Testimony of Dr. Jennifer Moore-Kucera
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Chair Castor, Ranking Member Graves, and Honorable Members of the House Select Committee on the Climate Crisis. I am Jennifer Moore-Kucera, the Climate Initiative Director for American Farmland Trust. Our nonprofit organization was founded 40 years ago to help protect farmland, advance sound farming practices, and keep farmers on the land.

I thank you for the opportunity to testify and I applaud the committee for exploring the critical issue of agriculture and climate change.

I want to open by saying that addressing climate change by promoting climate-smart, regenerative agricultural practices can be a win-win-win. We can ensure our nation's food security, improve our environment, and enhance economic returns to farmers and ranchers. Moreover, we already have the tools to reduce, or even eliminate, net greenhouse gas (GHG) emissions, and scientists and farmers are coming up with new innovations all the time. Along the way, we can make farmers and ranchers more productive, more profitable, and more resilient to the ups and downs of weather and markets. And finally, all of society will reap numerous additional benefits, including cleaner water, more wildlife habitat, and more productive soils that can keep growing food for generations to come. Not many sectors of the economy have the positive opportunities that we do in agriculture, so we need to work together, across the political spectrum, to seize these opportunities.

CLIMATE RISKS TO AGRICULTURE

There is a lot at stake. Too often we think of climate change as an abstraction, something that will happen in the far-off future. But for America's farmers and ranchers, climate change is already a daily reality. Extreme weather events, including record high temperatures and drought in parts of our country, threaten crop productivity, stress water supplies, and increase wildfire risks, while more frequent and intense storms in other areas wash away the soil and increase flooding. Collectively, these events negatively impact our crops and the soil and water resources we depend on. They also threaten livestock, wildlife, people, national food security, and our economy.

Within just the past 22 years, we have experienced 20 of the hottest years on record (WMO, 2019). **Increased temperatures** are predicted to impact crop yields and germination and harvest timing. These impacts may be positive or negative depending on the crop and location (Roesch-McNally et al., 2019). Whereas some crops might benefit from a longer growing season, the species and varieties of crops grown in an area shift, resulting in the need for new equipment, knowledge, and resources to maintain viability. Other impacts include greater risks of disease, insect, and weed pressures due to higher temperatures, longer growing seasons, and more frost-free days, which will increase dependence on inputs such as fungicides, herbicides, and insecticides.

In addition to higher temperatures, **more extreme weather events** are projected. Some areas will experience increased duration, frequency, and intensity of drought, whereas other areas will be subjected to intense storms, leading to major flooding. So-called 500-year floods have become 100-year floods. This makes planting and harvest more difficult, as seen in the Midwest this year when unusually wet conditions led to one of the latest planting seasons on record (Rippey, 2019). These events also lead to soil loss from erosion and flooding of farm fields, compounding water quality problems.

Other concerns, especially in western states, involve the reduction in snowpack amount and earlier peak flows (snow melt), which would reduce water availability during the growing season (Roesch-McNally et al., 2019). Heavy and earlier spring rains or flood events will delay planting or force farmers to perform field operations (e.g., tillage, planting) when the soil is susceptible to compaction or erosion. Major flooding also imperils infrastructures such as roads, railroads, barge landings, and buildings necessary for storage and crop processing. Higher temperatures and increased drought increase stress on both livestock and crops, thus requiring greater inputs to maintain their health.

Increased carbon dioxide (CO_2) levels will have both positive and negative effects on agriculture. Additional CO_2 will stimulate growth in some crops, such as soybean and wheat, and may provide some protection against moderate drought. However, increasing CO_2 levels will also stimulate weed growth, potentially increasing herbicide use (Ziska, 2003). In addition, higher CO_2 levels cause plants to take up less nutrients, leading to less nutritious feed in the trough and food on our plate (Myers et al., 2014).

