



Reducing the Health Impacts of the Nitrogen Problem

A Virtual Workshop from the
Environmental Health Matters Initiative

New sessions every Thursday
from 2:30–5:30 PM (ET)
from January 28 – February 25, 2021

Federal Programs Related to Conservation and Nitrogen Management and Use

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The findings and conclusions in this presentation are those of the author and should not be construed to represent any official USDA or U.S. Government determination or policy.

Key Themes

- Broad range of possible and actual policy approaches
We can focus on two large programs – EQIP and CSP
- Targeting is critical for all approaches
Eligibility, conservation planning, and offer ranking
- Which practices get adopted and incentivized?
Policymakers, farmers, and outside factors all matter
- Behavioral responses influence policy design
Joint adoption and non-additionality



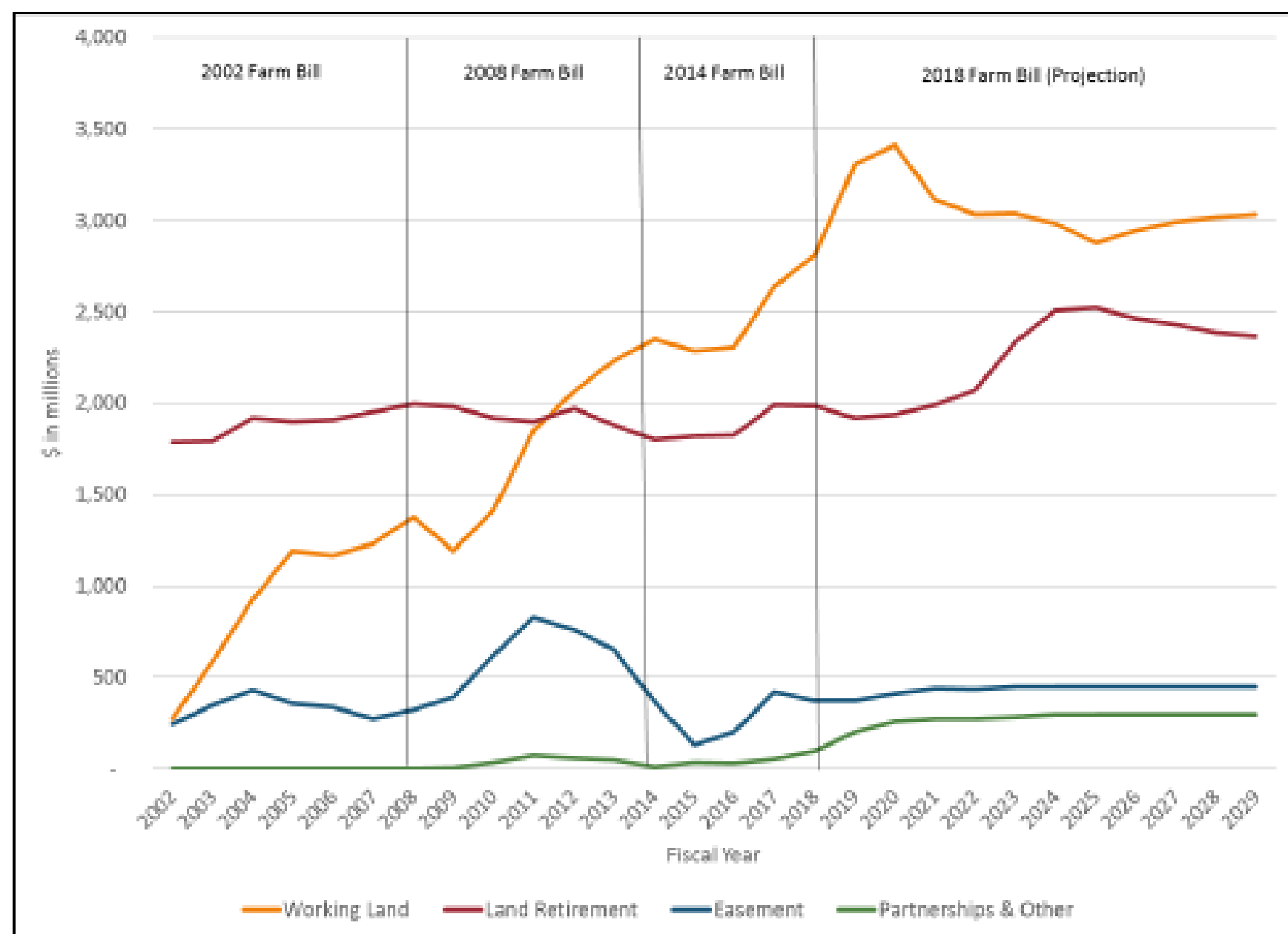
Pollution policy

Agricultural pollution
abatement programs
mainly use practice-
based contracts for
“cost-share” financial
assistance.

Broad approach	Up-stream focus	Down-stream focus
Regulation	Technology standard	Emission or concentration standard
Subsidy	Practice-based contracts	Pay-for-performance contracts

Figure 4. Farm Bill Conservation Program Mandatory Spending, FY2002-F2029

Outlays in millions of dollars



Source: CRS using CBO baseline data, FY2001-FY2019.

Notes: FY2002 through FY2018 include actual spending levels. FY2019 through FY2029 are projected spending levels. Chart does not include sequestration or savings from repealed programs. Working lands include the Environmental Quality Incentives Program (EQIP), Conservation Stewardship Program (CSP), Agricultural Management Assistance (AMA), and earlier programs; land retirement includes the Conservation Reserve Program (CRP) and subprograms; easement includes the Agricultural Conservation Easement Program (ACEP) and earlier programs; and other includes the Regional Conservation Partnership Program (RCPP) and other programs.

Working lands programs

From \$300 million in 2002 to over \$3 billion in 2021.

Nutrient management and nitrogen pollution abatement form a substantial share of these programs.

