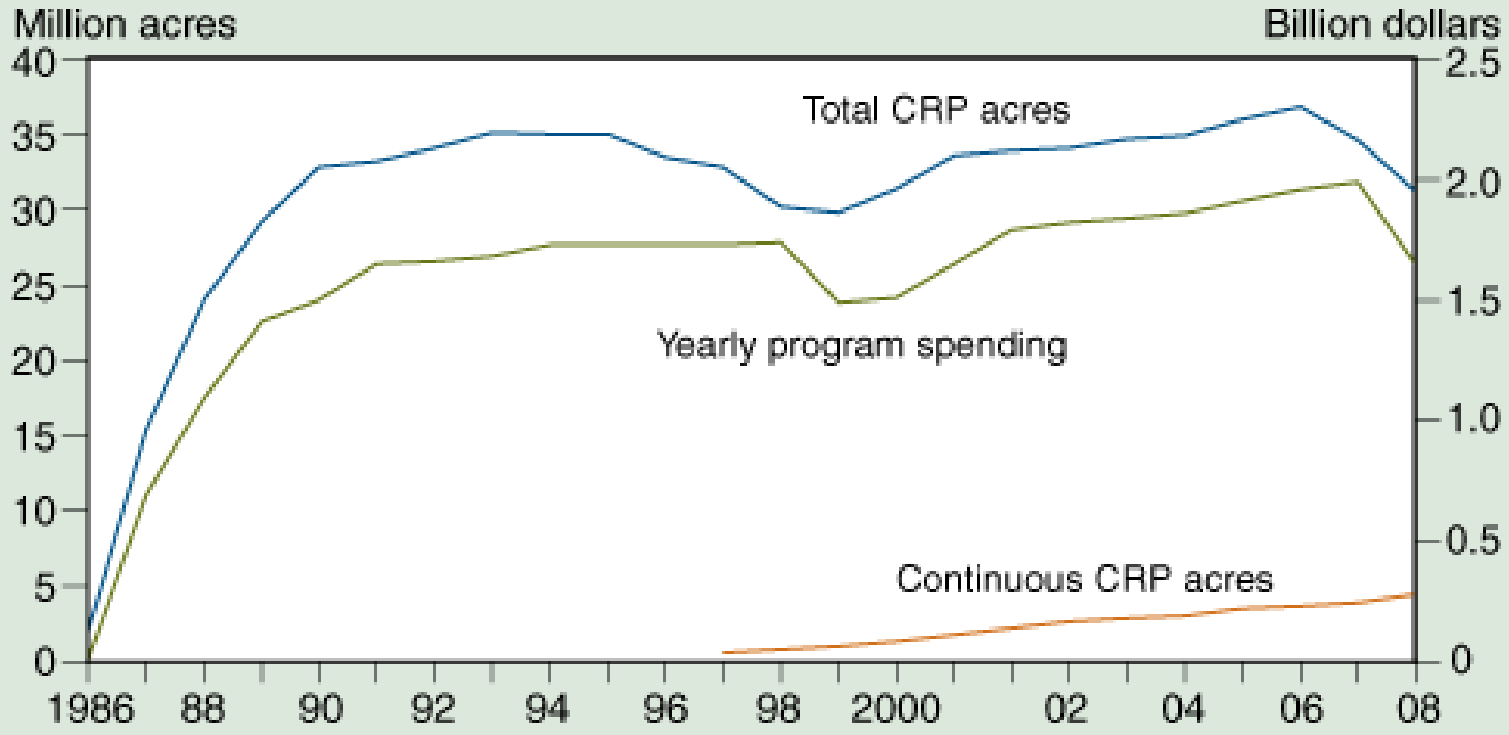
Grassland Protection & Conservation Reserve Program

While overall enrollment in the CRP is declining, continuous program acreage is increasing



Source: USDA, Economic Research Service, based on CRP contract data maintained by USDA's Farm Service Agency.

USDA Expands and Renews Conservation Reserve Program in Effort to Boost Enrollment and Address Climate Change

Contact: FPAC.BC.Press@usda.gov

WASHINGTON, April 21, 2021 – Agriculture Secretary Tom Vilsack announced today that USDA will open enrollment in the Conservation Reserve Program (CRP) with higher payment rates, new incentives, and a more targeted focus on the program's role in climate change mitigation. Additionally, USDA is announcing investments in partnerships to increase climate-smart agriculture, including $330 million in 85 Regional Conservation Partnership Program (RCPP) projects and $25 million for On-Farm Conservation Innovation Trials. Secretary Vilsack made the announcement today at the White House National Climate Task Force meeting to demonstrate USDA's commitment to putting American agriculture and forestry at the center of climate-smart solutions to address climate change.