Finally, drought and high temperatures will result in **increased wildfire risk** which threatens homes, fields, livestock, wildlife, and, tragically, human life. Smoke damage for certain susceptible specialty crops (e.g., wine grapes) has resulted in decreased quality and can negatively affect farmers and farm workers exposed to unhealthy air conditions. Farmers and their neighbors in northern California are suffering from intense wildfires at the time of this testimony, in what has unfortunately become a new normal. Chances are that all of you are already seeing one or more of these impacts within your own districts.

AGRICULTURE'S GREENHOUSE GAS EMISSIONS

Agricultural practices, in part, contribute to total greenhouse gas (GHG) emissions in the United States (US). The most recent EPA report indicates that agriculture releases about 582 million metric tons (MMT) of carbon dioxide equivalents (CO_2e), which translates to approximately 9% of total US emissions (USEPA, 2019)[1]. In contrast to other production sectors, which are dominated by energy-related CO_2 emission sources, the bulk of agriculture's impact on climate change is due to **nitrous oxide (N_20) and methane (CH_4) emissions** from fertilizer application, manure handling, and enteric fermentation from livestock (USEPA, 2019).

The following percentages exclude the 40.1 MMT CO_2 from fuel combustion in agriculture to focus on the contribution of agricultural management as reported in the agriculture chapter (Chapter 5) of the US EPA 2019 inventory report:

- **53% of agriculture's GHG contributions are in the form of nitrous oxide (N_2O)** from agricultural soil management (activities such as fertilizer application, growing N-fixing plants), drainage of organic soils and irrigation practices, manure management, and field burning of agricultural

[1] CO_2e refers to the carbon dioxide equivalent, because methane (CH_4) and nitrous oxide (N_20) are converted to their CO_2 equivalent, in terms of their global warming potential.

residues. Nitrous oxide stays in the atmosphere about 114 years and is almost 300 times more efficient at trapping heat than CO_2 (IPCC, 2007).

- **46% of agricultural emissions are from methane (CH_4)** primarily from enteric fermentation from livestock and manure management, as well as rice cultivation and field burning of agricultural residues. Methane's lifetime in the atmosphere is only 12 years, but it is 25 times more efficient at trapping heat than CO_2 over a 100-year period (IPCC, 2007).
- Unlike other sectors, only 1.5% of agriculture's GHG contributions are from **Carbon Dioxide (CO_2),** predominantly from urea fertilization and liming.

AGRICULTURE AS A CLIMATE SOLUTION

Although agriculture currently is a net source of GHG emissions, farmers and ranchers can be some of our nation's greatest allies in fighting climate change. There are numerous crop land and grazing land management practices that are known to increase the amount of carbon plants can capture and ultimately store belowground in the soil. This process is called soil carbon sequestration.

In fact, soils store 2-3 times more CO_2 than the atmosphere and 2-5 times more C than that stored in vegetation (IPCC, 2013). Unfortunately, between the late 1880s to 1985, agricultural soils have lost half or more of the soil organic carbon (SOC) that was present prior to industrialization (Lal, 2004). Since 1985, increased yields, reduced tillage intensity, and improved genetics have resulted in many soils beginning to increase soil carbon levels, and there is much more we can do! With more than 900 million acres of agricultural land in the US, we have an enormous opportunity to rebuild soil organic carbon, sequester atmospheric carbon, and reduce N_2O and CH_4 emissions as well. Some estimates suggest that if we were able to adequately address economic, social, and technical barriers to implementing best soil management practices, US croplands have the potential to sequester 1.5 billion to 5 billion metric tons of CO2e per year for 20 years (Sanderman et al., 2017; Zomer et al., 2017). Moreover, the same agronomic practices that increase carbon sequestration also help to mitigate flood events, protect water quality, recharge groundwater, and increase resilience to drought (Lehman et. al, 2015).