Source: Stubbs (2019) CRS report 45698

<https://crsreports.congress.gov/product/pdf/R/R45698>

Major Conservation Programs

Over 27 USDA Conservation Programs

Working Lands Programs

Environmental Quality Incentives Program

\$1,750 million in FY2020 enacted budget

+ \$472 million in EQIP Technical assistance

Conservation Stewardship Program

\$725 million dollars in FY2020 enacted budget for “new” CSP

\$1,835 million in FY2020 enacted budget for “old” CSP

+ \$198 million in CSP Technical assistance

Land Retirement Programs

Conservation Reserve Program

\$2,044 million in FY2020 estimated budget (mandatory spending)

+ \$112 million in CRP technical assistance

Source; <https://www.usda.gov/sites/default/files/documents/usda-fy2021-budget-summary.pdf>

Other Conservation Programs

Partnership Programs

Regional Conservation Partnership Program

\$300 million in FY2020 enacted budget

+ \$216 million in RCPP technical assistance

Conservation Reserve Enhancement Program

Federal funding included in CRP budget item

Other Programs

Grassroots Source Water Protection

\$7 million in FY2020 enacted budget

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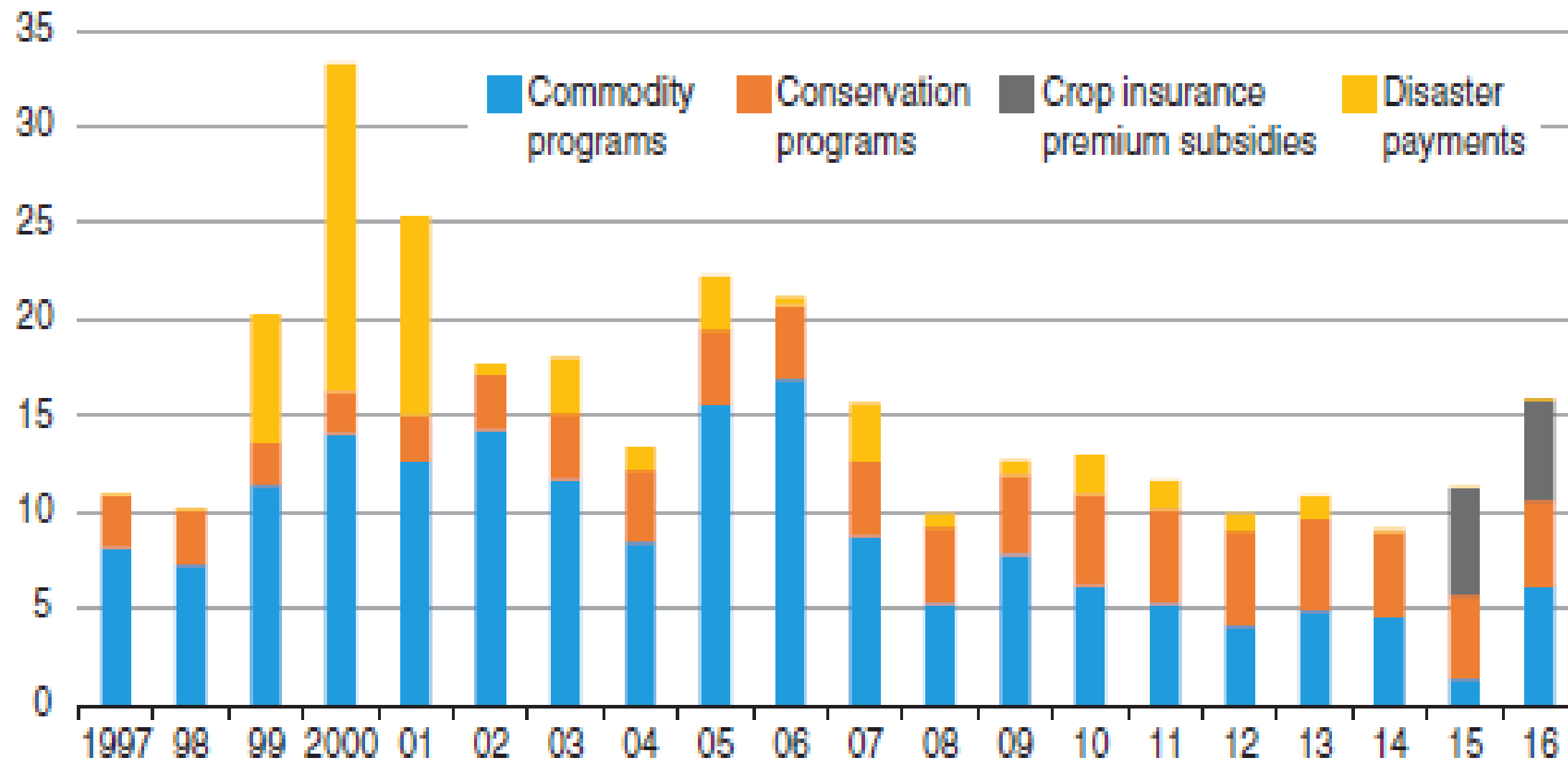
New in 2018 Farm Act, within CRP, funds 30-year contracts for water quality benefits

Landscape Initiatives

Concentrate EQIP and other funds, such as Chesapeake Bay Watershed Initiative

Compliance incentives by fiscal year, 1997-2016

\$ Billion (2012)



Source: USDA, Economic Research Service analysis of USDA's Office of Budget and Policy Analysis data.

Conservation compliance

Applies to operations that have highly erodible farmland or farmable wetlands and receive “program” payments.

Requires conservation plan and activities.

Source: Claassen et al. (2017) ERR 234

<https://www.ers.usda.gov/publications/pub-details/?pubid=84456>

Targeting Matters

Three key aspects of targeting

Targeting is necessary

\$3 billion dollars in working lands annual funding versus 900 million acres in US farms and ranches.