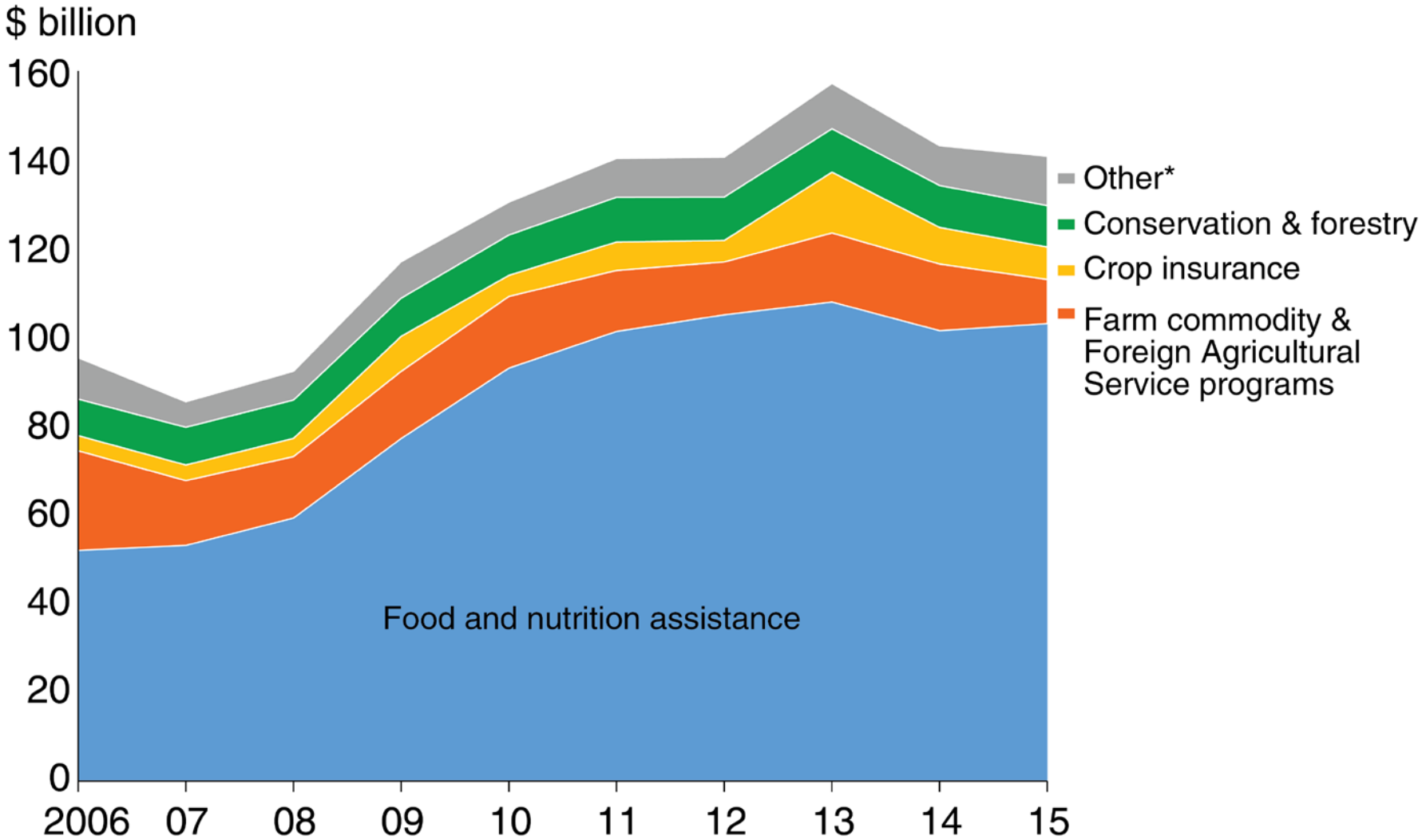
The Biden-Harris Administration is working to leverage USDA conservation programs for climate mitigation, including continuing to invest in innovation partnership programs like RCPP and On-Farm Trials as well as strengthening programs like CRP to enhance their impacts.