Rebuilding soil health is crucial to sustaining agriculture, enhancing the profitability of farmers and ranchers, and combatting climate change. Soil health is defined by USDA-Natural Resource Conservation Service (NRCS) as "the continued capacity of a soil to function as a vital living ecosystem that sustains plants, animals, and humans." Healthy, high-functioning soils:

1) Produce food, fuel, fiber, and medicinal products using management strategies that maintain or enhance environmental quality;
2) Store, filter, and release water, and thus protect or improve water quality;
3) Are resilient to environmental disturbances such as drought, fire, floods, and temperature extremes;
4) Resist diseases, pests, and pathogens, thus reducing the reliance on pesticides;
5) Store and cycle nutrients internally, reducing the reliance on external inputs and the potential for off-site movement of nutrients into the air and water;
6) Store and cycle carbon and modify other greenhouse gases, helping to reduce climate change; and,
7) Maintain biodiversity and habitat, which is critical to all above functions.

Recently, the USDA-NRCS Soil Health Division has outlined four soil health principles to improve soil function for a variety of ecosystem outcomes, but they also apply to building resilient agricultural systems that sequester C and reduce GHG emissions (Roesch-McNally et al., 2019). The four principles are:

1) Minimize disturbance (typically physical disturbance is the major focus, with a target to reduce tillage depth, intensity, and frequency);
2) Maximize soil cover, often through mulching, reduced tillage, residue retention, and cover crops;
3) Maximize the continuous presence of roots, which is typically achieved through cover crop planting but also longer rotations, forage, and biomass plantings, and incorporation of perennial crops into the rotation; and
4) Maximize biodiversity through practices similar as those described in #3; but can also include the integration of livestock into the cropping system and diversifying cover crop mix or more diversified crop rotations.

In addition to sequestering carbon, healthy soils absorb more water during heavy rains, which reduces runoff. They also offer better resilience during periods of drought because the land holds more water. Healthy soils also can help farmers increase yields, increase yield stability, and be more productive in the long term. Ultimately, building soil fertility can reduce farmers' dependence on fertilizers, saving them money and improving their bottom line. Soil health systems also offer a wide range of ecologically important co-benefits (Figure 1).

These practices can be put in place separately, but ideally producers will implement a suite of practices to optimize benefits and co-benefits. For example, the benefits of cover crops were detectable more quickly with no-till management compared with conventional tillage (Olson et al., 2014). Additionally, cover crops have been reported to increase economic gains when farmers transition to no-till practices in both corn and soybeans (Myers et al., 2019).

Estimated GHG Benefit from Cover Cropping and Conservation Tillage

Among the soil health practices promoted by American Farmland Trust, NRCS, Soil and Water Conservation Districts, and numerous other organizations across the nation, **reduced tillage** and **cover cropping** are the two most popular and studied.

According to the 2017 USDA AgCensus, there are ***396 million acres of total cropland*** and ***401 million acres of grazing land*** in the US (www.nass.usda.gov/AgCensus/). Of the total cropland reported, 15.3 million acres have adopted cover cropping, **104 million acres are in no-till** and **97.5 million acres have adopted reduced tillage practices** that disturb the soil less than conventional till.

Although there are many benefits of cover crop and conservation tillage adoption, I would like to focus on their impact on GHG emissions. To estimate the GHG reduction benefit from these key conservation practices, American Farmland Trust – in collaboration with the USDA Agricultural Research Service – used data from the 2017 AgCensus along with estimated GHG reduction coefficients reported in the USDA COMET-Planner tool (www.comet-Planner.com). Based on these data, our preliminary calculations estimate that relative to no cover cropping, **<u>current</u> adoption of 15.3 million acres of cover cropping have potentially reduced emissions between 4.2 and 6.3 million metric tons (MMT) CO_2e per year**.

Recognizing that not all the remaining cropland is suitable or appropriate for cover cropping, adopting cover crops on even 25% of the remaining cropland (e.g., about 95 million acres) can further reduce CO_2e emissions between 22.6 and 31.9 MMT per year. Combining **current cover crop adoptees and this conservative estimate of future adoption would reduce GHG emissions by an estimated 26.8 to 38.2 MMT of CO_2e per year**.