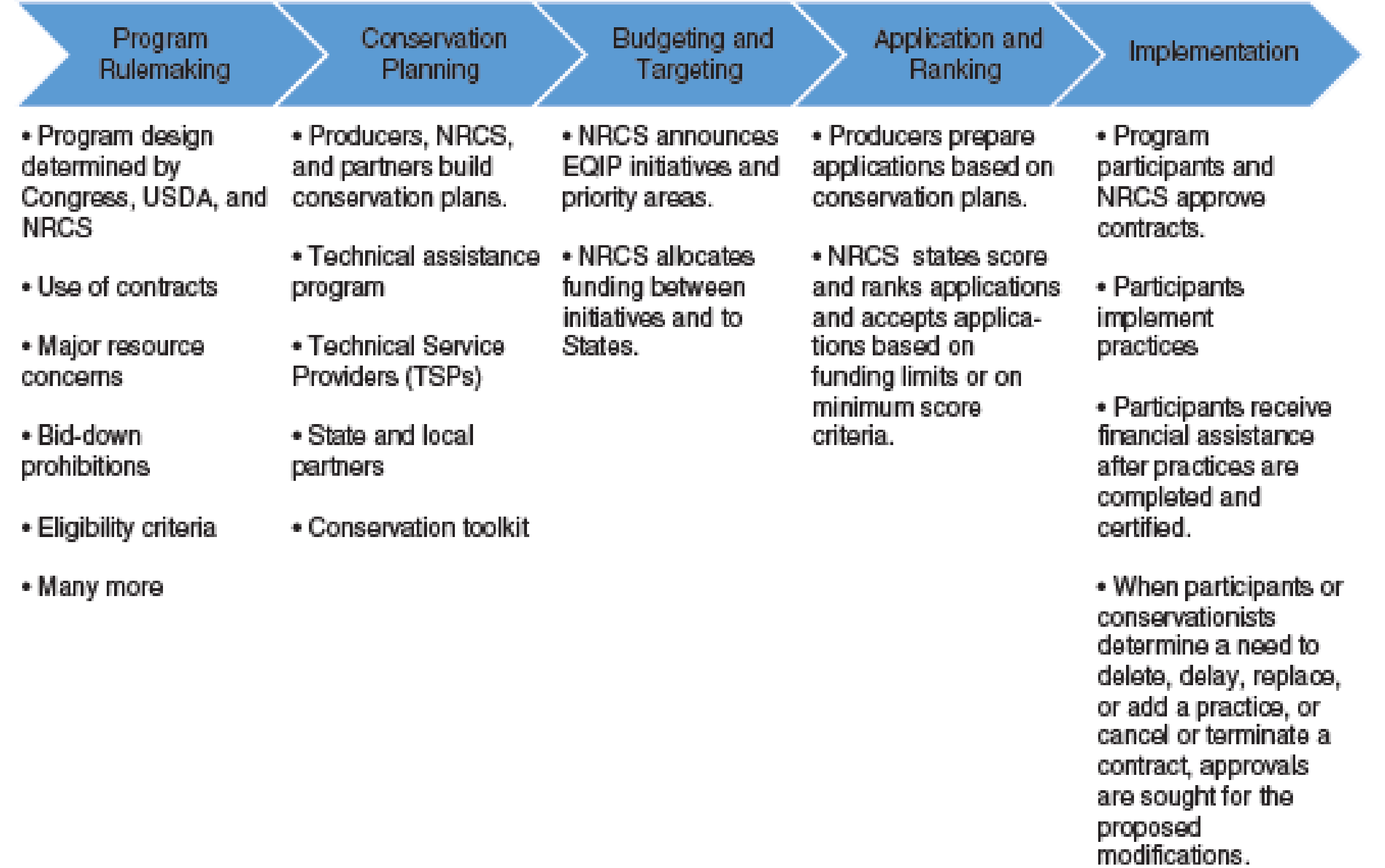
Targeting is imperfect

Most programs are voluntary, so targeting tools rarely achieve “first-best” policy.

Targeting rarely includes both benefits and costs

The largest exception to this is the General Signup in CRP

Conceptual map of the NRCS conservation process for establishing EQIP contracts



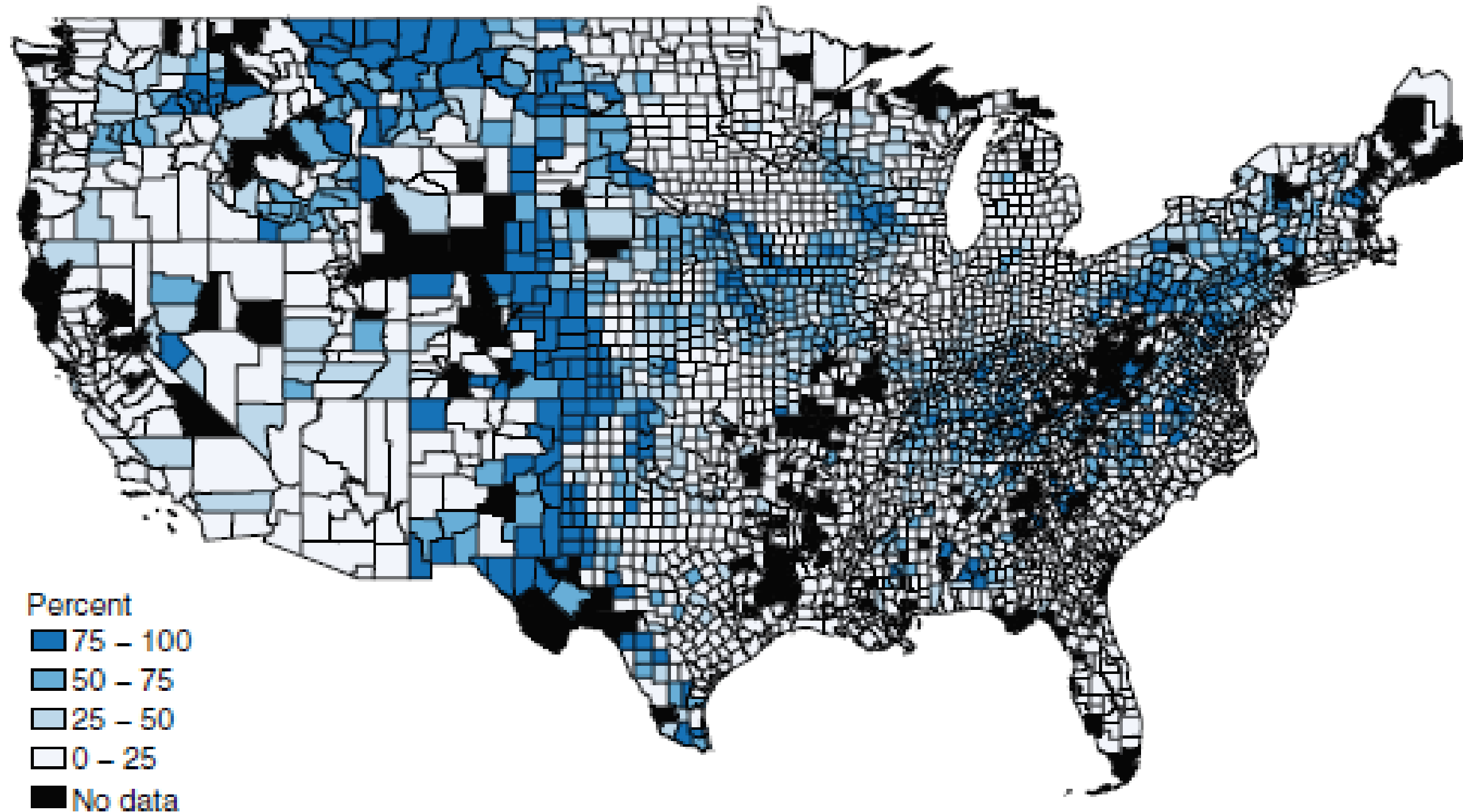
Targeting in EQIP

- Planning
- Eligibility
- Ranking
- Implementation

Source: Wallander et al.(2013) ERR 148

<https://www.ers.usda.gov/publications/pub-details/?pubid=45067>

Cultivated cropland in HEL fields



Note: Percent of cultivated cropland in common land units with HEL determination.