"Sometimes the best solutions are right in front of you. With CRP, the United States has one of the world's most successful voluntary conservation programs. We need to invest in CRP and let it do what it does best—preserve topsoil, sequester carbon, and reduce the impacts of climate change," said Vilsack. "We also recognize that we can't do it alone. At the White House Climate Leaders Summit this week, we will engage leaders from all around the world to partner with us on addressing climate change. Here at home, we're working in partnership with producers and local organizations through USDA programs to bring new voices and communities to the table to help combat climate change."

Conservation Reserve Program

USDA's goal is to enroll up to 4 million new acres in CRP by raising rental payment rates and expanding the number of incentivized environmental practices allowed under the program. CRP is one of the world's largest voluntary conservation programs with a long track record of preserving topsoil, sequestering carbon, and reducing nitrogen runoff, as well providing healthy habitat for wildlife.

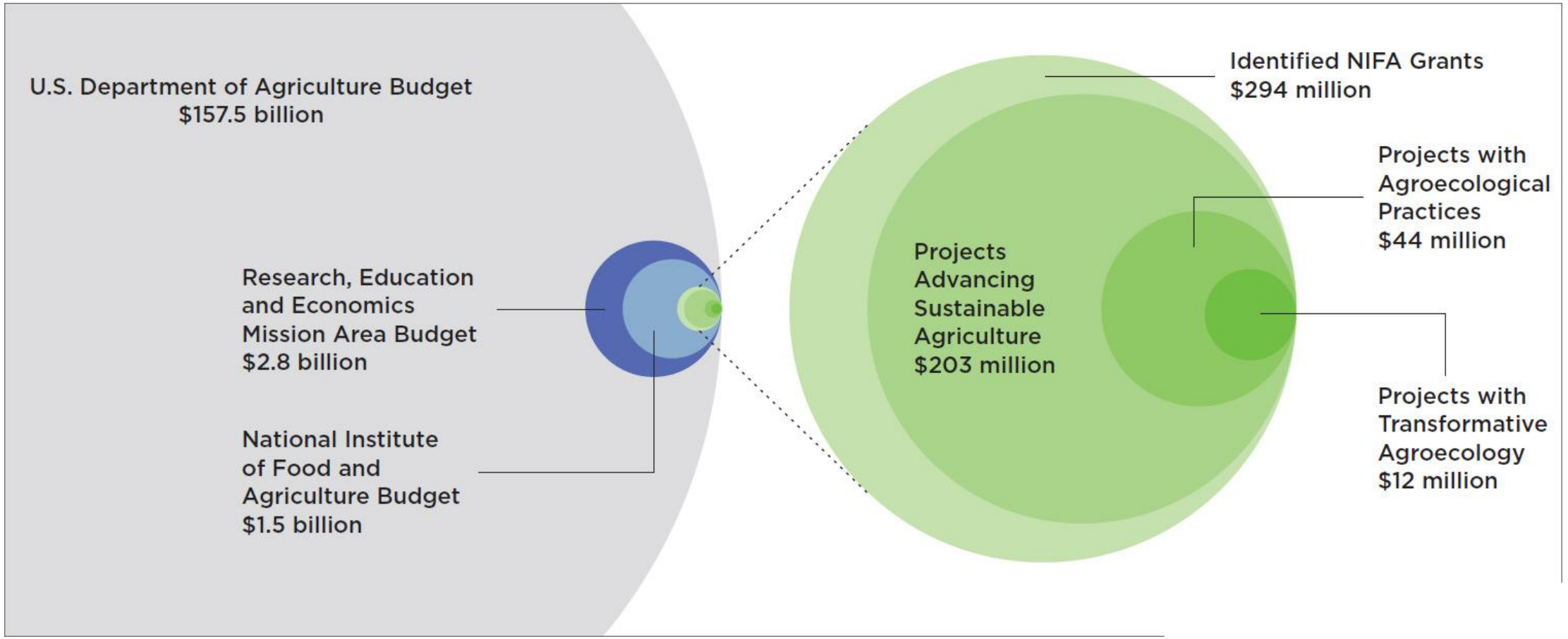
USDA budget outlays, fiscal years 2006-15



*Includes rural development, food safety, marketing and regulatory programs, rese and departmental activities. Note: Nominal dollars.

Source: USDA, Economic Research Service using data from FY2008-FY2016 USDA Budget Summary and Annual Performance Plan.