Similarly, we estimate that the **current adoption of conservation tillage on 201.5 million acres has reduced CO_2e between 59.1 and 70.8 MMT per year**. Expanding the current adoption levels and converting the remaining 79.9 million acres that are in intensive till to reduced till or no-till can reduce **an additional 12.6 to 39.4 MMT per year**.

If we add up the **current and projected future adoption of cover crops (25%) with no-till or reduced till practices (100%), our nation could reduce GHG emission by up to 148.5 MMT CO_2e per year.** This translates to approximately 25% of the total ag GHG emissions and that doesn't include what can be achieved through the addition of best practices for grazing land management and livestock/manure management. This 148.5 MMT CO_2e is **equivalent to removing 31.5 million passenger vehicles** from the road each year (https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator).

Additional Conservation Practices Provide Further GHG Reductions

Cover crops and conservation tillage are just two of the many conservation practices available on croplands. There are numerous nutrient management options such as replacing synthetic nitrogen fertilizers with composts or manure, switching sources of synthetic nitrogen from anhydrous ammonia to urea, improved timing of fertilizer application, and variable application rates within the field (Fargione et. al., 2018). Other practices include conservation crop rotations, improved manure management, biochar, and mulching. We currently are working on estimating the GHG benefits from many of these practices using the same approach we report on for croplands above.

Many of these practices can be economically beneficial for farmers, but their adoption involves real and perceived risk. AFT has worked on the ground in 18 states to help farmers optimize their fertilizer rates with risk free yield guarantees. Farmers reported high satisfaction with the program and 85% said they have continued to use the approach on their farm.

Grazing lands make up about 45% of all US agricultural lands. Although they typically are less suitable for crop production, they are ideally suited for livestock. These soils store vast amounts of carbon and, when managed properly, provide numerous ecosystem services such as wildlife and pollinator habitat and water storage and drainage. Similar to croplands, there are many conservation practices available for grazing lands. Ensuring sufficient rest periods between grazing events can maximize plant productivity and, hence, the amount of carbon fixed from the atmosphere. In addition, studies have shown that fertilizing California rangeland with compost could sequester large amounts of carbon (Ryals et al., 2015).

Other landscape-level considerations with major GHG reduction potential include establishing trees or shrubs along field borders, riparian forest buffers, hedgerow plantings, alley cropping, and establishing strips of permanent grass and legume covers to absorb rainfall and reduce erosion. All of these practices bring huge co-benefits, including supporting pollinators and other beneficial insects, creating wildlife habitat, and enabling native plant species to thrive. In Iowa, research has shown that planting strips of native prairie plants within existing crop fields can build soil carbon while substantially reducing erosion and nutrient loss and supporting pollinators and grassland birds (Pérez-Suárez et al., 2014; Schulte et al., 2017).

In addition, there are some technological interventions that can target key sources of emissions, such as installing methane digesters to turn stored manure into an energy source, and feed additives that can reduce enteric fermentation emissions from cattle.

As you can see from this testimony, there are numerous options available to support crop and grazing land productivity and environmental services like reduced GHG emissions and increased soil carbon sequestration. Successful implementation, however, requires technical and financial assistance to optimize productivity and GHG reductions.

Healthy Soil Case Studies

The success of these healthy soil practices is not just conceptual. With support from an NRCS Conservation Innovation Grant, American Farmland Trust staff partnered with four farmers in California, Illinois, Ohio and New York to produce easy-to-read, two-page case studies showing the excellent return on investment for healthy soil practices for a variety of crops (https://www.farmlandinfo.org/soil-health-case-studies). These farmers implemented steps such as no-till, nutrient management, cover crops, compost, and mulching. As a result, these farms cut their greenhouse gas emissions by an average of 379% on fields selected for the analysis. This means that these fields transformed from being net emitters to net reducers of greenhouse gases.

These case studies also illustrate the many benefits associated with healthy soil practices. The actions taken by these farmers increased yields and profits, stopped soil erosion problems, and improved water quality. The farmers saw, on average, increased yields of 12%, reduced nitrogen losses of 54%, reduced phosphorus losses of 81%, and reduced sediment losses of 85%. The average net income increase for the three crop farmers was $42 per acre per year. For the California almond grower, his net income increased an average $657 per acre per year, thanks to the soil health practices.

