



Fact Sheet

Conservation Measures and the Farm Bill

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The 1985 *Food Security Act* enshrined conservation in the Farm Bill. Already, Congress is discussing the 2018 Farm Bill, which will again be an important vehicle for encouraging on-farm conservation practices. On February 7, 2014, President Obama signed into law the *Agricultural Act*, or Farm Bill, of 2014 (Pub.L. 113-79), which extended the U.S. Department of Agriculture (USDA)'s broad work on agricultural research and opportunities for farmers, ranchers and growers. The 2014 Farm Bill authorized \$489 billion in spending by USDA through 2018, with 80 percent of its outlays funding nutrition programs, eight percent going to crop insurance, six percent to conservation, five percent to commodities, and one percent to other programs.¹ National conservation programs through the Farm Bill are an important component of effective, voluntary, farm-level conservation practices that provide multiple benefits both to rural and urban areas. These programs use a variety of conservation tools to protect and improve water quality and quantity, soil health, wildlife habitat, and air quality.

Conservation Tools

Agricultural pollution both from crop and livestock production has a major impact on water quality. According to the EPA's Assessment and Total Maximum Daily Load Tracking and Implementation System (ATTAINS), agriculture is currently the leading source of water contamination in surveyed rivers and streams.^{2,3} Much of this agricultural pollution is the result of nutrient runoff: nutrients like nitrogen and phosphorus, commonly used in fertilizer, seep into the environment when not absorbed by crops.² Reducing nutrient runoff through land use and conservation measures requires a multi-pronged strategy at the field level. Farm soils, topography and weather patterns vary greatly across geographic regions, requiring a highly tailored approach. Options supported by Farm Bill programs, agricultural extension agencies and growers include a variety of cover crop species, no-till/low-till, intercropping and edge-of-field monitoring. The timing, application and cost of these conservation practices add additional complexity to farming operations and take time and effort to reach high adoption rates. High adoption rates are necessary to achieve cleaner water.

Cover Crops

Cover crops can provide multiple benefits in the field, such as reducing the need for synthetic fertilizers. In 2011, cover crops were used on 1.7 percent of cropland in the United States, with adoption rates varying greatly by region.⁴ By keeping soil covered when "cash" crops are not planted, cover crops:

- *Improve water quality* by filtering sediment, pathogens, and pollutants.⁵ At the end of the growing season, cover crops can be planted to improve soil health, leading to better plant growth in future seasons.⁶ Cover crops help increase soil porosity and infiltration by breaking through compacted soil layers, resulting in higher water holding capacity.

- *Reduce nutrient applications* by producing but also scavenging crop nutrients. Cover crops such as cereal grains, annual rye grass, and radishes can be used to scavenge unused fertilizer and to release nutrients back into the soil for the next crop to use.⁶
- *Prevent erosion* by covering the soil during the fall when harvest season is over. When not exposed to wind and water, the soil can increase its productivity and build organic matter that will make it more resilient for the upcoming season.⁶

Cover Crop Challenges

A 2016 survey by Sustainable Agriculture Research and Evaluation (SARE) found that the top three cover crop challenges farmers face are: 1) establishing cover crops, 2) time/labor required for planting and management, and 3) seeding the right species for their operation.⁷ Because cover crops improve soil health and water-holding capacity slowly over time, there is no immediate return on investment, which may deter farmers from investing in these practices.⁸ Despite the challenges, total acreage of cover crops has increased almost fivefold between 2008 and 2013.⁹

No-till or Low-till Operations

No tillage operations require that 70 percent or more of the soil be covered with crop residue, while low or conservation tillage require that 30 percent or more of the soil be covered.¹⁰ In strip-till systems, narrow strips (6 – 8 inches) are tilled for seed planting and fertilizer application. In 2011, 44 percent of farmers planting commodities (corn, soy, wheat, cotton) were employing some form of no- or low-tillage in their operations, with 39 percent of total acreage in these crops being under no-till or strip-till management.⁴ The United Nations Environment Programme estimates that no-till operations in the United States have helped avoid the emission of 241 million metric tons of carbon dioxide since the 1970s.¹¹ No- and low-till operations:

- *Reduce soil erosion* by providing cover, making soil less susceptible to wind and water erosion.
- *Improve water holding* by building organic matter and the soil microbiome.
- *Increase soil productive capacity* by retaining soil moisture that otherwise would be decreased by the mechanical soil disturbance common in conventional tillage.^{12 & 13}
- *Sequester carbon* and other greenhouse gases by building organic matter, the soil microbiome and decreasing soil disruption.¹¹ In North America, converting from conventional to conservation tillage can sequester between 0.05 to 1.3 tons of carbon per hectare per year.¹⁴

No-till or Low-till Operation Challenges

No-till systems require several years to see the full benefits to soil quality and overall operations. Reducing tillage may require more herbicide resistance management since diseases may persist on crop residue due to higher soil moisture levels.¹⁵ Under no-till operations, poorly drained soils may require additional drainage systems to warm the soil more quickly and prepare it for harvest season, and wet springs may deter producers from greater implementation of low-tillage.^{4,16} Additionally, the greatest benefits of no-till systems are obtained in combination with cover cropping.

Intercropping

Intercropping entails growing two or more crops in close proximity to each other during part or all of their life cycles to increase interactions that improve soil and water quality. Examples include alternating strips of wheat, corn and soybeans or corn and sorghum. The different types of intercropping techniques vary in the timing and planting location of each crop.¹⁷ Intercropping can:

- *Stabilize the crop ecosystem* by increasing biodiversity and interaction between different organisms and by enhancing ecological services such as nutrient cycling, crop uptake and biological pest control.
- *Enhance natural biological processes* above and below the ground through the interaction of multiple species that facilitate symbiotic relationships.
- *Assist in creating a closed loop system* by linking all farm components and major interactions; for example, livestock manure can enhance crop production, while crop residues can feed animals.^{18 & 19}

Intercropping Challenges

With the simultaneous planting of more than one species comes additional management requirements. Intercropping requires careful timing and monitoring to avoid unwanted competition between intercropped species. If not carefully selected and managed, intercropped species can compete with each other for water and nutrient resources, thereby inhibiting growth.²⁰ For these reasons, intercropping of commodity crops is rare in the United States.

Land Use and Edge-of-Field Practices

Conservation management practices can also be combined with land use and edge-of-field practices to help farmers retain nutrients and prevent harmful run-off from their fields. These practices include:

- *Subsurface drainage bioreactors* contain a carbon source, usually woodchips, placed underneath drainage tiles (tiles are often used to enable growing crops in water-logged soils). Microorganisms subsisting on the carbon source break down nitrates and convert them into dinitrogen gas (N₂),²¹ a harmless substance that forms 78 percent of Earth's atmosphere. Bioreactors are a long-lasting, low-tech solution. A major benefit of this practice is that it does not require taking land out of production and can remove about 15 to 60 percent of the nitrate load per year.
- *Buffer strips of permanent vegetation*, such as trees and native plantings, retain sediment and sediment-bound nitrogen and phosphorus and remove 50 percent or more of the nutrients and pesticides. They also can stabilize stream banks by slowing water runoff and creating a riparian zone.²² The amount of runoff that reaches buffer strips largely depends on the topographic and climate conditions at the farm.²³

2014 Farm Bill Conservation Title

The 2014 Farm Bill provides \$57.6 billion in critical funding for conservation programs across the United States.²⁴ Most Farm Bill conservation dollars help farmers implement voluntary conservation practices on their farms or rent out environmentally sensitive lands to re-establish valuable land cover. A new aspect of the 2014 Farm Bill was the consolidation of several conservation programs under Title II that encourage partnerships between agricultural producers and stakeholders to address problems that may encompass more than one conservation issue or area.

Conservation programs funded through the Farm Bill's Conservation Title (Title II) specifically aim to protect and improve water quality and quantity, soil health, wildlife habitat, and air quality.²⁵ Additionally, these conservation programs are estimated to support more than 600,000 jobs.²⁶ The four largest conservation programs funded through the Farm Bill are the Environmental Quality Incentives Program (EQIP), Agricultural Conservation Easement Program (ACEP), Conservation Reserve Program (CRP), and Conservation Stewardship Program (CSP).