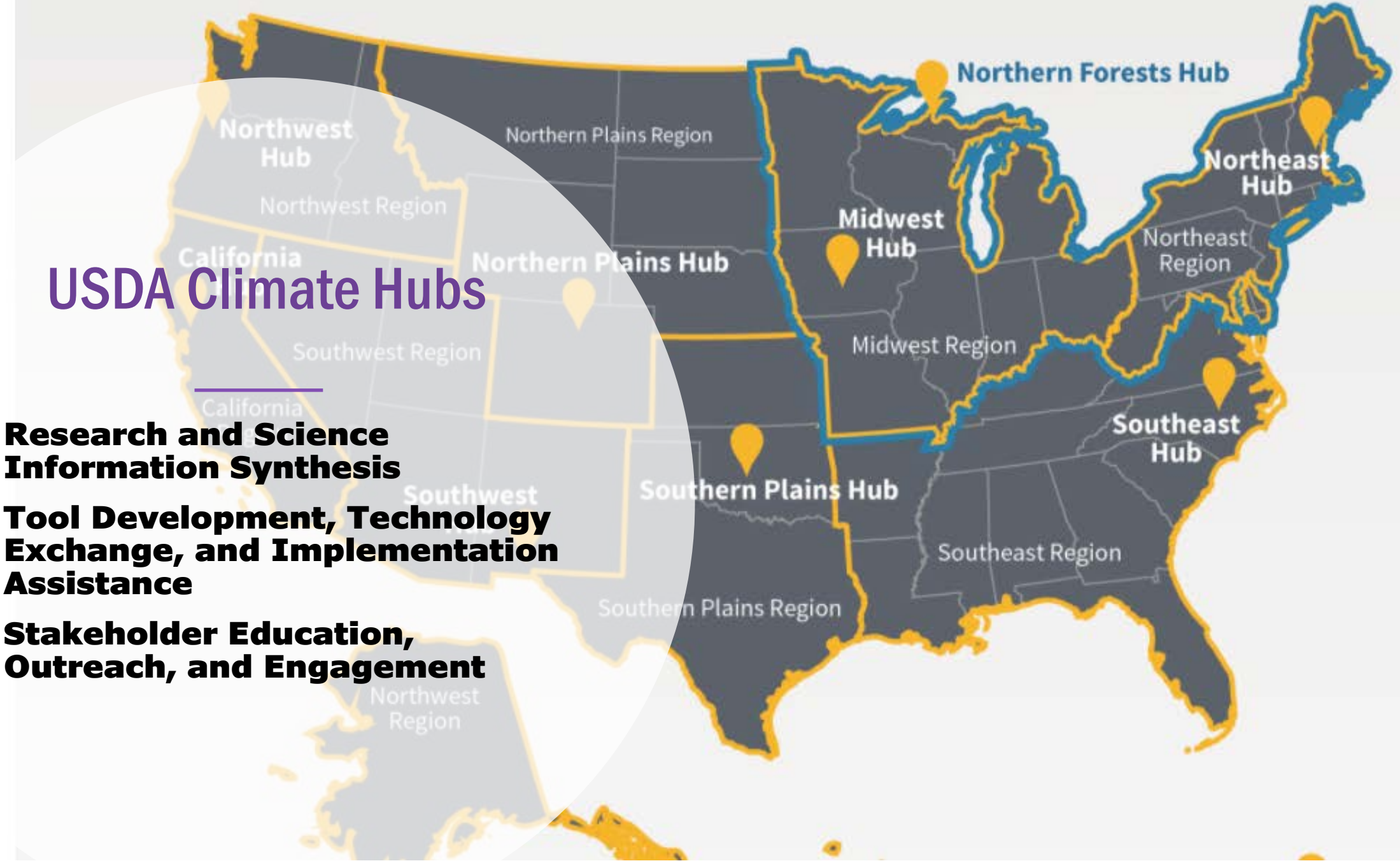
Agroecology funding in the 2014 USDA budget