Adopting climate-smart agricultural practices is among the least costly and most immediate actions that can help reduce greenhouse gas emissions on a meaningful scale. Their extensive adoption can serve as an important bridge until new climate-friendly energy and transportation technologies are developed.

Protection of Farmland as a Climate Strategy

None of these gains are possible unless we are able keep farmland as farmland. According to the USDA, over 25 million acres of farmland and ranch land were converted to development between 1982 and

2015. Through our "Farms Under Threat" project, American Farmland Trust is mapping the precise location of this past development, as well as areas with the highest threat in the future. This information will help towns, counties, and states make smart decisions to protect their valuable farmland.

A growing body of research demonstrates the necessity of protecting agricultural lands from development as a key component to any comprehensive GHG reduction strategy. Not only does it protect lands that can function as carbon sinks, it encourages inward and more compact development growth, thereby preventing additional transportation emissions and electrical and heating use. American Farmland Trust's 2018 "Greener Fields" study found that cutting California farmland loss by 75% by 2050 (700,000 acres), while encouraging compact urban growth, would reduce GHG emissions by 33 tons of GHG (per acre per year). That's the equivalent of taking 1.9 million cars off the road each year. Protecting farmland also keeps that land available for flood and fire mitigation.

With every acre of farmland we lose, we not only lose the ability of that land to grow food and sequester carbon, we put more pressure on the remaining land to be farmed more intensely, further reducing environmental benefits. And with 40% of U.S. agricultural land expected to change hands in the next 15 years due to the age of landowners, we need to take full advantage of tools such as easements to ensure that as much remains farmland as possible (NASS, ERS, https://farmland.org/project/farm-legacy).

CONGRESS' ROLE IN HELPING FARMERS AND RANCHERS ADDRESS CLIMATE CHANGE

I am here today as a scientist, not as a policy expert. Nonetheless, I want to share some perspective on these matters from the policy experts at American Farmland Trust.

First, we want to thank Congress for the significant commitments made in the **2018 Farm Bill Conservation Title**. These important programs provide technical assistance and financial incentives for farmers and ranchers to protect soil, water, wildlife, and other natural resources on privately owned lands and offer a strong starting point for how agriculture can be part of the solution to climate change.

Within the 2018 Farm Bill, Congress included critical additional funding for the **Agricultural Conservation Easement Program - Agricultural Land Easements (ACEP-ALE) program**, which provides funds to enable local and state partners to work with farmers to permanently protect their land. This new funding will begin to meet program demand and ensure productive agricultural lands remain available to future generations of farmers and ranchers and for GHG reduction.

We also appreciate the additional funding included for the **Regional Conservation Partnership Program (RCPP)**. This program enables public and private conservation agriculture groups to join with farmers in a focused, local area to develop innovative approaches toward shared conservation goals.

Other working lands programs, such as the **Environmental Quality Incentives Program (EQIP) and Conservation Stewardship Program (CSP)**, are vital tools for farmers and ranchers to implement or enhance current conservation practices on their land. They support farmers to plant cover crops, reduce tillage, diversify crop rotations, and improve grazing management, all of which can reduce greenhouse gas emissions. Likewise, studies have shown that land enrolled in the **Conservation Reserve Program (CRP)** rapidly sequesters soil carbon, while also providing benefits for wildlife and water quality (Gebhardt et al., 1994).

Such programs give us a foundation to build from. However, more must be done to help farmers and ranchers protect their land and implement agricultural practices addressing climate change. At a time when the farm economy is suffering, ensuring the widespread adoption of new practices will require additional incentives, training, and capacity.

American Farmland Trust would like to share a few additional ideas on how Congress can help more farmers and ranchers reap the benefits of practices that reduce GHG.