U.S. Department of Agriculture Farm Bill Conservation Title Programs ^{24 & 27}					
(Millions of Dollars)					
Program	2014	2015	2016	2017	2018
EQIP: <i>Implement conservation practices on agricultural and forest land.</i>	1,350	1,600	1,650	1,650	1,750
ACEP: <i>Conserve agricultural lands and wetlands using easements.</i>	400	425	450	500	250
(Millions of Acres ^a)					
CRP: <i>Provides yearly rental payment to farmers who remove environmentally sensitive acres from production and plant living cover.</i>	27.5	26	25	24	24
CSP: <i>Provides financial assistance to producers who meet stewardship requirements on working agricultural and forest land.</i>	10	10	10	10	10

a. Both CSP and CRP are authorized by an acreage cap, not a funding cap.

Farm Bill Conservation Title Programs

- *EQIP: Environmental Quality Incentives Program*

The Environmental Quality Incentives Program (EQIP) provides assistance and payment to farmers, ranchers, and other agricultural producers who complete eligible conservation practices on their land.²⁸ The conservation practices are chosen to address specific environmental concerns for the land in question. The program is designed to provide particular benefits to disadvantaged and beginning farmers, as well as to Native Americans and Veterans.²⁸ Contracts through EQIP can last up to ten years, but most are between one and three years.²⁹ The 2014 Farm Bill absorbed the Wildlife Habitat Incentive Program into EQIP.

- *ACEP: Agricultural Conservation Easement Program*

The Agricultural Conservation Easement Program (ACEP) allows for the purchase of Agricultural Land Easements or Wetland Reserve Easements. This program is a combination of three former Farm Bill programs: the Wetlands Reserve Program; the Grassland Reserve Program; and the Farm and Ranch Lands Protection Program.³⁰ Agricultural Land Easements require that the land be kept in working agriculture—including pastureland and other lands for grazing—to prevent the conversion of productive lands to non-agricultural uses.³¹ Depending on the environmental significance of the land, ACEP can cover up to 50-75 percent of the cost of the easement. USDA's Natural Resource Conservation Service (NRCS) partners with tribes, state/local governments, or non-governmental organizations to cover the rest of the cost.³¹

ACEP also offers Wetland Reserve Easements, promoting the protection and restoration of wetlands. These easements can be permanent, in which case NRCS covers 100 percent of the cost of the easement and 75-100 percent of restoration costs. Alternatively, partners can choose 30-year or term easements, in which case NRCS covers 50-75 percent of the costs of both the easement and restoration.³¹ Funding between the agricultural land side and the wetland side is left up to USDA, and has thus far been decided based on demand.³⁰

- *CRP: Conservation Reserve Program*

The Conservation Reserve Program (CRP), first enacted in 1985, aims to preserve environmentally significant or marginal lands by providing financial assistance to farmers to restore these areas.³² Land in the CRP can be planted with cover crops, grasses, trees, or buffer strips in an attempt to reduce erosion and improve water quality.³³ Contracts for the land in the program are generally between 10 and 15 years long, allowing for long-term restoration of land cover, habitat, and soil.

USDA has called the CRP its “most popular voluntary conservation program.”³⁴ Though the acreage limit has decreased in recent years, demand for the program has increased, leading to more and more selective enrollment criteria. USDA reported in May 2016 that of the 1.8 million acres offered in the 2016 general enrollment period, only 411,000 acres will be accepted, making this the most competitive general enrollment ever.³⁵

- *CSP: Conservation Stewardship Program*

The Conservation Stewardship Program (CSP) helps farmers and ranchers implement conservation tools and activities for their lands. Unlike the CRP, the land in CSP is in active agricultural or forest production. Currently, more than 70 million acres are enrolled in the CSP.³⁶ The program promotes planting cover crops, efficient grazing, no-till, and restoration of wildlife habitat. USDA reports that participants are seeing multiple benefits, including increased yields, decreased inputs, greater resilience, and higher amounts of wildlife.³⁶ Environmental benefits include decreased erosion, greater soil health, better water quality, increased diversity, higher carbon sequestration, and energy conservation.³⁷

This fact sheet is available electronically (with hyperlinks and endnotes) at www.eesi.org/papers.

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The Environmental and Energy Study Institute (EESI) is a non-profit organization founded in 1984 by a bipartisan Congressional caucus dedicated to finding innovative environmental and energy solutions. EESI works to protect the climate and ensure a healthy, secure, and sustainable future for America through policymaker education, coalition building, and policy development in the areas of energy efficiency, renewable energy, agriculture, forestry, transportation, buildings, and urban planning.

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