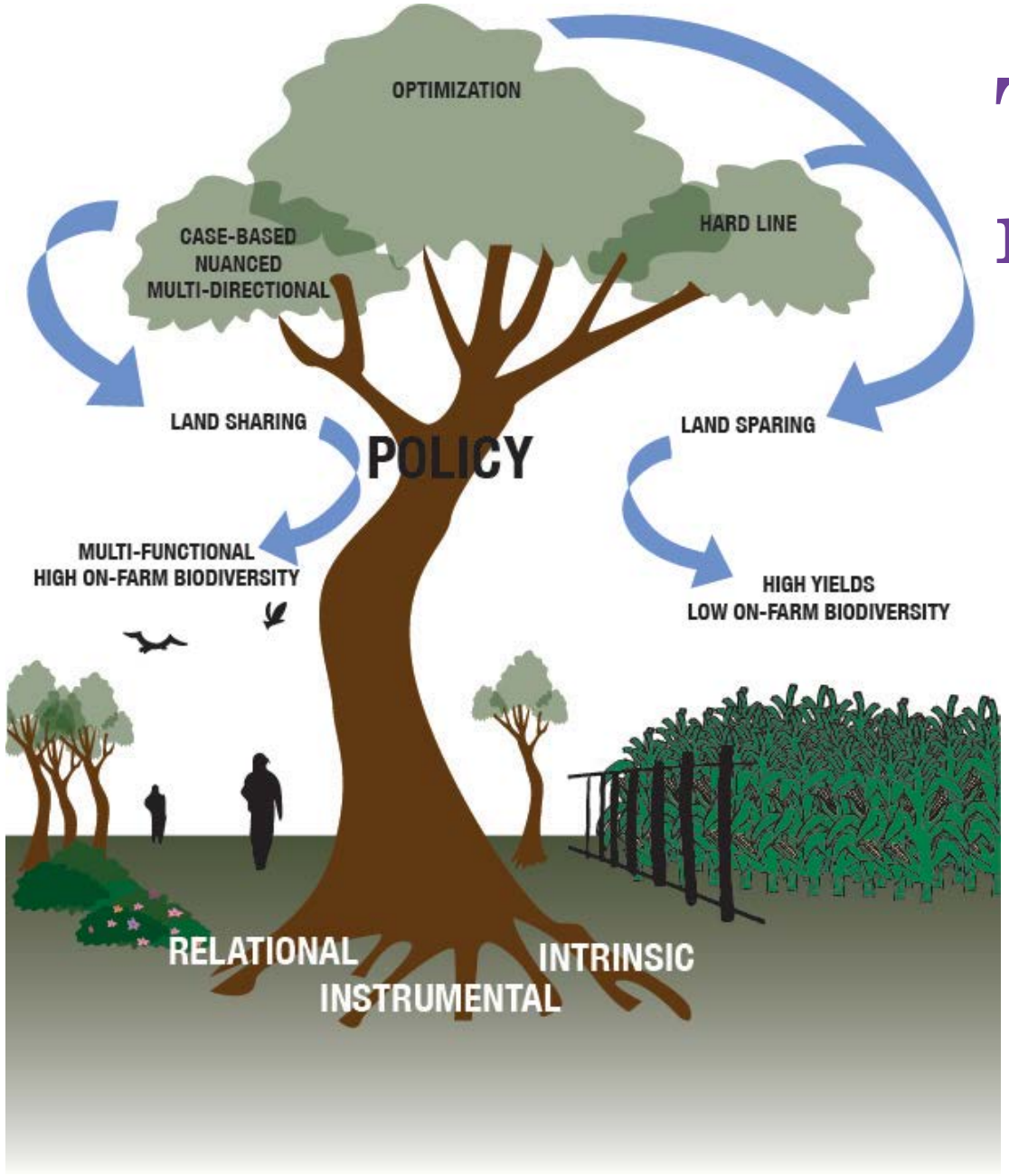
https://www.ucsusa.org/resources/counting-agroecology

USDA Climate Hubs

- **Research and Science Information Synthesis**
- **Tool Development, Technology Exchange, and Implementation Assistance**
- **Stakeholder Education, Outreach, and Engagement**