Source: USDA, Economic Research Service analysis of the Natural Resources Conservation Service's National Resources Inventory and Farm Service Agency data.

Highly Erodible Land

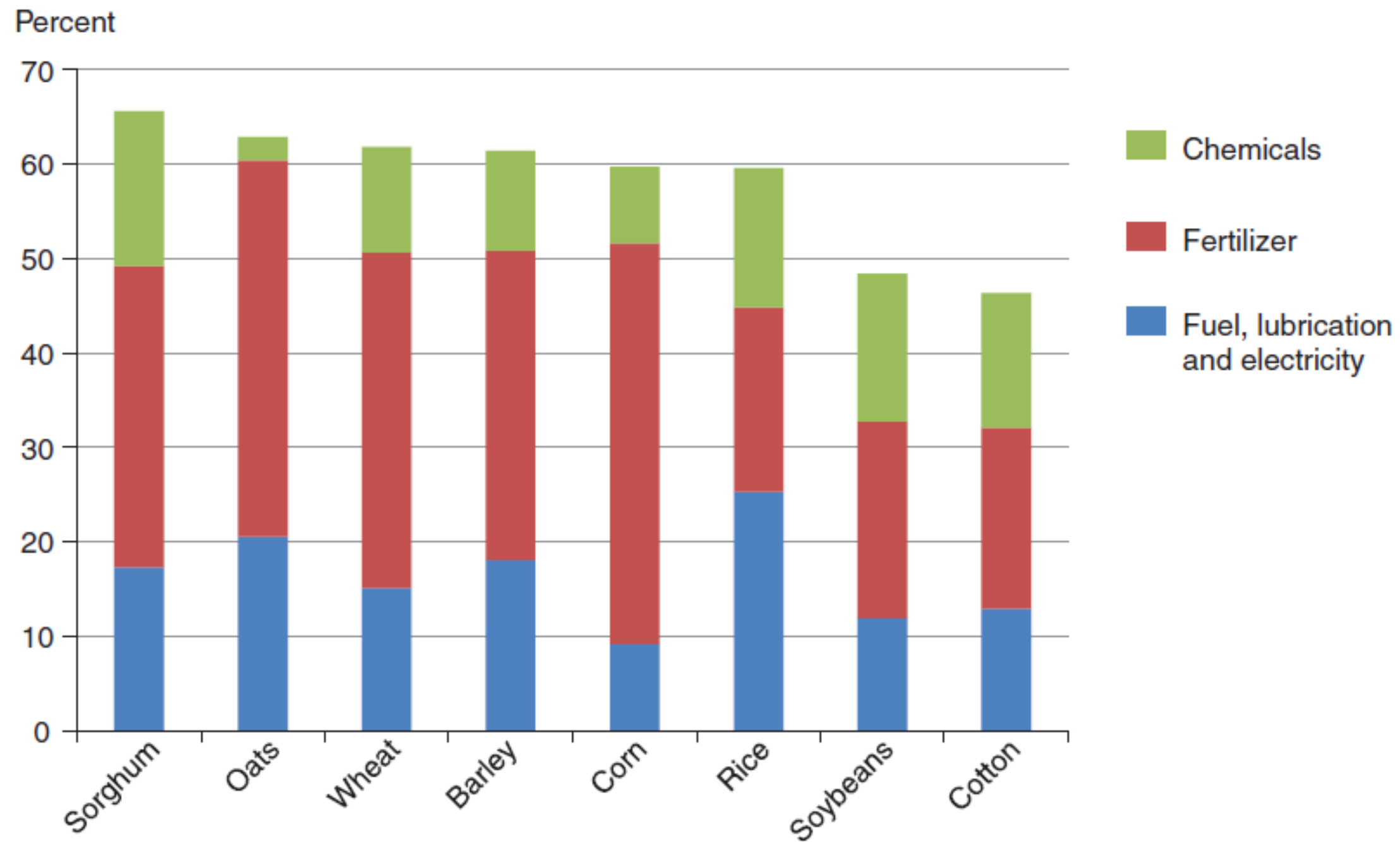
Erodibility measures play a major role in targeting for compliance and CRP

Source: Claassen et al. (2017) ERR 234

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Energy-related production expenses for selected crops relative to total operating expenses, 2014



Source: USDA, Economic Research Service, Cost of Production Database, November 2014.

Fertilizer Costs

On-farm private benefits to improved nitrogen management are heavily driven by the fact that fertilizer is between 15 percent and 40 percent of operating costs.