A first step would be to **provide additional funding for existing Farm Bill conservation programs, such as ACEP-ALE, RCPP, EQIP, CSP, CRP, and others**. However, both legislation and agency rulemaking could be strengthened to encourage GHG reductions in addition to other services. Historically, these conservation programs are oversubscribed, meaning there is not enough money to support the farmers who actively want to improve their operations, and not enough for critical technical assistance to help them make changes on their farm. Any farmer or rancher who wants to improve their soil health and reduce GHG emissions should get the support they need.

Another opportunity would be to **leverage other programs, including state soil health efforts.** This includes **incentives for climate-smart practices through the crop insurance program**. Cover crops can help increase resiliency, which reduces risk. As a result, Iowa and Illinois have launched pilot programs offering insurance premium reductions to those taking advantage of cover crops. Such a concept should be explored at the national level. **Expanding low to no-interest loans to help farmers implement practices is another option.**

We must also **increase support for climate-related agricultural research**. We have many different practices at our disposal, but ongoing research is needed to make them work for farmers in all the unique climates, soil types, and production systems where they grow our food. The National Academies' 2018 "Science Breakthroughs to Advance Food and Agricultural Research by 2030" report identifies the soil as one of the frontiers of agricultural science. We are just beginning to understand its immense potential. To unlock this potential, we need further investments in tools and methodologies to quantify and track the impacts of management practices on soil carbon storage. We also need better quantification of how innovative management practices affect emissions of N_2O and CH_4. This knowledge will be critical to ensuring that public investments in agricultural GHG mitigation are sound and provide incentives for the right management practices.

Lastly, we must **find new ways to help fund these crucial changes**. This can include engaging consumers and private companies through environmental markets, supply chain management, and labels. American Farmland Trust has worked across the country to develop markets for carbon and other ecosystem services, such as reductions in nitrogen and phosphorus. Now, many companies are becoming engaged in this work as they aggressively look for ways to reduce their carbon footprint. These local, state, and regional efforts are compelling models for how we can provide future funding that rewards best practices and keep farmers and ranchers viable as they innovate. More must be done to explore how these types of funding models could work nationally.

As policymakers think about how to address agriculture and climate change, we recommend a comprehensive, integrated approach. This could be achieved by fully including agriculture in a major climate bill. In addition, the next Farm Bill, as the piece of legislation that touches on all facets of agriculture, represents a transformational opportunity to enact many of these ideas. The most important objective is to ensure that the vast potential of agriculture is unleashed as part of any broader set of climate solutions.

The opportunities before us are enormous. Every day, farmers, ranchers, and private forest owners make stewardship decisions that impact over 1.4 billion acres of land. This is over 70% of the landmass of the contiguous 48 states (USDA, 2018). As a society, we must value not only the food our farmers and ranchers produce, we must value all of the environmental services they can produce for our nation.

CONCLUSION

America's farmers and ranchers are an essential and indispensable part of any meaningful plan to address climate change. I thank you once again for this opportunity and for elevating the role agriculture can play in addressing climate change. Our entire team at American Farmland Trust is excited to continue this conversation and to serve as a resource as you move forward with this important work.