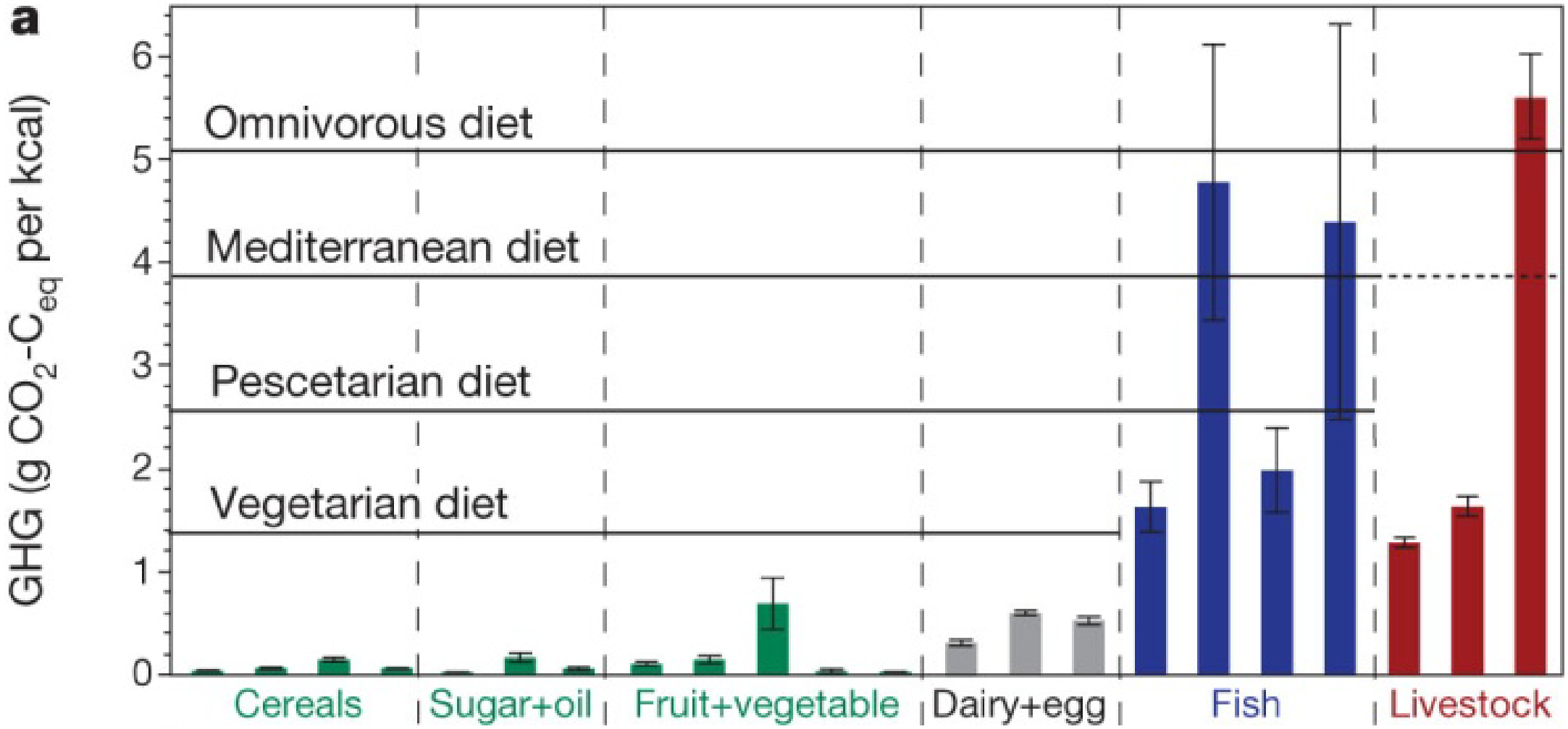
The importance of relationships for change



Allen et al. 2017
Riechers et al. 2020
Chapman et al. 2019

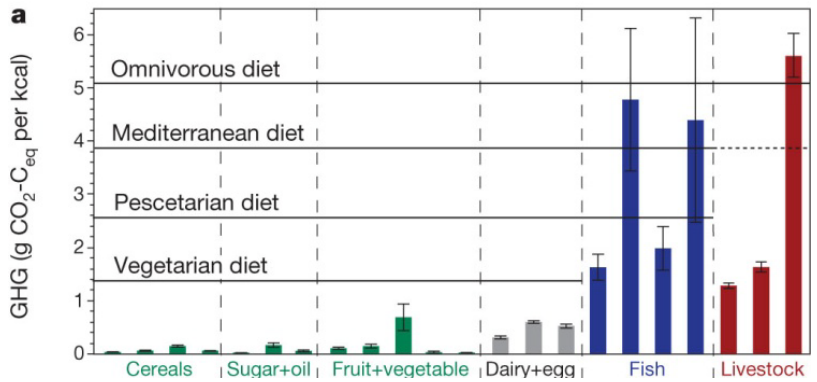
What About Consumers?