Source: Marshall et al. (2015) BIO-04

<https://www.ers.usda.gov/publications/pub-details/?pubid=35833>

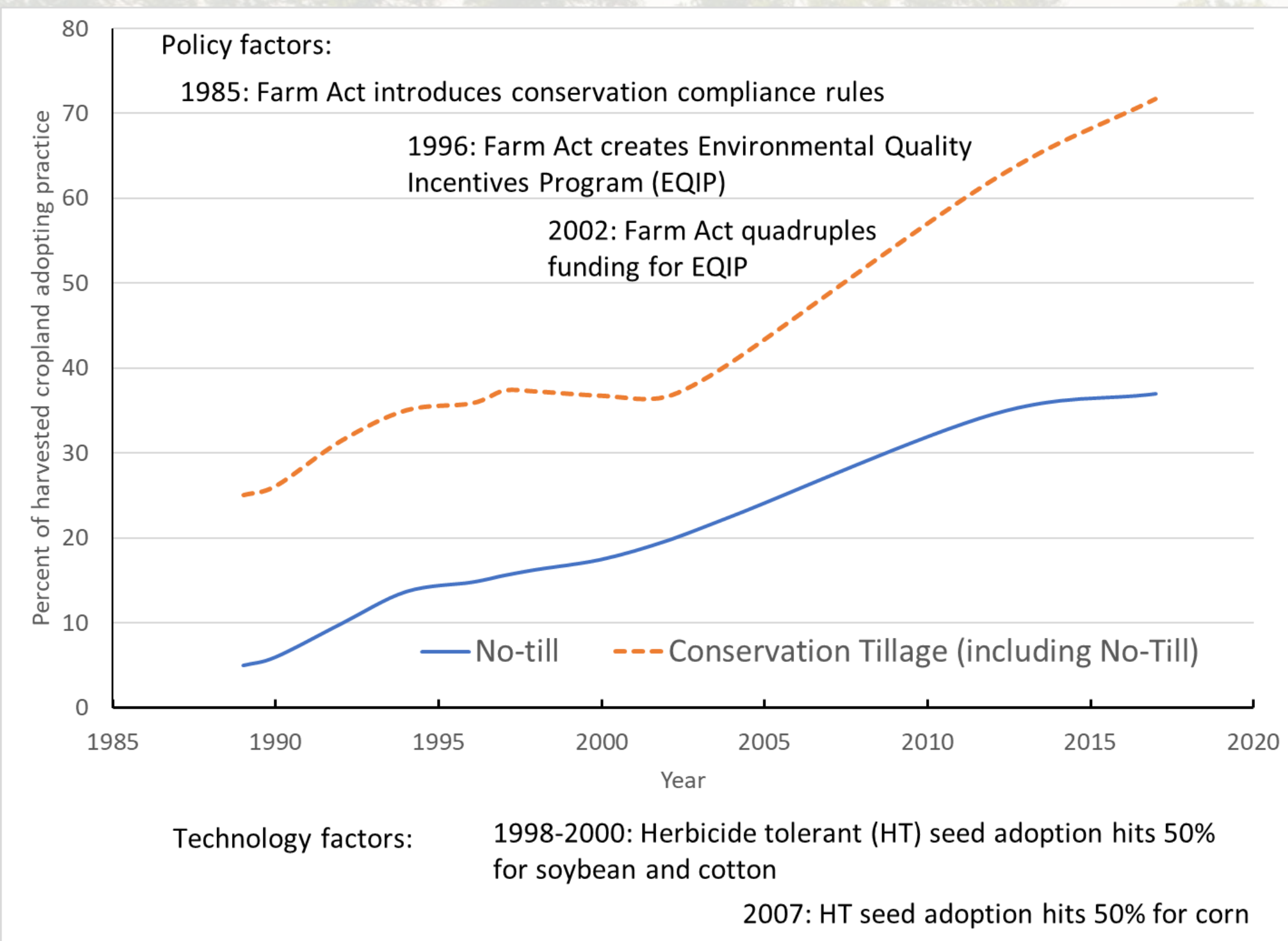
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Existing EQIP and CSP Practices

- Cover crops
- Nutrient management
- No-till and reduced tillage
- Manure management
- Riparian buffers
- Over 170 practices total in just EQIP.

Conservation Innovation Grants

- Many innovative practices undergo demonstration
- Bioreactors and digesters
- Drainage water management
- <https://www.nrcs.usda.gov/wps/portal/nrcs/ciglanding/national/programs/financial/cig/cigsearch/>



Trends in Tillage

At least three factors drive the large expansion in conservation tillage :

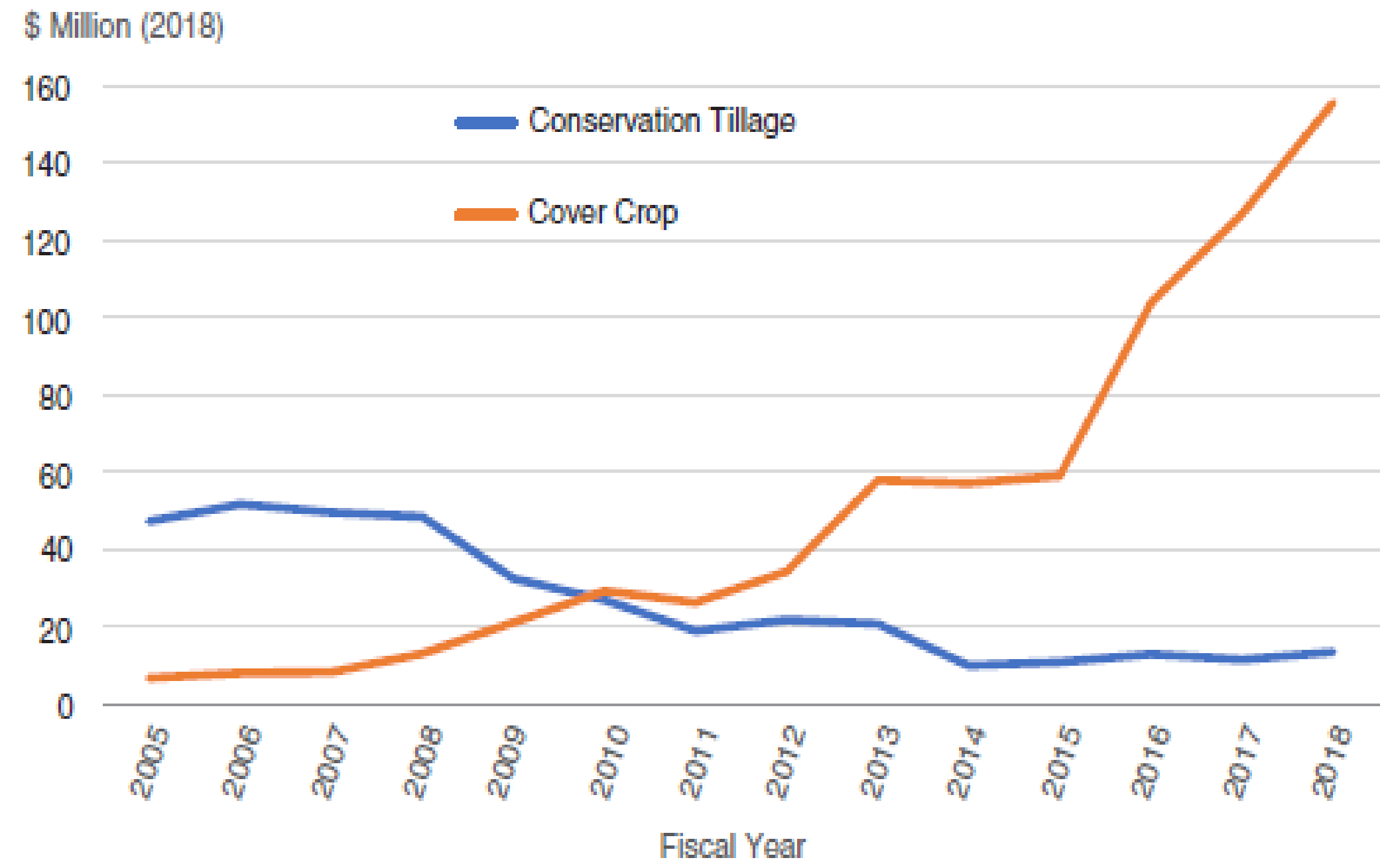
- Compliance
- Working lands programs
- Herbicide tolerant seed

Source: adapted from Wallander et al. (2020) JSWC

https://www.swcs.org/static/media/cms/75th_Book_online_small_EB8351774A8B2.pdf

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Spending trends on conservation tillage and cover crops in EQIP



Note: Dollar figure is the total amount of funding obligated for financial assistance ("cost-share") payments on the cover crop practice within EQIP contracts signed in each fiscal year. Adjustments for inflation are made with the Consumer Price Index.