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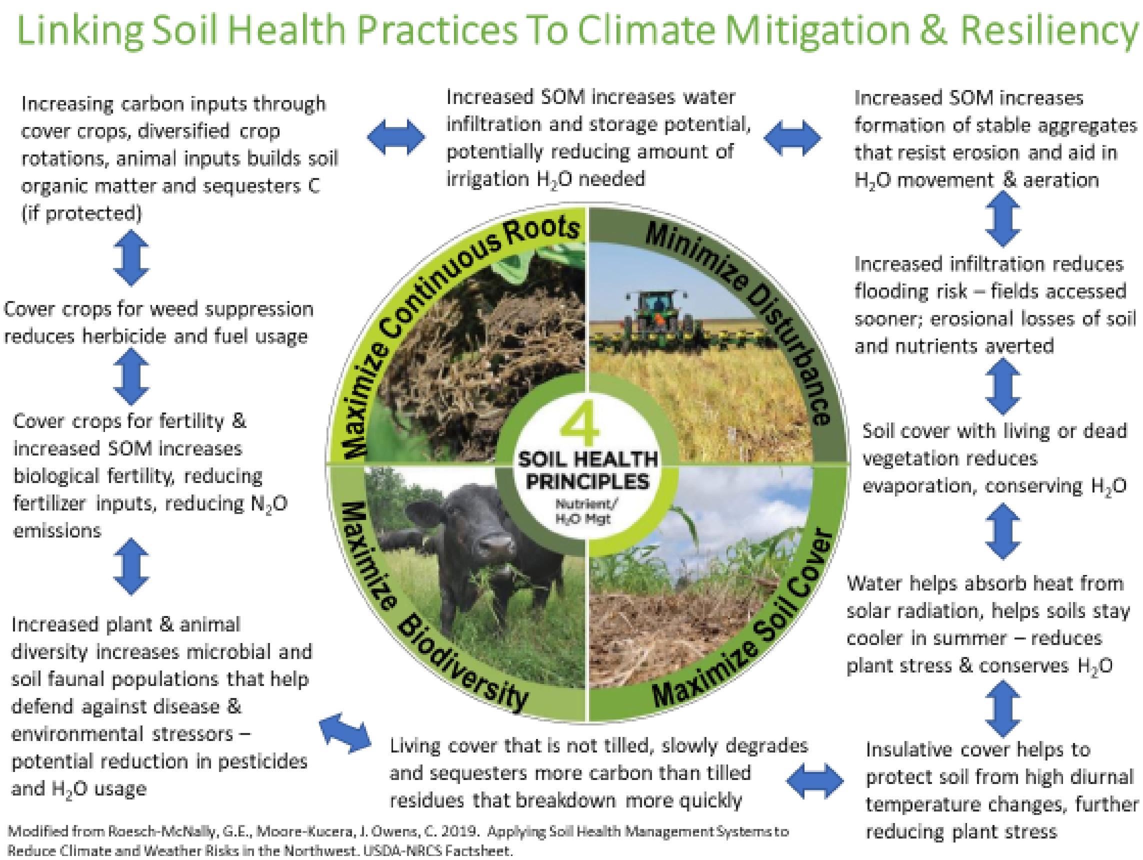

Figure 1. Linking Soil Health Practices to Climate Mitigation & Resiliency.
SOM = soil organic matter

Glossary of terms (not a comprehensive list)
The following terms were as defined in the 2017 Census of Agriculture – Report form guide:

Cover crop - a crop planted primarily to manage soil erosion, soil fertility, soil quality, water, weeds, pests, and diseases on non-CRP acres.

Intensive tillage leaves less than 15% of crop residue of small grain residue. This type of tillage is often referred to as conventional tillage. Intensive tillage often involves multiple operations with implements such as a mold board, disk, and/or chisel plow.

No-till farming practices is cropland used for production from year to year without disturbing the soil through tillage other than planting. Do not include as no-till, land that was not planted in 2017 such as existing orchards, land in berries, nursey stock, or hay harvested from existing grassland or alfalfa that was established prior to 2017. No-till is an agricultural technique which increases the amount of water that infiltrates into the soil and increases organic matter retention. In many agricultural regions it can reduce or eliminate soil erosion. As explained in LaRose and Myers (2019) "no-till, which would include both continuous no-till and rotational no-till (rotational no-till refers to using no tillage after one crop, such as soybeans, but tilling after another crop in the rotation, such as after corn."

Reduced tillage leaves between 15% and 30% residue cover on the soil of small grain residue to conserve moisture and prevent erosion. This may involve the use of a chisel plow, field cultivators, or other implements.