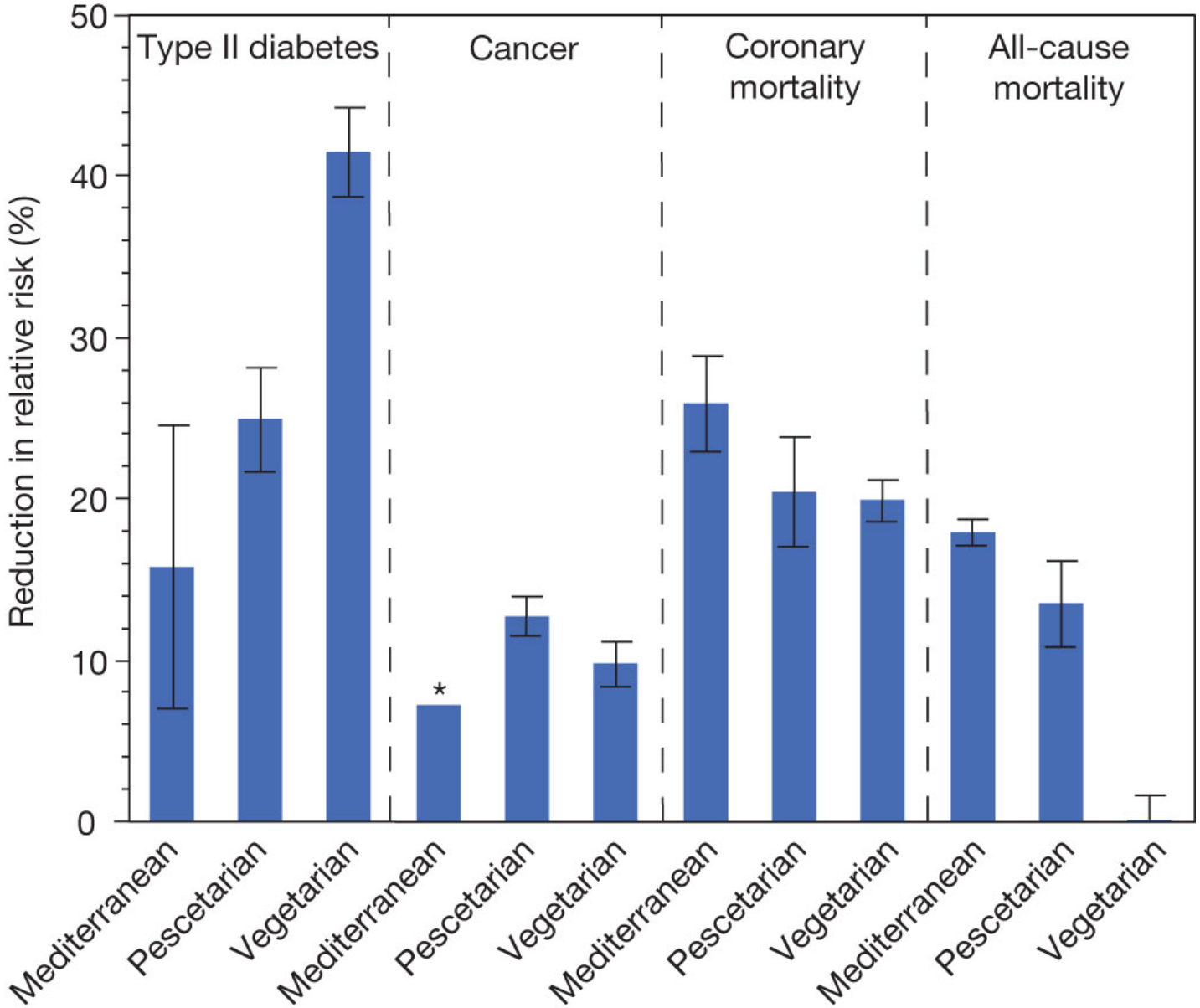
Lifecycle GHG emissions (CO_2-C_{eq}) for 22 different food types.