Source: USDA, Economic Research Service analysis of USDA, Natural Resources Conservation Service ProTracts data on Environmental Quality Incentive Program (EQIP) obligations.



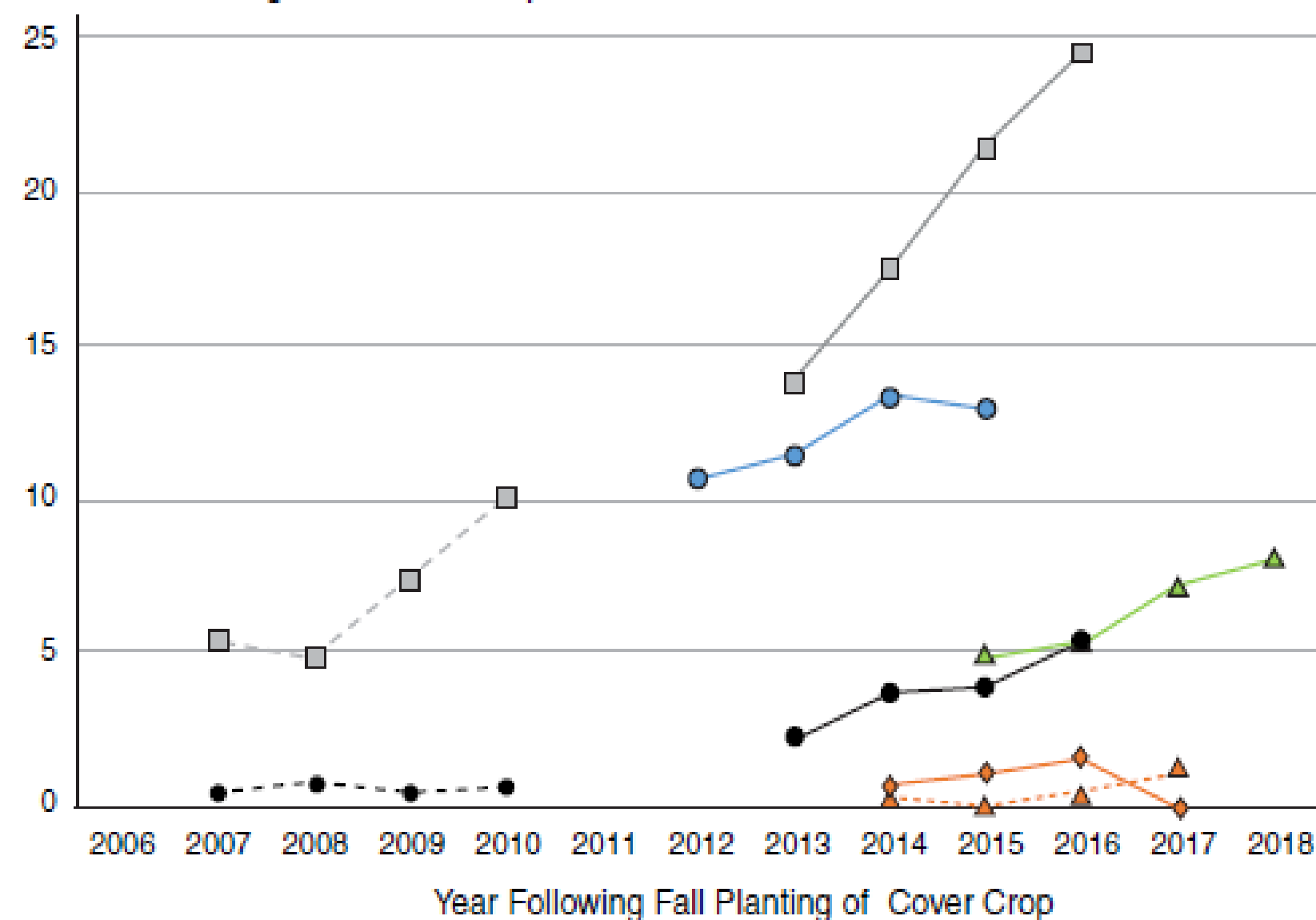
Cover Crops in EQIP

Obligated funds (as measured based on signed contracts) for cover crops are about ten percent of EQIP funding.

Source: Wallander et al. (2021) Forthcoming report

Trends in fall cover crop adoption by related cash crop

Percent of Acreage with Cover Crop



—■— 2010 Corn Silage Fields —●— 2010 Corn Grain Fields - -▲- - 2017 Spring Wheat Fields
—▲— 2018 Soybean Fields —■— 2016 Corn Silage Fields —●— 2016 Corn Grain Fields
—◆— 2017 Winter Wheat Fields —●— 2015 Cotton Fields

Note: For each crop, the sampled fields are planted with the designated crop in the survey year and a mix of other crops in earlier years. The samples used to calculate these adoption percentages are restricted to fields that had a 4-and-a-half-year history of crops.

Source: USDA, Economic Research Service and USDA, National Agricultural Statistics Service; 2010, 2016, 2017, 2018 Agricultural Resource Management Surveys.

Cover Crop Adoption Trends

Cover crop adoption is expanding but varies by crop. It is highest on corn silage fields.

Source: Wallander et al. (2021) Forthcoming report

Linking Payments to Outcomes

Additionality

All subsidy programs, and even regulation, is likely to have some degree of non-additionality.

- Cover crop additionality estimates range from 91% (Mezzatesta et al. (2013)) to 67% (Sawadgo (2018)).
- No-till or conservation tillage additionality estimates range from 47% (Claassen et al (2018)) to 19% (Mezzatesta et al (2013)).