American Farmland Trust Soil Case Studies

These case studies were developed by American Farmland Trust as part of a 2018 USDA Natural Resources Conservation Service Conservation Innovation Grant (CIG) project, "Accelerating Soil Health Adoption by Quantifying Economic and Environmental Outcomes & Overcoming Barriers on Rented Lands," and feature farms in California, Illinois, Ohio and New York. The four case studies can be accessed below:

- MadMax Farms, Ohio (https://www.farmlandinfo.org/sites/default/files/AFT_NRCS_Case%20Niemeyer%20web2.pdf)
- Swede Farm LLC, New York (https://www.farmlandinfo.org/sites/default/files/AFT_NRCS_Case%20Swede%20web2.pdf)
- Okuye Farms, California (https://www.farmlandinfo.org/sites/default/files/AFT_NRCS_Case%20Sauter_web2.pdf)
- Thorndyke Farms, Illinois (https://www.farmlandinfo.org/sites/default/files/AFT_NRCS_Case%20Thorndyke%20web2.pdf)

AMERICAN FARMLAND TRUST CLIMATE EXPERTS

American Farmland Trust (AFT) has a wide range of experts that can serve as a resource on issues related to agriculture and climate change, including:

Jennifer Moore-Kucera, PhD, Climate Initiative Director, was hired in late 2018 to provide overall leadership for AFT's climate work and technical assistance to the U.S. Climate Alliance states. Jen is a nationally recognized soil health expert having led NRCS's West Region Soil Health Team and co-directed the USDA Northwest Climate Hub. Before that, Jen was an associate professor in environmental soil microbiology at Texas Tech University.

Tim Fink, Policy Director, was hired in 2019 to develop AFT's overall policy strategies. Tim brings extensive policy experience from both the agriculture and energy sectors to AFT's work on the Farm Bill and work advocating for agriculture to be included in federal and state climate plans.

Jimmy Daukas, Senior Program Officer, has worked on agriculture and climate issues at AFT in various leadership roles for over 20 years. He spearheads AFT's work on smart solar siting. Jimmy also serves on the Steering Committee of the Coalition on Agriculture Greenhouse Gases.

Michelle Perez, PhD, Water Initiative Director, leads a companion effort that addresses nonpoint source pollution. An expert in quantifying environmental outcomes, she is working in partnership with the NRCS through a Conservation Innovation Grant on the work entitled "Quantifying Economic and Environmental Outcomes of Soil Health". The first four case studies published outline outcomes that have been shared with this testimony.

Gabrielle Roesch-McNally, Women for the Land Director, leads AFT's national initiative to ensure women landowners have access to the resources and technical advice to lead in building resilient agrifood systems. She is an expert in producer decision-making in the context of climate change adaptation and mitigation and has written or contributed to many publications on climate change. Before AFT she worked at the USDA Northwest Climate Hub.

Brian Brandt, Director of Conservation Innovation, is an expert on environmental markets. He currently manages a project that employs conservation practices in the Ohio River Basin to reduce pollutants contributing to the dead zone in the Gulf of Mexico.

Mitch Hunter, Director of Research, returned to AFT in 2019 to lead its collaborative research program, including 'Farms Under Threat,' a comprehensive data project with multiple connections to climate. He is an expert in sustainable intensification and climate resilience in agriculture.

Ann Sorensen, PhD, Research Senior Advisor, is author of more than 70 refereed papers. Ann has had an outsized influence on agricultural policy during three decades at AFT. She currently advises on 'Farms Under Threat,' having led the project and recently taken partial retirement.

Beth Sauerhaft, PhD, Vice President who oversees AFT's National Initiatives (including Climate and Water). Just hired in early 2019, Beth brings to AFT experience as an environmental and social sustainability consultant, a sustainability officer at a global food company, and an EPA official. She began her career at NRCS.

David Haight, Vice President who oversees AFT's Regional Offices, where AFT works directly with farmers on conservation practices and with state legislators on agricultural policy. David is spearheading AFT's effort to bring on-the-ground experiences to U.S. Climate Alliance states. This work involves several of AFT's regional directors.

John Piotti, President & CEO, sees climate as the central issue of our times and agriculture as essential to achieving climate goals. As such, he plays a direct role in AFT's Climate Initiative, bringing a wealth of experience in management and program development.