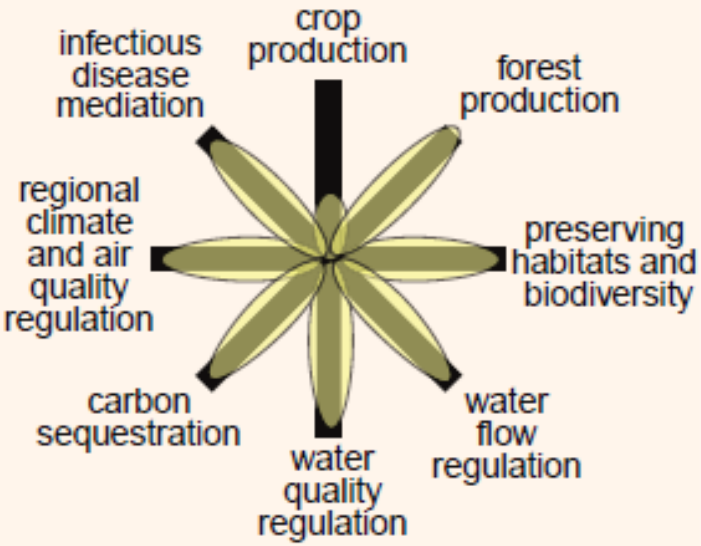
nature

D Tilman & M Clark *Nature* **000**, 1-5 (2014) doi:10.1038/nature13959

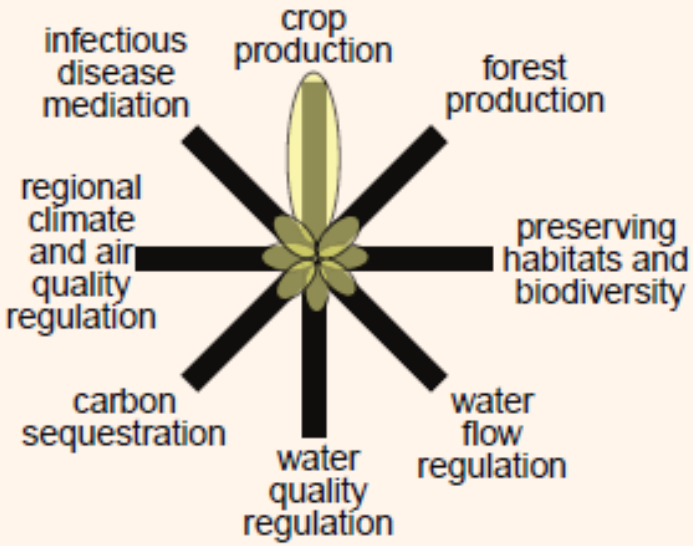




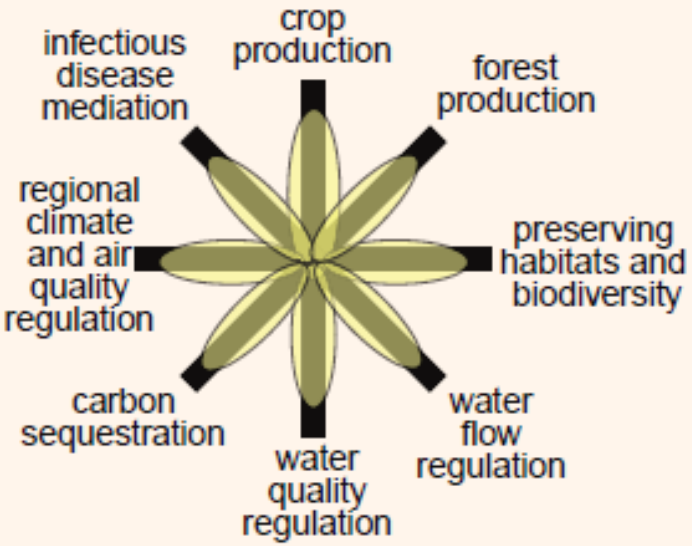
D Tilman & M Clark *Nature* (2014) doi:10.1038/nature13959



natural ecosystem

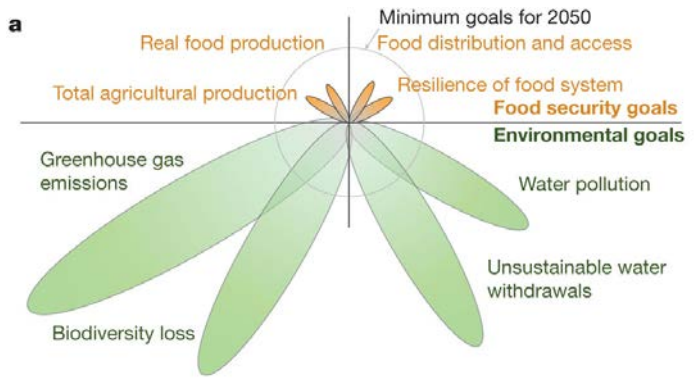


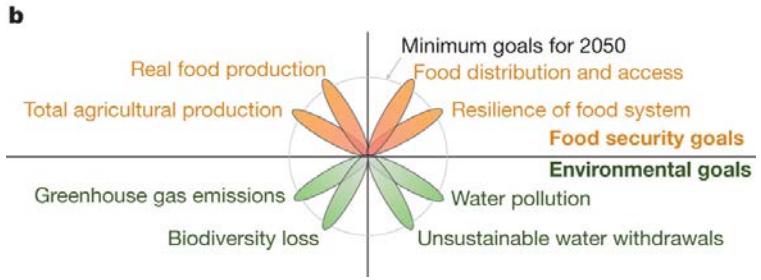
intensive cropland



cropland with restored ecosystem services

Foley et al. 2005





Solutions for a cultivated planet

Foley et al. 2011

Thank You & Questions?

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