Direct Impacts

Nutrient management EQIP payments: (Claassen et al. (2014) ERR 170)

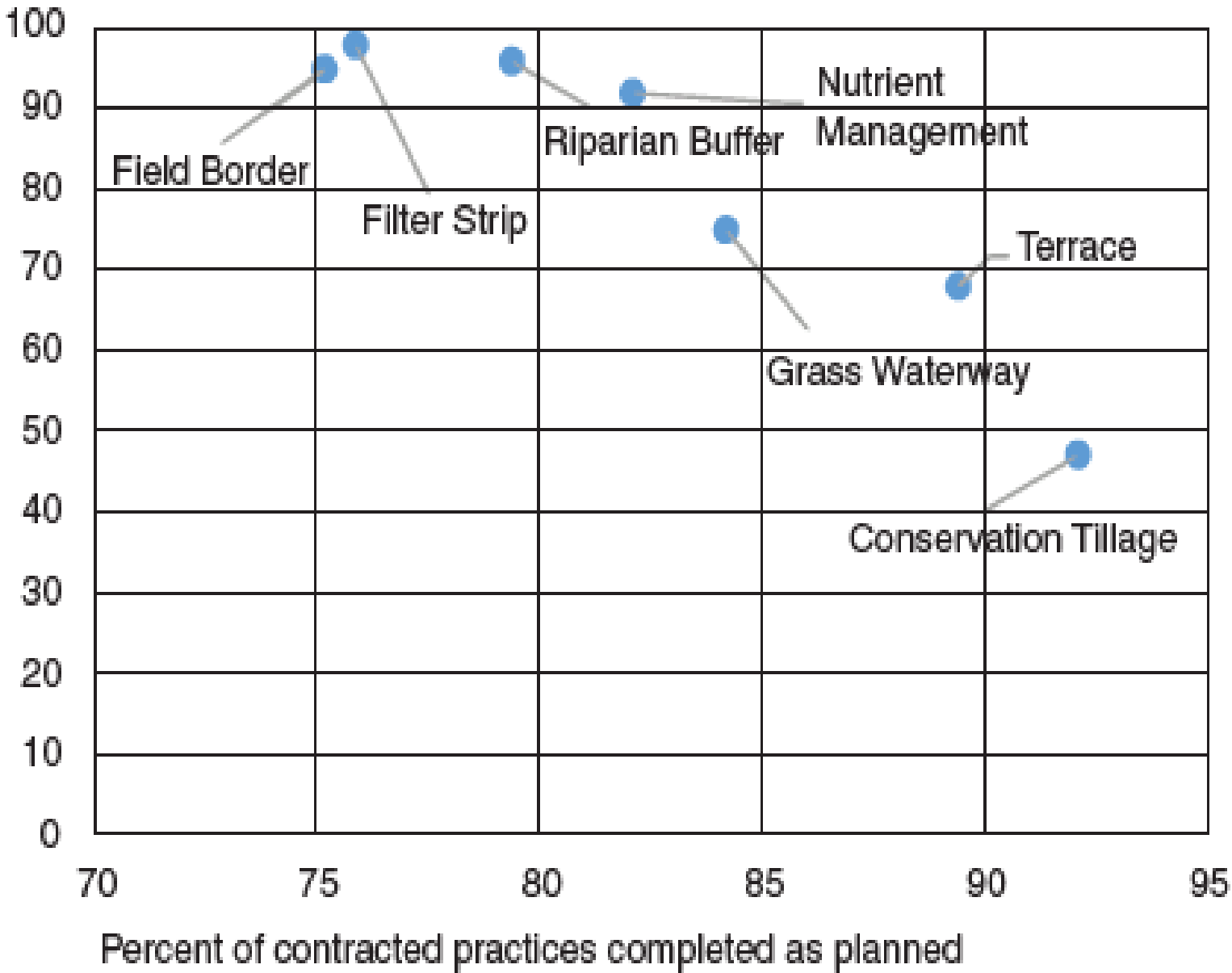
- Nearly eliminates fall application of nitrogen
- Statistically insignificant reductions in nitrogen application rates
- Statistically insignificant increase in post-planting application

Joint Adoption

Conservation practices may lead to joint adoption of other management practices or input decisions. This could either improve or hinder environmental outcomes.

Comparing dropped EQIP practices to additionality estimates.

Additionality (estimated percent of participants who adopted because of payments)



EQIP= Environmental Quality Incentives Program.

Source: The data on percentage of practices completed as planned is from USDA, Economic Research Service analysis of USDA, Natural Resources Conservation Service (NRCS) ProTracts data on EQIP conservation contracts originally signed in fiscal year 2010 and analyzed for practice status in the spring of 2014.



EQIP Contract Modifications

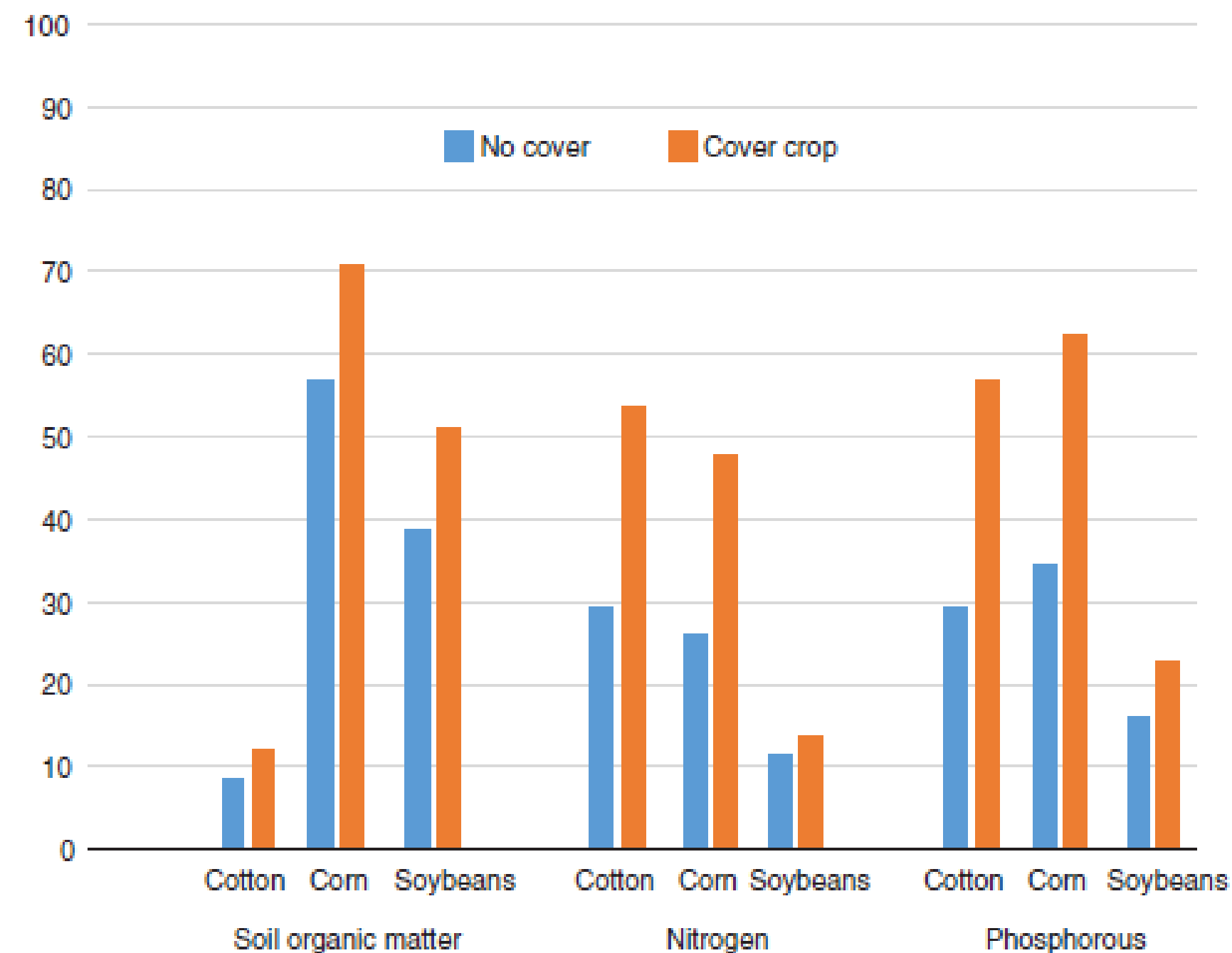
Practices with higher additionality are also less likely to be completed as planned.

Source: Wallander et al.(2019) ERR 262

<https://www.ers.usda.gov/publications/pub-details/?pubid=92643>

Use of soil testing with and without cover crops

Percent of acres using soil testing



Note: Acres adopting cover crops are based on whether the selected fields had a cover crop on the field in the survey year

Source: USDA, Economic Research Service and USDA, National Agricultural Statistics Service, 2015 (cotton), 2016 (corn), and 2018 (soybean) Agricultural Resource Management Survey.

Joint Adoption with Cover Crops

- Testing for nitrogen is more likely (shown)
- Continuous no -till is more likely
- Manure and compost use is more likely on corn fields

Source: Wallander et al. (2021) Forthcoming report

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Questions and Discussion?

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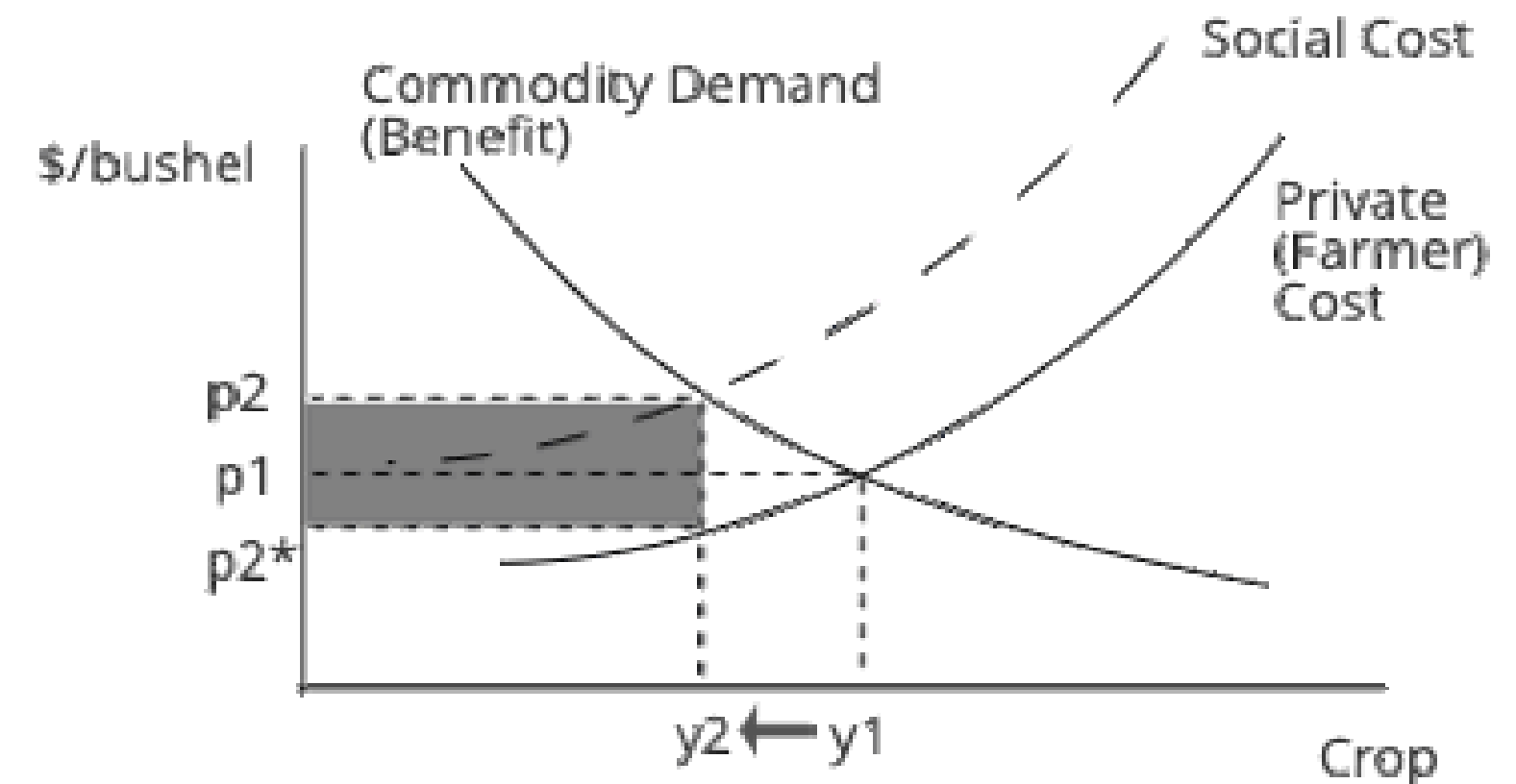
Traditional pollution policy targets output (Pigou 1920)

Abatement activity can be treated as a public good (Ostrom 1988), but a “cost share” approach requires impure public goods.

Source: Wallander et al. (2020) JSWC

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